# Project Manual

## Dzilth-Na-O-Dith-Hle Community School

Bloomfield, New Mexico

October 8, 2020

99% SPECIFICATIONS

DRAFT

# VOLUME 1

fbt architects

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Western Technologies Inc.

# GEOTECHNICAL EVALUATION REPORT

**PROPOSED SCHOOL AND DORMITORY**
Dzilth-Na-O-Dith-Hle Community School
35 Road 7585
Bloomfield, New Mexico
WT Reference No. 3120JS042

**PREPARED FOR:**
Dzilth-Na-O-Dith-Hle Community School
35 Road 7585
Bloomfield, New Mexico

May 18, 2020


Roger K. Southworth, P.E.
Managing Director

Jeff M. Boyd, P.E.
Senior Geotechnical Engineer

**Western Technologies Inc.**
The Quality People
Since 1955

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May 18, 2020

Dzilth-Na-O-Dith-Hle Community School
35 Road 7585
Bloomfield, New Mexico 87413

Attn: Ms. Barbara Borgeson

Re: Geotechnical Evaluation
Proposed School and Dormitory
Dzilth-Na-O-Dith-Hle Community School
Bloomfield, New Mexico

Job No. 3120JS042

Western Technologies Inc. (WT) has completed the geotechnical evaluation for the above-referenced project. This study was performed in general accordance with our proposal number 3120PS048-R dated April 30, 2020. The results of our study, including the boring location diagram, boring logs, laboratory test results, and geotechnical recommendations are attached.

We have appreciated being of service to you in the geotechnical engineering phase of this project and are prepared to assist you during the construction phases as well. Please do not hesitate to contact us if the design conditions change or if you have any questions concerning this report. We look forward to working with you on future projects.

Sincerely,
**WESTERN TECHNOLOGIES INC.**

Roger K. Southworth, P.E.
Managing Director

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**GEOTECHNICAL EVALUATION**
**PROPOSED SCHOOL AND DORMITORY**
**DZILTH-NA-O-DITH-HLE COMMUNITY SCHOOL**
**BLOOMFIELD, NEW MEXICO**

**JOB NO. 3120JS042**

## 1.0 PURPOSE

This report contains the results of our geotechnical evaluation for the school and dormitory that will be constructed at the Dzilth-Na-O-Dith-Hle Community School. The purpose of these services is to provide information and recommendations regarding:

- Foundation Design
- Floor Slab Support
- Pavement Design
- Seismic Design Parameters
- Drainage
- Earthwork

The results of the field exploration and laboratory tests are presented in the Appendix.

## 2.0 PROJECT DESCRIPTION

The project will consist of constructing a new school and dormitory at the Dzilth-Na-O-Dith-Hle Community School. It was assumed that the buildings would consist of one- to two-story structures with maximum column loads of less than 300 kips and maximum wall loads of less than 4 kips per linear foot. The project will also include the construction of parking lot and drive pavements, and associated improvements. The layout of the proposed improvements is provided on the attached Boring Location Diagram (Plate 1). It was assumed that grade changes of less than about 3 feet would be required to develop the final site grades. We should be notified immediately if any of our assumptions are incorrect since a revision of the recommendations presented herein could then be necessary.

## 3.0 SCOPE OF SERVICES

### 3.1 Field Exploration

Three borings were drilled in the area of the proposed dormitory and four borings were drilled in the area of the proposed school. The borings were drilled to depths of about 21½

to 30½ feet. Three of the borings for this project (Borings B-1 through B-3) were previously drilled as part of a *Preliminary Geotechnical Evaluation Report* prepared by Western Technologies Inc (WT project No. 3127JS049 dated June 21, 2017). Information from these previous borings was used to supplement the information obtained from the borings drilled for this phase of the project. The approximate boring locations are indicated on the attached Boring Location Diagram (Plate 1).

A WT graduate engineer monitored the drilling operations and prepared a field log for each boring. These logs contain visual classifications of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples.

The final boring logs, included in Appendix A, represent our interpretation of the field logs and may include modifications based on laboratory observations of the recovered samples. The final logs describe the materials encountered, their thicknesses, and the depths at which samples were obtained.

The Unified Soil Classification System was used to classify the soil. The soil classification symbols appear on the boring logs and are briefly described in Appendix A.

## 3.2 Laboratory Testing

Laboratory tests were performed on representative samples to aid in material classification and to estimate the pertinent engineering properties of the soil. Testing was performed in general accordance with applicable ASTM methodologies. The following tests were performed and the results are presented on the boring logs and in Appendix B.

- Water Content
- Swell Potential
- Percent Passing the No. 200 Sieve
- Dry Unit Weight
- Liquid and Plastic Limits

The laboratory test results were used in the development of the recommendations contained in this report.

## 3.3 Analyses and Report

Analyses were performed and this report was prepared for the exclusive purpose of providing geotechnical engineering information and recommendations. The scope of

services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken. We are available to discuss the scope of such studies with you.

This geotechnical engineering report includes a description of the project, a discussion of the field exploration and laboratory testing programs, a discussion of the subsurface conditions, and design recommendations as required to satisfy the purpose previously described.

## 4.0 SITE CONDITIONS

### 4.1 Surface

The proposed dormitory will be located in an area that is currently occupied by a one-story masonry block building. This building will be razed to allow construction of the proposed dormitory. The proposed school will be located in an area that is currently occupied by the school's track. Both of the proposed building areas are relatively flat and level, and are typically vegetated with sparse grass and weeds.

### 4.2 Subsurface

The borings typically encountered stiff to hard lean clay with variable sand content and loose to dense sand with variable clay content to the boring termination depths. An exception to this general stratigraphy was encountered in Boring B-2, where loose clayey sand fill was encountered to a depth of about 4 feet.

### 4.3 Groundwater

Groundwater was not encountered in the borings during drilling. The level of the groundwater table will fluctuate seasonally with variations in the amount of precipitation, evaporation, and surface water runoff. The observations made during this investigation must be interpreted carefully because they are short-term and do not constitute a groundwater study.

## 5.0 GEOTECHNICAL PROPERTIES & ANALYSIS

Swell tests were performed to evaluate the swell potential of the clays. The test results indicated a swell values ranging between 0.0 and 10.6 percent when the samples were placed under a load of 100 pounds per square foot (psf) and inundated with water. These test results indicate that the clays have a low to high potential for shrink/swell with variations in their water content.

## 6.0 RECOMMENDATIONS

### 6.1 General

The recommendations contained in this report are based on our understanding of the project criteria described in Section 2.0, **Project Description**, and the assumption that the subsurface conditions are those disclosed by the test borings. Others may change the plans, final elevations, number and type of structures, foundation loads, and floor levels during design or construction. Substantially different subsurface conditions from those described herein may be encountered or become known. Any changes in the project criteria or subsurface conditions shall be brought to our attention in writing.

### 6.2 Design Considerations

The borings indicate that the project site is underlain by highly expansive clay, which will experience volume change with variations in its water content. Structures and related improvements situated within the clay will experience large movements if the moisture content of the clay increases. The foundations and floor slabs should therefore be underlain by non-expansive fill and moisture conditioned soil in order to reduce the amount of movement due to clay shrink/swell. Recommendations for treatment of the foundation/floor slab subgrade in order to reduce the potential for excessive movement are presented herein.

### 6.3 Foundations

The proposed buildings can be supported by spread footings. However, the site is underlain by expansive clay that is not recommended for direct foundation support. The foundations should therefore be underlain by a minimum of 30 inches of non-expansive fill and 8 inches of moisture-conditioned on-site soil in order to reduce the amount of potential foundation movement. Foundation subgrade preparation is discussed in greater detail in the **Earthwork** section of this report.

Foundations bearing on the newly placed engineered fill can be designed for a maximum net allowable bearing capacity of 2,500 pounds per square foot (psf). The allowable bearing capacity applies to dead load plus design live load conditions.

Resistance to lateral loads will be provided by the passive earth pressure acting against the footing and the frictional resistance acting along the base of the footing. An ultimate passive earth pressure resistance of 280 pounds per square foot per foot (psf/ft) is recommended for design. A coefficient of sliding resistance of 0.35 is recommended for design. The lateral load resistance should incorporate a factor of safety of at least 1.5.

The foundations should bear a minimum of 24 inches below the final adjacent site grade for frost considerations. Strip footings should have a minimum width of 16 inches and isolated column pad foundations should have a minimum dimension of 24 inches.

It is estimated that the total post-construction movement of foundations supported as recommended herein will be on the order of an inch or less. It is estimated that the differential movement between comparably sized and loaded foundations could be on the order of one-half the total foundation movement. Additional foundation movement can occur if water from any source infiltrates the foundation subgrade. Therefore, proper drainage should be provided in the final design and during construction.

All footings, stem walls, and masonry walls should be reinforced to reduce the potential for distress caused by differential foundation movement. The use of joints at openings and other discontinuities in masonry walls is recommended. Joints should also be closely spaced along the length of masonry site retaining walls and screen walls to accommodate minor differential foundation movement.

We recommend that the geotechnical engineer or a representative of the engineer observe the foundation overexcavations before backfilling operations. This observation is to assess whether the exposed bearing stratum is similar to that anticipated for indirect support of the footings. Any loose, soft, or disturbed material should be undercut to a suitable bearing subgrade.

## 6.4 Slab-on-Grade Support

Slab-on-grade floors can be used on this site provided that the floor slab subgrades are prepared as discussed in the **Earthwork** section of this report. The floor slabs should be supported by a minimum of 30 inches of non-expansive fill and 8 inches of moisture-conditioned on-site soil in order to reduce the potential for excessive movement due to

shrink/swell of the clay. The floor slab subgrade should be prepared as recommended in the **Earthwork** section of this report.

A minimum four-inch-thick layer of drainage aggregate should be provided beneath at-grade floor slabs to prevent the capillary rise of water beneath the slab and a damp slab. The drainage aggregate should consist of sand, sand-gravel, crushed stone, or a combination of these materials. The granular fill should have a maximum particle diameter of no more than one-half the granular fill thickness and should contain no more than 5 percent passing the No. 200 sieve. In addition, the granular fill should have a maximum plasticity index of 6.

The use of vapor retarders is desirable for any slab-on-grade where the floor will be covered by products using water-based adhesives, wood, vinyl-backed carpet, impermeable floor coatings (urethane, epoxy, acrylic terrazzo, etc.). When used, the design and installation should be in accordance with the recommendations presented in ACI 302.1R and 302.2R. Final determination on the use of a vapor retarder should be left to the slab designer.

All concrete placement and curing operations should follow the American Concrete Institute manual recommendations. Improper curing techniques and/or high slump (high water-cement ratio) could cause excessive shrinkage, cracking, or curling of the floor slab. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture-sensitive floor covering.

## 6.5 Seismic Considerations

Seismic structural design criteria is provided below.

- Design Code Reference: ASCE7-16
- Site Soil Classification: Site Class D*

| | | |
|---|---|---|
| $S_s$ = 0.169 g | $S_{MS}$ = 0.271 g | $S_{DS}$ = 0.181 g |
| $S_1$ = 0.059 g | $S_{M1}$ = 0.142 g | $S_{D1}$ = 0.095 g |

* The site class was based on the conditions exposed in our shallow exploratory soil borings and our knowledge of the soil conditions in the site vicinity. The soil characteristics extending beyond the depth of our borings were assumed for the purposes of providing this site classification.

## 6.6 Drainage

Properly functioning foundations and floor slabs require appropriately constructed and maintained site drainage conditions. Therefore, it is essential that positive drainage be provided during construction and maintained throughout the life of the structures. It is also important that proper planning and control of landscape and irrigation be performed.

Infiltration of water into utility or foundation excavations must be prevented during construction. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration. If utility line trenches are backfilled with the clay, care should be taken not to overcompact the backfill. However, if the trenches are backfilled with a granular soil then a clay plug should be placed in the trench adjacent to the buildings to reduce the potential for water following the trench back under the structures.

The buildings should be provided with downspout extensions to direct water away from the structure. The downspouts should discharge into drainage swales or into the storm sewer system.

In areas where sidewalks, patios, or driveways do not immediately adjoin the structures, the ground surface adjacent to the buildings should slope down at a grade of about five percent for a distance of at least 10 feet from the perimeter walls. Planters or other surface features that could retain water adjacent to the buildings should be avoided. If planters and/or landscaping are adjacent to or near the structure, we recommend the following:

- Grades should slope away from the buildings.
- Planters should slope away from the buildings and should not pond water. Drains should be installed in enclosed planters to facilitate flow out of the planters.
- Only shallow-rooted landscaping should be used.
- Watering should be kept to a minimum. Irrigation systems should be situated on the far side of any planting and away from the buildings to reduce the potential for infiltration beneath foundations from possible leaks.
- A minimum of 36 inches should be maintained between the building foundations and shallow-rooted plants. In like manner, for deeper-rooted plants a minimum of 72 inches should be maintained between the building foundations and the plants. These deeper-rooted plants should still have a low moisture requirement.
- Trees should be planted no closer than a distance equal to one-half their mature height or fifteen feet, whichever is greater, from the buildings.

It should be understood that these recommendations will help reduce the potential for soil movement and resulting distress, but will not eliminate this potential.

## 6.7 Exterior Slabs

The site soil is expansive and has a potential to settle and heave with variations in its water content. Therefore, relatively lightweight exterior concrete flatwork such as sidewalks, patios, and driveways, may experience movement resulting in cracking or vertical offsets. To reduce the potential for damage, we recommend:

- Use of fill with low expansion potential and negligible frost susceptibility
- Placement of effective control joints on relatively close centers
- Moisture-density control during placement of subgrade fill
- Provision for adequate drainage in areas adjoining the slabs
- Use of designs which allow vertical movement between the exterior slabs and adjoining structural elements

It should be understood that these recommendations will help reduce the potential for soil movement and resulting distress, but will not eliminate this potential.

## 6.8 Pavement

The project will include the construction of new parking lots, drives, and bus lanes. Details regarding the amount and type of traffic that the pavements will experience were not available. It was assumed that the parking lots would be subject to passenger vehicles and occasional small- to medium-size delivery trucks. It was assumed that the bus drives will be subject to approximately 30 bus passes per day and approximately one heavy delivery truck per week. It was assumed that this traffic volume is an average for the life of the pavement and that it includes any anticipated traffic growth. The design period for the pavement was 20 years.

A revision of the recommended pavement sections may be necessary if the expected traffic loading conditions are different than assumed. An evaluation of the type and volume of traffic that each portion of the parking lot will experience should be conducted to determine if the pavement sections presented herein are appropriate.

Based upon these parameters, the resulting pavement sections according to the AASHTO procedure are:

| Traffic Area | Asphalt Concrete Pavement (inches) | Base Course (inches) |
|---|---|---|
| Light Duty | 2.5 | 6.0 |
| Access Drives | 3.0 | 7.0 |
| Bus Lanes | 4.0 | 8.0 |

The "design life" of a pavement is defined as the expected life at the end of which reconstruction of the pavement will need to occur. Normal maintenance, including crack sealing, slurry sealing, and/or chip sealing, should be performed during the life of the pavement.

Due to the high static loads imposed by parking trucks in loading and unloading areas and at dumpster locations, we recommend a rigid pavement section for these areas. A minimum six-inch thick Portland cement concrete pavement is recommended.

Bituminous pavement should be constructed of dense-graded, central plant-mix, asphalt concrete. Base course, Portland cement, and asphalt concrete should conform to the New Mexico Department of Transportation standard specifications.

Material and compaction requirements should conform to recommendations presented in the **Earthwork** section of this report. The pavement should be sloped to ensure positive drainage. Water should not pond in areas directly adjoining paved sections.

The site soils are expansive and differential heave may occur. The pavement service life may be reduced due to water infiltration into the subgrade soils heave induced cracks in the pavement. This will result in a softening and loss of strength of the subgrade soils. A regular maintenance program to seal pavement cracks will help prolong the life of the pavement.

Pavement design methods are intended to provide an adequate thickness of structural materials over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. The support characteristics of the subgrade for pavement design do not account for shrink and swell movements of an expansive clayey subgrade such as the soils encountered on this project. Consequently, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell movement of the subgrade. It is therefore important to minimize moisture changes in the subgrade in order to reduce shrink/swell movements. The pavement surface, subbase

surface, and adjacent areas should be well drained. Excessive watering of landscaped areas adjacent to pavements should be avoided. Proper maintenance should be performed on cracks in the pavement surface to prevent water from penetrating through to the base or subbase material. Even with these precautions, some movement and related cracking may still occur, requiring periodic maintenance.

## 7.0 EARTHWORK

### 7.1 General

The conclusions contained in this report are contingent upon compliance with recommendations presented in this section. Any excavating, trenching, or disturbance that occurs after completion of the earthwork must be backfilled, compacted, and tested in accordance with the recommendations contained herein. It is not reasonable to rely upon our conclusions and recommendations if any future unobserved and untested trenching, earthwork activities, or backfilling occurs.

### 7.2 Site Clearing

Remove any remnants of previous construction, existing fill, vegetation, topsoil, and any other deleterious materials from the building and pavement areas. The building area is defined as the area within the building footprint plus five feet beyond the perimeter of the footprint. All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction.

### 7.3 Building Pad Preparation

The building pads should be overexcavated, as required, to allow the placement of a minimum of 30 inches of non-expansive fill beneath the floor slabs. The foundation areas should be overexcavated to allow the placement of a minimum of 30 inches of non-expansive fill beneath the foundations. The foundation overexcavations should not extend laterally beyond the edges of the foundations. The base of the overexcavations should be scarified to a minimum depth of 8 inches, moisture conditioned to a water content of 0 to 4 percent above the optimum water content, and recompacted to between 93 and 97 percent of the standard Proctor maximum dry density (ASTM D 698).

The foundation/floor slab overexcavations should be backfilled to the design finish grade with non-expansive fill placed and compacted in accordance with the recommendations

presented in Section 7.6. The engineered fill should consist of low expansive potential material meeting the requirements presented in Section 7.5.

The perimeter foundation excavations on the exterior side of the building area should be backfilled with on-site clay to reduce the potential for surface water ponding in the non-expansive fill. The clay backfill should be sloped away from the structure to promote drainage away from the foundations.

## 7.4 Pavement Subgrade Preparation

Following site clearing operations, cut the pavement subgrade, as required, to the design finish subgrade elevation. The subgrade should be scarified to a minimum depth of 8 inches and recompacted in accordance with the recommendations presented in Section 7.6. The site can then be raised to the design finish grade with engineered fill.

## 7.5 Materials

The on-site soil can be used as fill in the proposed pavement areas provided that it does not contain any deleterious materials. However, the on-site soil is not recommended for use as fill in the proposed building area. Imported fill should conform to the following:

- Gradation (ASTM C136):

| | percent finer by weight |
|---|---|
| 6" | 100 |
| 4" | 85-100 |
| ¾" | 70-100 |
| No. 4 Sieve | 50-100 |
| No. 200 Sieve | 30 (max) |

- Maximum expansive potential (%)* ..... 1.5
- Maximum soluble sulfates (%) ..... 0.10

* Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about three percent below the optimum water content. The sample is confined under a 100 psf surcharge and submerged.

Imported fill should be approved by WT prior to placement.

## 7.6 Placement and Compaction

a. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended water contents and densities throughout the lift.

b. Uncompacted fill lifts should not exceed 10 inches.

c. No fill should be placed over frozen ground nor should frozen fill or backfill be used.

d. Materials should be compacted to the following:

| Material | Minimum Percent Compaction (ASTM D698) |
|---|---|
| • Recompacted on-site soil in the building areas | 93 to 97 |
| • Imported non-expansive fill in the building areas | 95 |
| • Fill in the pavement areas | 95 |
| • Nonstructural backfill | 90 |

Imported non-expansive fill should be compacted within a water content range of –3 to +3 percent of the optimum water content. Recompacted on-site soil in the building area should be compacted within a water content range of 0 to +4 percent of the optimum water content. Fill in the pavement areas should be compacted within a water content range of -3 to +3 percent of the optimum water content.

## 7.7 Compliance

Recommendations for foundation and slab-on-grade elements supported on compacted fill or prepared subgrade depend upon compliance with the **Earthwork** recommendations. To assess compliance, observation and testing should be performed under the direction of the project geotechnical engineer. Please contact us to provide these observation and testing services.

# 8.0 LIMITATIONS

This report has been prepared assuming the project criteria described in Section 2.0. If changes in the project criteria occur, or if different subsurface conditions are encountered or become known, the conclusions and recommendations presented herein shall become invalid. In any such event, contact WT to assess the effect that such variations may have on our conclusions and

recommendations. If WT is not retained for the construction observation and testing services to determine compliance with this report, our professional responsibility is accordingly limited.

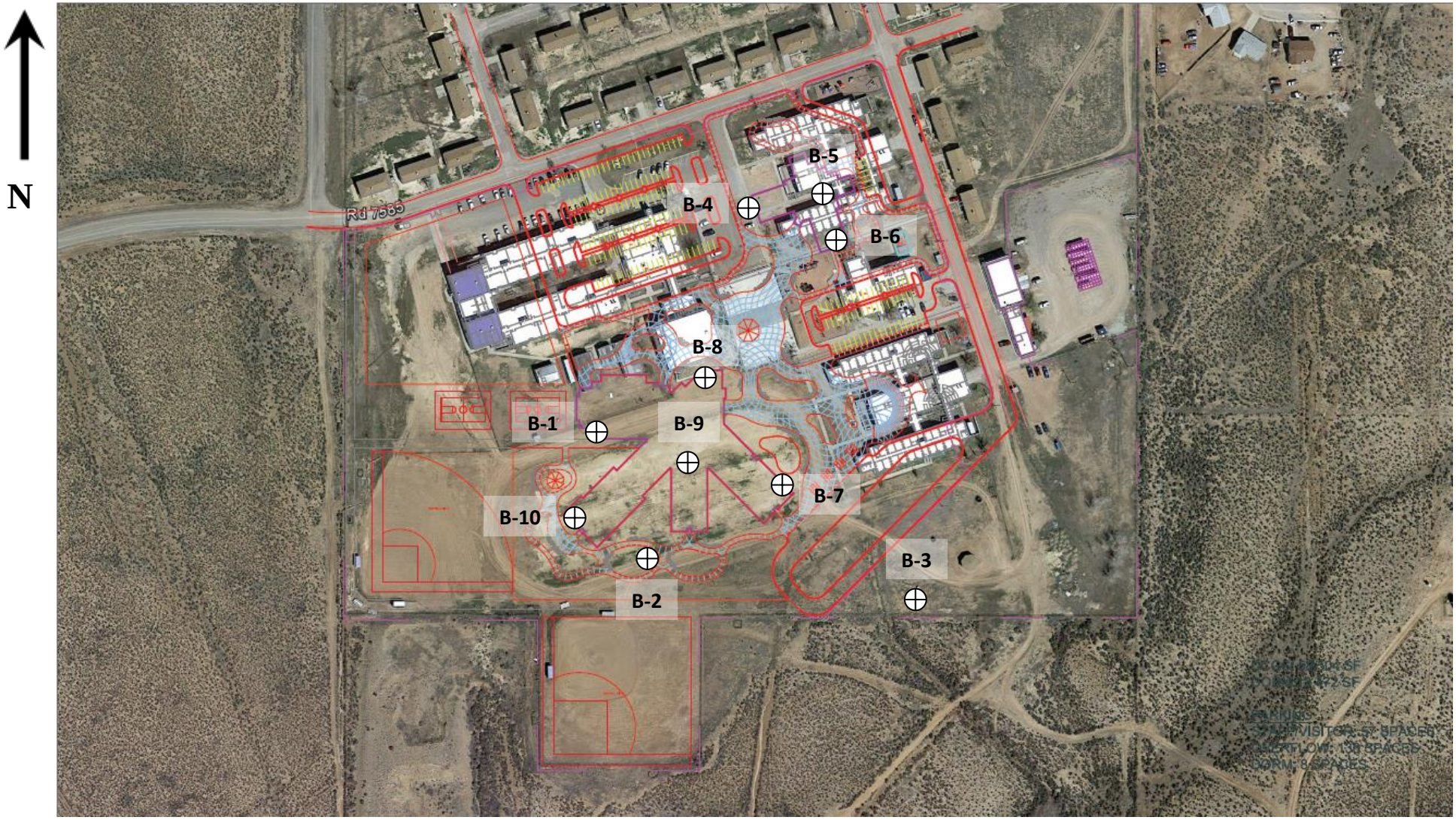
The recommendations presented are based entirely upon data derived from a limited number of samples obtained from widely spaced test borings. The attached logs are an indicator of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and soil structure, however variations can and often do exist. Whenever any deviation, difference or change is encountered or becomes known, WT should be contacted.

This report is for the exclusive benefit of our client alone. There are no intended third-party beneficiaries of our contract with the client or this report, and nothing contained in the contract or this report shall create any express or implied contractual or any other relationship with, or claim or cause of action for, any third party against WT.

This report is valid until the earlier of one year from the date of issuance, a change in circumstances, or discovered variations. After expiration, no person or entity shall have any right to rely on this report without the express written authorization of WT.

## 9.0 CLOSURE

We prepared this report as an aid to the designers of the proposed project. The comments, statements, recommendations and conclusions set forth in this report reflect the opinions of the authors. These opinions are based upon data obtained at the test boring locations. Work on your project was performed in accordance with generally accepted standards and practices utilized by professionals providing similar services in this locality. No other warranty, express or implied, is made.




⊕ **Approximate Boring Location**

*Geotechnical Environmental Inspections Materials*

**Western Technologies Inc.** The Quality People Since 1955

DZILTH-NA-O-DITH-HLE COMMUNITY SCHOOL

PROJECT: DZILTH-NA-O-DITH-HLE COMMUNITY SCHOOL

JOB NO.: 3120JS042

**PLATE: 1**

# BORING LOCATION DIAGRAM

| | |
|---|---|
| **Allowable Soil Bearing Capacity** | The recommended maximum contact stress developed at the interface of the foundation element and the supporting material. |
| **Backfill** | A specified material placed and compacted in a confined area. |
| **Base Course** | A layer of specified aggregate material placed on a subgrade or subbase. |
| **Base Course Grade** | Top of base course. |
| **Bench** | A horizontal surface in a sloped deposit. |
| **Caisson/Drilled Shaft** | A concrete foundation element cast in a circular excavation which may have an enlarged base (or belled caisson). |
| **Concrete Slabs-On-Grade** | A concrete surface layer cast directly upon base course, subbase or subgrade. |
| **Crushed Rock Base Course** | A base course composed of crushed rock of a specified gradation. |
| **Differential Settlement** | Unequal settlement between or within foundation elements of a structure. |
| **Engineered Fill** | Specified soil or aggregate material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer. |
| **Existing Fill** | Materials deposited through the action of man prior to exploration of the site. |
| **Existing Grade** | The ground surface at the time of field exploration. |
| **Expansive Potential** | The potential of a soil to expand (increase in volume) due to absorption of moisture. |
| **Fill** | Materials deposited by the actions of man. |
| **Finished Grade** | The final grade created as a part of the project. |
| **Gravel Base Course** | A base course composed of naturally occurring gravel with a specified gradation. |
| **Heave** | Upward movement. |
| **Native Grade** | The naturally occurring ground surface. |
| **Native Soil** | Naturally occurring on-site soil. |
| **Rock** | A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation. |
| **Sand and Gravel Base Course** | A base course of sand and gravel of a specified gradation. |
| **Sand Base Course** | A base course composed primarily of sand of a specified gradation. |
| **Scarify** | To mechanically loosen soil or break down existing soil structure. |
| **Settlement** | Downward movement. |
| **Soil** | Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water. |
| **Strip** | To remove from present location. |
| **Subbase** | A layer of specified material placed to form a layer between the subgrade and base course. |
| **Subbase Grade** | Top of subbase. |
| **Subgrade** | Prepared native soil surface. |



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## COARSE-GRAINED SOILS

LESS THAN 50% FINES

| GROUP SYMBOLS | DESCRIPTION | MAJOR DIVISIONS |
|---|---|---|
| **GW** | WELL-GRADED GRAVEL OR WELL-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES | GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE |
| **GP** | POORLY-GRADED GRAVEL OR POORLY-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES | |
| **GM** | SILTY GRAVEL OR SILTY GRAVEL WITH SAND, MORE THAN 12% FINES | |
| **GC** | CLAYEY GRAVEL OR CLAYEY GRAVEL WITH SAND, MORE THAN 12% FINES | |
| **SW** | WELL-GRADED SAND OR WELL-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES | SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE |
| **SP** | POORLY-GRADED SAND OR POORLY-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES | |
| **SM** | SILTY SAND OR SILTY SAND WITH GRAVEL, MORE THAN 12% FINES | |
| **SC** | CLAYEY SAND OR CLAYEY SAND WITH GRAVEL, MORE THAN 12% FINES | |

**NOTE:** Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

## FINE-GRAINED SOILS

MORE THAN 50% FINES

| GROUP SYMBOLS | DESCRIPTION | MAJOR DIVISIONS |
|---|---|---|
| **ML** | SILT, SILT WITH SAND OR GRAVEL, SANDY SILT, OR GRAVELLY SILT | SILTS AND CLAYS LIQUID LIMIT LESS THAN 50 |
| **CL** | LEAN CLAY OF LOW TO MEDIUM PLASTICITY, SANDY CLAY, OR GRAVELLY CLAY | |
| **OL** | ORGANIC SILT OR ORGANIC CLAY OF LOW TO MEDIUM PLASTICITY | |
| **MH** | ELASTIC SILT, SANDY ELASTIC SILT, OR GRAVELLY ELASTIC SILT | SILTS AND CLAYS LIQUID LIMIT MORE THAN 50 |
| **CH** | FAT CLAY OF HIGH PLASTICITY, SANDY FAT CLAY, OR GRAVELLY FAT CLAY | |
| **OH** | ORGANIC SILT OR ORGANIC CLAY OF HIGH PLASTICITY | |
| **PT** | PEAT AND OTHER HIGHLY ORGANIC SOILS | HIGHLY ORGANIC SOILS |

**NOTE:** Fine-grained soils may receive dual classification based upon plasticity characteristics (e.g. CL-ML).

### SOIL SIZES

| COMPONENT | SIZE RANGE |
|---|---|
| BOULDERS | Above 12 in. |
| COBBLES | 3 in. – 12 in. |
| GRAVEL | No. 4 – 3 in. |
| Coarse | ¾ in. – 3 in. |
| Fine | No. 4 – ¾ in. |
| SAND | No. 200 – No. 4 |
| Coarse | No. 10 – No. 4 |
| Medium | No. 40 – No. 10 |
| Fine | No. 200 – No. 40 |
| Fines (Silt or Clay) | Below No. 200 |

**NOTE:** Only sizes smaller than three inches are used to classify soils

### CONSISTENCY

| CLAYS & SILTS | BLOWS PER FOOT |
|---|---|
| VERY SOFT | 0 – 2 |
| SOFT | 3 – 4 |
| FIRM | 5 – 8 |
| STIFF | 9 – 15 |
| VERY STIFF | 16 – 30 |
| HARD | OVER 30 |

### RELATIVE DENSITY

| SANDS & GRAVELS | BLOWS PER FOOT |
|---|---|
| VERY LOOSE | 0 – 4 |
| LOOSE | 5 – 10 |
| MEDIUM DENSE | 11 – 30 |
| DENSE | 31 – 50 |
| VERY DENSE | OVER 50 |

**NOTE:** Number of blows using 140-pound hammer falling 30 inches to drive a 2-inch-OD (1⅜-inch ID) split-barrel sampler (ASTM D1586).

### PLASTICITY OF FINE GRAINED SOILS

| PLASTICITY INDEX | TERM |
|---|---|
| 0 | NON-PLASTIC |
| 1 – 7 | LOW |
| 8 – 20 | MEDIUM |
| Over 20 | HIGH |

### DEFINITION OF WATER CONTENT

| |
|---|
| DRY |
| SLIGHTLY DAMP |
| DAMP |
| MOIST |
| WET |
| SATURATED |



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DZILTH-NA-O-DITH-HLE COMMUNITY SCHOOL

The number shown in **"BORING NO."** refers to the approximate location of the same number indicated on the "Boring Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features, or through the use of Global Positioning System (GPS) devices. The accuracy of GPS devices is somewhat variable.

**"DRILLING TYPE"** refers to the exploratory equipment used in the boring wherein **HSA = hollow stem auger**, and the dimension presented is the outside diameter of the HSA used.

**"N" in "BLOW COUNTS"** refers to a 2-inch outside diameter split-barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows, or "blow count", of the hammer is recorded for each of three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches (2nd and 3rd increments) is defined as the Standard Penetration Test (SPT) "**N**"-Value. Refusal to penetration is considered more than 50 blows per 6 inches. (Ref. ASTM D1586).

**"R" in "BLOW COUNTS"** refers to a 3-inch outside diameter ring-lined split barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 12 inch is achieved or until refusal. The number of blows required to advance the sampler 12 inches is defined as the "**R**" blow count. The "**R**" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows per foot. (Ref. ASTM D3550).

**"CS" in "BLOWS/FT."** refers to a 2½-in. outside diameter California style split-barrel sampler, lined with brass sleeves, driven into the ground with a 140-pound hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows of the hammer is recorded for each of the three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches (2nd and 3rd increments) is defined as the "CS" blow count. The "CS" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows for a 6-inch increment. (Ref. ASTM D 3550)

**"SAMPLE TYPE"** refers to the form of sample recovery, in which **N** = Split-barrel sample, **R** = Ring-lined sample, **"CS"** = California style split-barrel sample, **G** = Grab sample, **B** = Bucket sample, **C** = Core sample (ex. diamond bit rock coring).

**"DRY DENSITY (LBS/CU FT)"** refers to the laboratory-determined dry density in pounds per cubic foot. The symbol **"NR"** indicates that no sample was recovered.

**"WATER (MOISTURE) CONTENT"** (% of Dry Wt.) refers to the laboratory-determined water content in percent using the standard test method ASTM D2216.

**"USCS"** refers to the "Unified Soil Classification System" Group Symbol for the soil type as defined by ASTM D2487 and D2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the boring logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the boring location. The transition between materials is approximate and may be more or less gradual than indicated.

DATE DRILLED: **6-6-17**
LOCATION: **N36.39020 W107.83780**
ELEVATION: **Not determined**

# BORING NO. B-1

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7" HSA**
FIELD ENGINEER: **R. Gowda**

| WATER CONTENT (%) | DRY DENSITY (psf) | SAMPLE TYPE | SAMPLE | BLOWS/FT. | DEPTH (FEET) | USCS | GRAPHIC | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 8.2 | | G | | | | CL | | SANDY LEAN CLAY; brown, very stiff, damp |
| 9.8 | | R | | 34 | | | | |
| | | | | | 5 | SP-SC | | POORLY GRADED SAND; with clay, light brown, medium dense to very dense, damp |
| 2.6 | | R | | 27 | | | | |
| 3.0 | | R | | 50/4" | | | | |
| | | | | | | CL | | SANDY LEAN CLAY; brown, hard, damp |
| 8.3 | | N | | 53 | 10 | | | |
| | | | | | | SC | | CLAYEY SAND; with sandy lean clay seams, brown, medium dense, damp |
| | | N | | 26 | 15 | | | |
| | | N | | 21 | 20 | | | |
| | | | | | | | | **Boring terminated at 21.5 feet** |

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE
BN- BLUNT NOSE PENETROMETER

NOTES: **Groundwater not encountered during drilling**

**WESTERN TECHNOLOGIES INC.**

PROJECT: **PROPOSED SCHOOL BUILDINGS**
REF. NO.: **3127JS049**

PLATE **A-4**

**BORING LOG**

DATE DRILLED: **6-6-17**
LOCATION: **N36.38963 W107.83753**
ELEVATION: **Not determined**

# BORING NO. B-2

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7" HSA**
FIELD ENGINEER: **R. Gowda**

| WATER CONTENT (%) | DRY DENSITY (psf) | SAMPLE TYPE | SAMPLE | BLOWS/FT. | DEPTH (FEET) | USCS | GRAPHIC | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 8.9 | | G | | | | CL | | SANDY LEAN CLAY; brown, hard, damp |
| 6.2 | | R | | 50 | | SC | | CLAYEY SAND; brown, medium dense, damp |
| 2.7 | | R | | 16 | 5 | SP-SC | | POORLY GRADED SAND; with clay, light brown, loose, damp |
| 4.6 | | R | | 28 | | SC | | CLAYEY SAND; light gray and dark yellow-brown, medium dense, damp |
| | | N | | 30 | 10 | CL | | SANDY LEAN CLAY; with interbedded clayey sand seams, brown-gray, stiff to very stiff, damp |
| | | N | | 26 | 15 | | | |
| | | N | | 15 | 20 | | | |
| | | | | | | | | **Boring terminated at 21.5 feet** |

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE
BN- BLUNT NOSE PENETROMETER

NOTES: **Groundwater not encountered during drilling**

**WESTERN TECHNOLOGIES INC.**

PROJECT: **PROPOSED SCHOOL BUILDINGS**
REF. NO.: **3127JS049**

PLATE **A-5**

**BORING LOG**

DATE DRILLED: **6-6-17**
LOCATION: **N36.38949 W107.83485**
ELEVATION: **Not determined**

# BORING NO. B-3

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7" HSA**
FIELD ENGINEER: **R. Gowda**

| WATER CONTENT (%) | DRY DENSITY (psf) | SAMPLE TYPE | SAMPLE | BLOWS/FT. | DEPTH (FEET) | USCS | GRAPHIC | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 7.3 | | G | | | | SC | | CLAYEY SAND; brown, medium dense, damp |
| 8.9 | | R | | 26 | | | | |
| | | | | | 5 | SP-SC | | POORLY GRADED SAND; with clay, light brown, loose, damp |
| 9.7 | | R | | 11 | | | | |
| | | | | | | CH | | FAT CLAY; with sand and interbedded clayey sand seams, gray-brown, stiff to very stiff, moist |
| 17.4 | | R | | 30 | | | | |
| | | N | | 10 | 10 | | | |
| | | N | | 19 | 15 | | | |
| | | | | | | CL | | SANDY LEAN CLAY; gray-brown, very stiff, damp |
| | | N | | 24 | 20 | | | |
| | | | | | | | | **Boring terminated at 21.5 feet** |

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE
BN- BLUNT NOSE PENETROMETER

NOTES: **Groundwater not encountered during drilling**

**WESTERN TECHNOLOGIES INC.**

PROJECT: **PROPOSED SCHOOL BUILDINGS**
REF. NO.: **3127JS049**

PLATE **A-6**

**BORING LOG**

Logo

Western Technologies

# BORING NUMBER B-4



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** --- Dry
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** --- Dry
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (CL) SANDY LEAN CLAY; light brown, moist | GB | | | | | 9 | | | | 60 |
| | | (SC) CLAYEY SAND; light brown, medium dense to very dense, damp | MC | | 12-12 | | | 6 | 28 | 16 | 12 | 42 |
| 5 | | | MC | | 20-50 | | 121 | 7 | 27 | 17 | 10 | 47 |
| | | (SP-SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, light brown, medium dense to dense, damp | SS | | 8-8-8 (16) | | | 3 | | | | 13 |
| 10 | | | SS | | 8-16-20 (36) | | | | | | | |
| | | (CL) SANDY LEAN CLAY to CLAYEY SAND; gray, dense, moist | | | | | | | | | | |
| 15 | | | SS | | 15-15-18 (33) | | | 9 | | | | 46 |
| | | changing to light brown, medium dense | | | | | | | | | | |
| 20 | | | SS | | 12-12-15 (27) | | | | | | | |

Bottom of borehole at 21.5 feet.

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Logo

Western Technologies

# BORING NUMBER B-5



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** --- Dry
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** ---
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (SC) FILL - CLAYEY SAND; light brown, loose, moist | GB | | | | | 8 | | | | 43 |
| | | | MC | | 7-7 (14) | | | 9 | | | | 45 |
| 5 | | (SC) CLAYEY SAND; light brown, dense, damp | MC | | 20-25 (45) | | 113 | 7 | 26 | 16 | 10 | 43 |
| | | (SP-SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, light brown, medium dense, damp | SS | | 7-5-7 (12) | | | 3 | | | | 9 |
| 10 | | | SS | | 10-10-14 (24) | | | | | | | |
| | | (CL) SANDY LEAN CLAY to CLAYEY SAND; gray, medium dense, moist | | | | | | | | | | |
| 15 | | | SS | | 15-10-12 (22) | | | | | | | |
| | | (SC) CLAYEY SAND; brown to brown-gray, medium dense, damp | | | | | | | | | | |
| 20 | | | SS | | 20-10-12 (22) | | | | | | | |
| 25 | | | SS | | 5-8-10 (18) | | | 9 | | | | 31 |
| | | changing to gray, moist | | | | | | | | | | |
| 30 | | | SS | | 7-8-8 (16) | | | | | | | |

Bottom of borehole at 31.5 feet.

DZILTH-NA-O-DITH-HLE
COMMUNITY SCHOOL

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# BORING NUMBER B-6



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** ---
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** ---
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (SC) CLAYEY SAND; light brown, dense, moist | GB | | | | | 5 | | | | 31 |
| | | | MC | | 40 | | 116 | 5 | 23 | 15 | 8 | 43 |
| 5 | | (CL) SANDY LEAN CLAY; gray-brown, hard, damp | MC | | 30-50/4" | | 124 | 10 | | | | 60 |
| | | (SP-SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, light brown, medium dense, damp | SS | | 7-10-8 (18) | | | 2 | | | | 13 |
| 10 | | | SS | | 12-16-10 (26) | | | | | | | |
| | | (SC) CLAYEY SAND; brown-gray, medium dense, moist | | | | | | | | | | |
| 15 | | | SS | | 10-10-12 (22) | | | 7 | | | | 29 |
| 20 | | | SS | | 8-12-6 (18) | | | | | | | |

Bottom of borehole at 21.5 feet.

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Logo

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# BORING NUMBER B-7



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** ---
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** ---
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (CL) SANDY LEAN CLAY to CLAYEY SAND; brown, hard, damp to moist | GB | | | | | 13 | | | | 57 |
| | | | MC | | 17-25 | | 101 | 7 | 38 | 16 | 22 | 49 |
| 5 | | | MC | | 20-30 | | | 4 | | | | 26 |
| | | (SP-SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, light brown, medium dense to dense, damp | SS | | 8-12-12 (24) | | | 2 | | | | 5 |
| 10 | | | SS | | 1-25-24 (49) | | | | | | | |
| | | (SC) CLAYEY SAND; brown-gray, dense, moist | | | | | | | | | | |
| 15 | | | SS | | 10-12-24 (36) | | | | | | | |
| 20 | | | SS | | 8-16-20 (36) | | | 7 | | | | 27 |
| | | changing to medium dense | | | | | | | | | | |
| 25 | | | SS | | 6-7-8 (15) | | | | | | | |
| 30 | | | SS | | 7-10-10 (20) | | | | | | | |

Bottom of borehole at 31.5 feet.

DZILTH-NA-O-DITH-HLE
COMMUNITY SCHOOL

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# BORING NUMBER B-8



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** ---
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** ---
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (SC) CLAYEY SAND; light brown, very dense, moist | GB | | | | | 5 | | | | 32 |
| | | | MC | | 27-45 | | 123 | 6 | | | | 40 |
| | | changing to medium dense | | | | | | | | | | |
| 5 | | | MC | | 10-6 | | 107 | 10 | 34 | 16 | 18 | 43 |
| | | (SP-SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, light brown, medium dense, damp | SS | | 5-6-6 (12) | | | 3 | | | | 7 |
| 10 | | | SS | | 6-8-10 (18) | | | | | | | |
| | | (CL) SANDY LEAN CLAY to CLAYEY SAND; brown-gray, medium dense, moist | | | | | | | | | | |
| 15 | | | SS | | 9-12-12 (24) | | | | | | | |
| 20 | | | SS | | 7-8-9 (17) | | | | | | | |
| | | (CL) SANDY LEAN CLAY; gray, hard, moist | | | | | | | | | | |
| 25 | | | SS | | 20-25/3" | | | | | | | |
| 30 | | | SS | | 30-25/3" | | | | | | | |

Bottom of borehole at 30.8 feet.

DZILTH-NA-O-DITH-HLE
COMMUNITY SCHOOL

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Logo

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# BORING NUMBER B-9



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** ---
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** ---
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (SC) CLAYEY SAND; light brown, dense, damp | GB | | | | | 7 | | | | 35 |
| | | | MC | | 25-20 | | 113 | 6 | 25 | 17 | 8 | 41 |
| 5 | | changing to medium dense | SS | | 5-5-5 (10) | | | 14 | | | | 70 |
| | | (SP-SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, light brown, medium dense, damp | SS | | 5-8-6 (14) | | | 3 | | | | 7 |
| 10 | | | SS | | 7-10-5 (15) | | | | | | | |
| 15 | | (CL) SANDY LEAN CLAY; brown-gray, very stiff, moist | SS | | 7-10-15 (25) | | | 13 | | | | 68 |
| 20 | | (SC) CLAYEY SAND; brown, medium dense, moist | SS | | 8-9-8 (17) | | | | | | | |

Bottom of borehole at 21.5 feet.

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Western Technologies

# BORING NUMBER B-10



**CLIENT** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NAME** Dzilth-Na-O-Dith-Hle Community School
**PROJECT NUMBER** 3120JS042
**PROJECT LOCATION** Bloomfield, New Mexico
**DATE STARTED** 5/13/20 **COMPLETED** 5/13/20
**GROUND ELEVATION** _____ **HOLE SIZE** 7"
**DRILLING CONTRACTOR** Envirodrill
**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow-Stem Auger
**AT TIME OF DRILLING** ---
**LOGGED BY** C. Dumitru **CHECKED BY** R. Southworth
**AT END OF DRILLING** ---
**NOTES**
**AFTER DRILLING** ---

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY % (RQD) | BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTIC LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | FINES CONTENT (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | (CL) SANDY LEAN CLAY; light brown, hard, damp | GB | | | | | 12 | | | | 56 |
| | | | MC | | 20-30 (50) | | | 9 | | | | 64 |
| 5 | | changing to gray | MC | | 20-29 (49) | | | 10 | | | | 64 |
| | | (SC) POORLY GRADED SAND; with clay, occasional sandy lean clay seams, very dense, damp | SS | | 7-19-30 (49) | | | 4 | | | | 12 |
| 10 | | (CL) LEAN CLAY; with sand, gray, very stiff, moist | SS | | 9-9-9 (18) | | | | | | | |
| 15 | | (SC) CLAYEY SAND; brown, dense, damp | SS | | 11-15-18 (33) | | | | | | | |
| 20 | | (CL) SANDY LEAN CLAY; brown, hard, moist | SS | | 7-15-19 (34) | | | 15 | | | | 70 |
| 25 | | (CL) SANDY LEAN CLAY to CLAYEY SAND; with interbedded sand seams, brown-gray, stiff, moist | SS | | 7-10-10 (20) | | | | | | | |
| 30 | | | SS | | 8-11-5 (16) | | | | | | | |

Bottom of borehole at 31.5 feet.

DZILTH-NA-O-DITH-HLE
COMMUNITY SCHOOL

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| BORING NO. | SAMPLE DEPTH (ft) | SAMPLE CLASSIFICATION | INITIAL WATER CONTENT (%) | DRY DENSITY (pcf) | SURCHARGE LOAD (PSF) | PERCENT SWELL |
|---|---|---|---|---|---|---|
| B-4 | 5 - 6 | CLAYEY SAND | 6.8 | 121 | 100 | 5.9 |
| B-5 | 5 - 6 | CLAYEY SAND | 6.9 | 113 | 100 | 3.6 |
| B-6 | 2 - 3 | CLAYEY SAND | 5.2 | 116 | 100 | 0.5 |
| B-6 | 5 - 6 | SANDY LEAN CLAY | 9.7 | 124 | 100 | 10.6 |
| B-7 | 2 - 3 | SANDY LEAN CLAY/CLAYEY SAND | 6.5 | 101 | 100 | 1.5 |
| B-8 | 2 - 3 | CLAYEY SAND | 5.9 | 123 | 100 | 5.9 |
| B-8 | 5 - 6 | CLAYEY SAND | 10.4 | 107 | 100 | 6.8 |
| B-9 | 2 - 3 | CLAYEY SAND | 6.1 | 113 | 100 | 1.9 |
| | | | | | | |

| Boring No. | Depth (ft.) | USCS Classification | Dry Density (pcf) | Water Content (%) | Expansion Properties | | Plasticity | | Percent Passing #200 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Surcharge (ksf) | Expansion (%) | Liquid Limit (%) | Plasticity Index | | |
| B-1 | 0 - 2 | CL | | 8.2 | | | 27 | 12 | 55.8 | |
| B-1 | 2 - 3 | CL | 118 | 9.8 | 0.1 | 5.7 | | | 61.0 | |
| B-1 | 5 - 6 | SP-SC | | 2.6 | | | | | 7.3 | |
| B-1 | 7 - 8 | SP-SC | | 3.0 | | | | | 10.8 | |
| B-1 | 10 - 11½ | CL | | 8.3 | | | | | 71.0 | |
| B-2 | 0 - 2 | CL | | 8.9 | | | 35 | 19 | 58.0 | |
| B-2 | 2 - 3 | SC | 111 | 6.2 | 0.1 | 1.5 | | | 34.0 | |
| B-2 | 5 - 6 | SP-SC | 100 | 2.7 | 0.1 | 0.0 | | | 7.9 | |
| B-2 | 7 - 8 | SC | | 4.6 | | | | | 17.1 | |
| B-3 | 0 - 2 | SC | | 7.3 | | | | | 49.1 | |
| B-3 | 2 - 3 | SC | 119 | 8.9 | 0.1 | 0.1 | | | 33.4 | |
| B-3 | 5 - 6 | SP-SC | | 9.7 | | | | | 10.5 | |
| B-3 | 7 - 8 | CH | | 17.4 | | | | | 73.6 | |

**Note**: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

**Remarks**

1. Test performed on undisturbed sample.
2. Submerged to approximate saturation.

Geotechnical Environmental Inspections Materials

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PROJECT: DZILTH-NA-O-DITH-HLE

JOB NO.: 3127JS049

PLATE

**B-2**

## LABORATORY TEST RESULTS

# SECTION 02 4116 – BUILDING & SITE DEMOLITION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of buildings or structures in their entirety.
3. Demolition and removal of selected site elements.
4. Salvage of existing items to be reused or recycled.
5. Disposing of nonhazardous demolition waste.

B. Related Requirements:

1. Section 01 1000 – Summary
2. Section 01 7000 – Execution Requirements
3. Section 02 5639 – Temporary Tree Protection
4. Section 31 0000 – Earthwork

### 1.3 DEFINITIONS

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

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner or store ready for reuse as noted on drawings.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

F. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

G. Disposal: removal off-site of demolition and construction waste and subsequent sale, recycling reuse, or deposit in landfill or incinerator acceptable to the authorities having jurisdiction.

## 1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

## 1.5 PREDEMOLITION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

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

## 1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Demolition Activities: Indicate the following:

1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs and other egress components (if applicable).
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

D. Warranties: Coordinate with Owner for documentation indicating that existing warranties are still in effect after completion of selective demolition.

## 1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

## 1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

## 1.9 FIELD CONDITIONS

A. If Owner occupies portions of building immediately adjacent to demolition area. Conduct demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before demolition, Owner will remove the items noted on the drawings.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

1. Maintain fire-protection facilities in service during demolition operations.

## 1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.11 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

## 3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

## 3.5 DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and after flame-cutting operations as required.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Legally dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owner, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

F. Explosives: Use of explosives is not permitted.

G. Drawings indicate extent of demolition but do not show every element that will need to be removed. The contractor is responsible for demolition of all elements required to accomplish new work.

## 3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

## 3.7 CLEANING

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

END OF SECTION 02 4116

SECTION 031100 - CONCRETE FORMWORK

## PART 1 GENERAL

### 1.01 WORK INCLUDED

A. This section includes formwork for cast-in-place concrete, including waterstops, and installation of embedded items.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Reinforcement - Section 03 20 00

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

### 1.03 QUALITY ASSURANCE

A. Comply with the American Concrete Institute Standard, ACI 347R-94, Recommended Practice for Concrete Formwork.

### 1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM D 226-97a — Standard Specification for Asphalt - Saturated Organic Felt used in Roofing and Waterproofing".

2. ASTM D 1751-83 — Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

3. NFPA 5000, 2018 ED

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Forms for Exposed Finish Concrete: Plywood complying with U.S. Product Standard PS-1-83 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Forms for Round Piers or Columns: One-piece, disposable fiber forms or approved equal.

D. Void Forms: Wax treated fiber board, 4" height, designed to resist 1000 psf pressure.

E. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

F. Chamfer Strips: 3/4" by 3/4" wood, PVC, or rubber.

G. Preformed Construction Joint: 24 gage steel, galvanized, shaped to form a continuous tongue and groove key.

H. Preformed Control Joint: Rigid plastic or metal strip with removable top section.

I. Expansion Joint Material: Asphalt saturated fiberboard, 1/2" thick, meeting the requirements of ASTM D 1751.

J. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.

K. Waterstops: PVC, meeting the requirements of CRD-C572. Provide 6" wide dumbbell shape waterstop with 3/16 inch minimum web thickness and 3/8 inch minimum end bulb diameter.

## PART 3 EXECUTION

### 3.01 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

### 3.02 PREPARATION

A. Form Coating: Coat contact surfaces of forms with a form-coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

### 3.03 INSTALLATION

A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact, shock or damage to cast-in- place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform

surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.

B. Chamfer Strips: Provide at exposed corners and edges.

C. Form Ties: Use factory fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.

D. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.04 INSTALLATION OF EMBEDDED ITEMS

A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.

B. Waterstops: Install according to manufacturers printed instructions. Splice waterstop sections using square cut butt joints and fuse sections together with indirect heat from preheated splicing iron. Use of direct flame is prohibited.

3.05 JOINTS

A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints unless noted otherwise.

B. Keyways: Provide keyways at least 1-1/2" deep in construction joints in walls and slabs.

C. Preformed Construction Joint For Slabs on Grade: Secure with galvanized steel stakes, 1/8" thick by 1-1/8 inches wide with 1/2" deep rib and tapered point. Splice adjoining joints with 24 gage steel, galvanized splice plates.

D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints on exterior slabs abutting vertical surfaces with 1/2" thick expansion joint material.

E. Control Joints in Slabs-on-Grade:

1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10 foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such

that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.

2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/3 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.

F. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch.

3.06 REMOVAL OF FORMWORK

A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.

C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

3.07 RE-USE OF FORMS

A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

B. When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and laitance. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

END OF SECTION 031100

SECTION 032100 - CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Formwork - Section 03 11 00.

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

1.03 QUALITY ASSURANCE

A. Reference Standards:

1. American Concrete Institute (ACI)

| | | |
|---|---|---|
| a. | ACI 301-96 | Specifications for Structural Concrete for Buildings. |
| b. | ACI 315-92 | Details and Detailing of Concrete Reinforcement. |
| c. | ACI 318-85 | Building Code Requirements for Reinforced Concrete. |

2. American Society for Testing and Materials (ASTM)

| | | |
|---|---|---|
| a. | ASTM A 82-95 | Standard Specification for Steel Wire, Plain, For Concrete Reinforcement |
| b. | ASTM A 185-94 | Standard Specification for Steel Welded Steel Wire Fabric, Plain, for Concrete Reinforcement |
| c. | ASTM A 615/ A 615M-95b | Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement |

3. Concrete Reinforcing Steel Institute (CRSI).

a. Manual of Standard Practice - 1992 Edition.

1.04 SUBMITTALS

A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.

B. Welded Wire Fabric: ASTM A 185, flat sheets.

C. Steel Wire: ASTM A 82, 16 gage.

D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

E. Fibrous Reinforcing: 100 percent virgin polypropylene fibrillated fibers containing no reprocessed olefin materials and specifically manufactured for use as concrete reinforcement at a minimum of 0.1% by volume for the control of cracking due to drying shrinkage and thermal expansion/contraction.

### 2.02 FABRICATION

A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.

B. Do not fabricate reinforcing steel until shop drawings are approved.

## PART 3 EXECUTION

### 3.01 PLACING BAR SUPPORTS

A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.

B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

### 3.02 PLACING REINFORCING STEEL

A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".

B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold

reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

D. Concrete Cover:

1. Concrete cast against and permanently exposed to earth .....3"

2. Concrete exposed to earth or weather:

Bars larger than No. 5 ..... .....2"
Bars No. 5 or smaller .....1 1/2"

3. Columns or piers ..... ...1 1/2"

E. Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters or 18" minimum length.

F. Welded Wire Fabric Splices: Lap one complete wire spacing.

G. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18" minimum length.

H. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

I. Fibrous Reinforcing:

1. Add fibrous concrete reinforcement to concrete materials at the time concrete is batched in amounts in accord with approved submittals for each type of concrete required.

2. Mix concrete in strict accord with fiber reinforcement manufacturer's instructions and recommendations for uniform and complete distribution.

END OF SECTION 032000

SECTION 033000 - CAST IN PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section covers cast-in-place concrete including finishing, surface repair and curing.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Formwork - Section 03 11 00

B. Concrete Reinforcement - Section 03 21 00

1.03 QUALITY ASSURANCE

A. Reference Standards: Meet the requirements of the following codes, specifications and standards.

1. American Concrete Institute (ACI) Publications;

a. ACI 301-96 Specifications for Structural Concrete for Buildings.

b. ACI 306.1-90 Standard Specification for Cold Weather Concreting

c. ACI 318-95 Building Code Requirements for Reinforced Concrete.

2. American Society for Testing and Materials (ASTM);

a. ASTM C 31-91 Standard Practice for Making and Curing Concrete Test
C 31M-96 Specimens in the Field.

b. ASTM C 33-97 Standard Specification for Concrete Aggregates.

c. ASTM C 39-96 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

d. ASTM C 94-97 Standard Specification for Ready-Mixed Concrete.

e. ASTM C 131-96 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

f. ASTM C 136-96a Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

g. ASTM C 143-90a Standard Test Method for Slump of Hydraulic Cement

Concrete.

h. ASTM C 150-97 Standard Specification for Portland Cement.

i. ASTM C 171-97 Standard Specification for Sheet Materials for Curing Concrete.

j. ASTM C 172-97 Standard Practice for Sampling Freshly Mixed Concrete.

k. ASTM C 173-94a Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

l. ASTM C 231-97 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

m. ASTM C 260-95 Standard Specification for Air Entraining Admixtures for Concrete

n. ASTM C 309-97 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

o. ASTM C 330-92 Standard Specification for Lightweight Aggregates for Structural Concrete

p. ASTM C 494-92 Standard Specification for Chemical Admixtures for Concrete

q. ASTM C 618-97 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

r. ASTM D 2103-92 Standard Specification for Polyethylene Film and Sheeting

s. ASTM D 4318-95a Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and admixtures.

B. Concrete Mix Design:

1. Submit mix design in accordance with ACI-301, Section 4.

2. Submit with mix design results of laboratory tests performed within previous 6 months indicating aggregates from the proposed source comply with the requirements of ASTM C 33 or C 330 as applicable.

C. Test Reports: Submit copies of test reports for concrete compressive strength, air content, temperature and slump.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, low alkali. Use one brand of cement throughout project.

B. Normal Weight Aggregates: ASTM C 33. Provide aggregates from a single source for exposed concrete.

C. Water: Potable.

D. Air-Entraining Admixture: ASTM C 260.

E. Water Reducing Admixture: ASTM C 494.

F. Fly-Ash: ASTM C 618, Class F.

G. Moisture-Retaining Cover: Provide waterproof paper, polyethylene film, or polyethylene-coated burlap meeting the requirements of ASTM C 171.

H. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound meeting the requirements of ASTM C 309; Type 1-D with fugitive dye for interior concrete and foundations; Type 2, white pigmented, for exposed exterior concrete except exposed exterior Architectural concrete, use Type 1-D.

I. Granular base shall meet the following grading requirements when tested in accordance with ASTM C 136.

| Sieve Size (Square Openings) | Percent Passing by Weight |
|---|---|
| 1 inch | 100 |
| 3/4 inch | 70-100 |
| No. 4 | 35-85 |
| No. 200 | 0-10 |

The plasticity Index shall be no greater than 3 when tested in accordance with ASTM D 4318. The coarse aggregate shall have a percent wear of 50 or less when tested in accordance with ASTM C.

### 2.02 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixture or field experience methods as specified in ACI 301, Section 4. If trial mixture method is used, employ an independent testing facility, acceptable to Architect, for preparing and reporting proposed mix designs.

B. Submit written reports to Architect, or Engineer, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved.

C. Refer to the General Structural Notes for concrete strengths.

D. Admixtures

1. Use air-entraining admixture in all concrete, except air entrainment may, be omitted from concrete to receive a steel trowel finish. The entrained air content for exterior concrete shall be 4 - 7 percent and for interior concrete the air content shall be 3 - 6 percent.

2. Use water reducing admixture conforming to ASTM C 494, Type A, in all concrete unless approved otherwise by the Structural Engineer.

3. Use high range water reducing admixture conforming to ASTM C 494, Type F, in all concrete slabs unless approved otherwise by the Structural Engineer.

4. All other admixtures shall have the written approval of the Architect or Structural Engineer.

5. Calcium chloride is not permitted.

6. All admixtures, except high range water reducers, shall be added to the concrete at the batch plant.

7. Concrete for slabs to receive a steel trowel or float finish shall not contain both fly ash and high range water reducer.

## PART 3 EXECUTION

### 3.01 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

### 3.02 PREPARATION

A. Before placing concrete, clean and roughen surface of previously placed concrete. Clean reinforcing steel. Remove debris, providing clean-outs at bottom of forms when necessary. Moisten surfaces to receive concrete unless otherwise prepared. Remove excess water before placing concrete.

3.03 CONCRETE PLACEMENT

A. General: Comply with ACI 301.

B. Place concrete continuously in layers not deeper than 24 inches. Concrete shall not be placed against concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practicable to its final location to avoid segregation. Do not use vibrators to transport concrete.

C. Maintain reinforcing in proper position during concrete placement operations.

D. Consolidate concrete, immediately after placing, by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

E. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface. Do not disturb slab surfaces prior to beginning finishing operations.

F. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength caused by frost, freezing or low temperatures. Comply with ACI 306.1.

G. Hot Weather Concreting: When hot weather conditions exist that would impair quality and strength of concrete, reduce delivery time of ready mix concrete, lower the temperature of materials, or add retarder to ensure that the concrete is plastic. Retempering with water is not allowed.

3.04 FINISH OF FORMED SURFACES

A. Rough Form Finish: Provide where formed concrete surfaces are not exposed to view. Tie holes and surface imperfections shall be repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

3.05 FINISH OF HORIZONTAL SURFACES

A. At tops of foundation walls and grade beams finish with a texture matching adjacent formed surfaces unless otherwise indicated.

3.06 SLAB FINISHES

A. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven or hand floats. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to

power units. Check and level surface plane to a tolerance not exceeding 1/4" in 10' when tested with a 10' straightedge.

B. Scratch Finish: Apply scratch finish to slab surfaces that are to receive floor topping. Roughen surface before final set, using stiff brushes, or brooms.

C. Trowel Finish: Apply trowel finish to all slab surfaces unless noted otherwise. After floating, begin first trowel finish using a power-driven or hand trowel. Finish concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8" in 10' when tested with a 10' straightedge.

D. Broom Finish: Apply on exterior slabs, ramps, steps, and sidewalks. Immediately after concrete has received a float finish, draw a broom or burlap belt across the surface to give a coarse transverse scored texture.

3.07 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days using one of the following methods.

B. Moisture-retaining Cover curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed. Repair any holes or tears in cover during curing period. All concrete slabs are to be cured with moisture retaining cover for the first 24 hours. After that time the Contractor has the option to continue the moisture retaining cover, or remove the cover and apply liquid membrane-forming curing compound.

C. Curing compound: Apply curing compound uniformly in accordance with manufacturer's printed instructions.

3.08 CONCRETE SURFACE REPAIRS

A. Patching Surface Imperfections: Remove loose material and patch surface imperfections and holes left by tierods with cement mortar. Surface imperfections include honeycomb, excessive air voids, sand streaking and cracks.

3.09 FOR EXPOSED-TO-VIEW SURFACES

A. Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.10 FIELD QUALITY CONTROL

A. The Contractor shall coordinate the services of a qualified testing laboratory to perform tests and submit test reports.

B. Sampling Fresh Concrete: ASTM C 172.

C. Slump: ASTM C 143; one test for each set of compressive strength test specimens.

D. Air Content: ASTM C 173 or C 231 for each set of compressive strength test specimens.

E. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, when 80 degrees F and above; and when compression test specimens are made.

F. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required. Mold one set of standard cylinders for volume of concrete specified below or fraction thereof.

| | | |
|---|---|---|
| 1. | Slabs on Grade or Metal Deck | 30 cubic yards |
| 2. | Footings and stem walls | 50 cubic yards |
| 3. | All other locations (unless noted otherwise) | 30 cubic yards |

G. Compressive Strength Tests: ASTM C 39; test 1 specimen at 7 days, 2 specimens at 28 days, and retain one specimen in reserve for later testing. Additional Tests: The testing laboratory will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure as directed by the Architect. The testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Architect or Engineer. The Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION 033000

SECTION 04 2113 – BRICK VENEER MASONRY

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:
1. Face veneer brick.
2. Stone trim units.
3. Mortar and grout.
4. Ties and anchors.
5. Embedded flashing.
6. Miscellaneous masonry accessories.

1.2 RELATED DOCUMENTS

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

B. Division 03 Section “Cast-in-place Concrete” for installing dovetail slots for Masonry anchors.

C. Division 05 Section “Structural Steel Framing" for installing anchor sections for connecting to structural steel frame.

D. Division 05 Section “Metal Fabrications” for furnishing steel lintels and shelf angles for brick masonry.

E. Division 07 Section “Sheet Metal Flashing and Trim” for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

F. Division 07 Section Joint Sealants.

1.3 SUBMITTALS

A. LEED REQUIREMENT.
1.Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data and material certificates: For each type of product indicated.

C. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Cast Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

D. Samples for Initial Selection:
   1. Face brick in the form of straps of five or more bricks.
   2. Cast Stone trim.
   3. Colored mortar.
   4. Weep holes/vents.

E. Mock-Up: See section 03-3100 Project Management and Coordination for Building Assemblies Mock-up requirements.
   1. Showing the proposed color range, texture, bond, mortar and workmanship. All brick shipped for the sample shall be included in the mock-up.
   2. Use panel as standard of comparison for all masonry work built of same material.
   3. Do not destroy or move panel until work is completed and accepted by Owner

1.4 QUALITY ASSURANCE

A. Section includes: Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 PRODUCT DELIVERY, STORAGE, HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementations materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of work:
   1. Wall covering:
      a. During erection, cover top of wall with strong waterproof membrane at

end of each day or shutdown.
b. Cover partially completed walls when work is not in progress.
c. Extend cover minimum of 24 in. down both sides.
d. Hold cover securely in place.

B. Staining:
1. Prevent grout or mortar from staining the face of masonry to be left exposed or painted:
a. Remove immediately grout or mortar in contact with face of such masonry.
b. Protect all sills, ledges and projections from droppings of mortar, protect door jambs and corners from damage during construction.

C. Cold Weather Protection:
1. Preparation:
a. If ice or snow has formed on masonry bed, remove by carefully applying heat until top surface is dry to the touch.
b. Remove all masonry deemed frozen or damaged.

2. Products:
a. Use dry masonry units
b. Do not use wet or frozen units.

3. Construction requirements while work is progressing:
a. Air temperature 40 F to 32F:
1) Heat sand or mixing water to produce mortar temperatures between 40F and 120F.
b. Air temperature 32F to 25F:
1) Heat sand and mixing water to produce mortar temperatures between 40F and 120F
2) Maintain temperatures of mortar on boards above freezing
c. Air temperatures 25F to 20F:
1) Heat sand and mixing water to produce mortar temperatures between 40F and 120F
2) Maintain mortar temperatures on mortar boards above freezing
3) Use salamanders or other heat sources on both sides of walls under construction
4) Use windbreaks when wind is in excess of 15mph
d. Air temperature 20F and below:
1) Heat sand and mixing water to produce mortar temperatures between 40F and 120F
2) Provide enclosures and auxiliary heat to maintain air temperature above 32F
3) Minimum temperature of units when laid: 20F
4. Protection requirements for completed masonry and masonry not being worked on:
a. Mean daily air temperature 40F to 32F
1) Protect masonry from rain or snow for 24hr by covering with weather-resistive membrane
b. Mean daily air temperature 32F
1) Completely cover masonry with weather-resistive membrane for 24hr
c. Mean daily air temperature 25F
1) Completely cover masonry with insulating blankets or equal protection for 24hr

d. Mean daily air temperature 20F and below
   1) Maintain masonry temperature above 32F for 24hr by
      a) Enclosure and supplementary heat or
      b) Electric heating blankets or
      c) Infrared lamps or
      d) Other approved methods

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 ACCEPTABLE MANUFACTURER

A. Kinney Brick Co.: P.O. Box 1804, Albuquerque, NM 87103. Ph (505) 877-4550.

B. Submit for approval by Architect per section 01 3300.

2.3 BRICK MATERIALS

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 brick returns at all transitions from brick to adjacent exterior finish.
   3. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   4. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
   5. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. FACE BRICK: Facing brick complying with ASTM C 216

   1. Products: Subject to compliance with requirements:
   2. Grade: SW.
   3. Type: FBX
   4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
   5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
   6. Size (Actual Dimensions): 3-1/2 inches wide by 2-1/4 inches high by 7-5/8 inches long.
   7. Application: Use where brick is exposed unless otherwise indicated.

8. Color and Texture: From Manufacturer's full range of color and texture, as selected by Architect.

C. MORTAR MATERIALS:

1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

2. Hydrated Lime: ASTM C 207, Type S.

3. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

4. Mortar Cement: ASTM C 1329.

5. Colored Cement Product: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

6. Aggregate for Mortar: ASTM C 144.

7. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

8. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

9. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

10. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with masonry units, containing integral water repellent by same manufacturer.

D. CAST STONE TRIM UNITS:

1. Provide stone units accurately shaped, with exposed faces dressed true, and with beds and joints at right angles to faces.

2. Provide smooth finish.

E. EMBEDDED FLASHING MATERIAL

1. Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and Division 07 Section "Sheet Metal Flashing and Trim".

2. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Place through wall flashing on mortar bed, cover with mortar.

F. TIES AND ANCHORS

1. Provide corrugated galvanized metal ties and anchors that meet seismic and structural requirements.
2. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches , around perimeter.
3. Per ASTM A 1008/A; 1008M; ASTM A 82/A ; 82M.

G. MISCELLANEOUS MASONRY ACCESSORIES

a. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity. Provide strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

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. Lay all brick with 3/8” joint, unless called out otherwise, or if matching an existing condition which varies from 3/8”.

D. 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.

E. 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.

F. Provide weep holes at bottom of wall, in mortar joint, at four feet o.c.

G. Leave joints around outside perimeters of exterior door and window frames open for sealant.

H. Install expansion joint materials in unit masonry as masonry progresses at a maximum of 20’-0” o.c. and no less than 10’ feet from corners. Do not allow materials to span

expansion joints without provision to allow for in-plane wall or partition movement. Install backer rod and joint sealant at expansion joint matching the color of the brick.

I. Place only clean reinforcement, remove loose rust, ice, or other coatings.

3.2 CLEANING

A. Cut out any defective joints and holes in exposed masonry and repoint with mortar.

B. After mortar is thoroughly set and cured, Clean all exposed masonry:
   1. Apply cleaning agent to sample wall area of 20 square feet in location acceptable to the Architect
   2. Do not proceed with cleaning until sample area is approved by Architect.
   3. Clean initially with stiff brushes and water
   4. When cleaning agent is required:
      a. Follow brick manufacturer's recommendations
      b. Thoroughly wet surface of masonry on which no green efflorescence appears
      c. Scrub with acceptable cleaning agent approved by brick manufacturer and Architect
      d. Immediately rinse with clear water
      e. Do small sections at a time
      f. Work from top to bottom, after fully wetting top to bottom.
      g. Protect all sash, metal lintels and other corrodible parts when masonry is cleaned with acid solution
      h. Remove green efflorescence in accordance with brick manufacturer's recommendations

3.3 LEED REQUIREMENT

A. If section includes wet applied materials, provide submittals as required by Section 01 8113 Supplemental Table.

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

END OF SECTION 04 2113

# SECTION 04 2300 REINFORCED UNIT MASONRY

## PART 1 GENERAL

### 1.1 WORK INCLUDED

A. This section includes the construction of reinforced hollow core unit masonry, masonry veneer and special shapes. It includes all split face units and smooth face units, as well as masonry mortar and grout.

### 1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Project Management & Coordination – Section 01 3100

B. Concrete Reinforcement – Section 03 2100

C. Painting – Section 09 9000

### 1.3 QUALITY ASSURANCE

A. Reference Standards

1. American Society for Testing and Materials (ASTM) Standard Specification, latest edition

   a. A 615/ A 615 M-96a "Deformed and Plain Billet Steel Bars for Concrete Reinforcement"
   b. C 90-94b "Standard Specification for Loadbearing Concrete Masonry Units"
   c. C 109/ C 109 M-95 "Compressive Strength of Hydraulic Cement Mortars" (Using 2-in. Or [50mm] Cube Specimens)
   d. C 140-97 "Sampling and Testing Concrete Masonry Units"
   e. C 270-97a "Mortar for Unit Masonry"
   f. C 476-95 "Grout for Reinforced and Non-Reinforced Masonry"
   g. C 1019-93 "Sampling and Testing Grout
   h. ASTM C 1403 Standard Test Method for Rate of Water Absorption of Masonry Mortars

2. International Congress of Building Officials, Uniform Building Code Standards

   a. No.24-22 "Field Test Specimens for Mortar and Grout"

B. Mock-Ups

1. See Building Assemblies Mock-up requirements in 01 3100
2. Mock-Ups will be used to judge workmanship, material application, color selection, joint size, tooling and mortar color.
3. Use mock-up to show compatibility of anti-graffiti coating.
4. Allow 48 hours for inspection of mock-up before proceeding with work.

5. When accepted by the Owner and Architect, Mock-ups will demonstrate the minimum standard of quality required for this work. Construction mock-ups to remain on site throughout the project.

1.4 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

C. Product Data: Submit sample of exposed masonry unit of each color and texture to be used to complete the work. Submit copies of test reports performed within last 12 months for representative specimens to be used in accordance with ASTM C 140 for strength, absorption and moisture content, and ASTM C 426 for drying shrinkage.

D. Test Reports: Submit copies of test reports for masonry units, mortar and grout.

E. Block Samples: Full range of manufacturers color samples for selection and 2- 8”x16” full block samples of each final color and texture.

F. Mortar: Full range of manufactures color samples for selection.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store masonry units above ground on level platforms which allow air circulation under stacked units.

B. Cover and protect against wetting prior to use.

C. Handle units on pallets or flat bed barrows.

D. Store cementitious ingredients in weather-tight enclosures.

PART 2 PRODUCTS

2.1 LEED REQUIREMENTS.
A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MATERIALS

A. Hollow Core Units: ASTM C90, Type I, moisture controlled, modular size complete with corners, bases, bond beams, lintels and fillers to match and compliment block units; medium weight at concealed block. Size and location as indicated on drawings. Colors to be selected by architect from manufacturer’s full range of colors including standard gray and white cement.

1. Aggregate: Color selected by architect from manufacturer's full range at exposed block.
2. Aggregate: Natural color at concealed block.
3. Texture: Unit type as indicated on drawings. Standard at concealed block.
4. Water Permanence of Masonry: ASTM E 514: Capable of achieving a Class E Rating when evaluated using ASTM E 514 with the test extended to 72 hours, using the rating criteria specified in ASTM E 514-74.

B. Mortar: ASTM C 270-94 "Standard Specification for Mortar for Unit Masonry," Type S.

C. Grout: ASTM C 476-90 "Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens."

D. Cell Reinforcing: ASTM A 615-95b "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," Grade 40. Comply with Section 03210.

E. Bond Beam and Lintel Reinforcing: ASTM A 615, Grade 40. Comply with Section 03210.

F. Joint Reinforcing: Standard Dur-O-Wal or approved equal.

G. Control Joint Material: Rubber, neoprene or PVC joint material for use with standard sash block by Dur-O-Wal or approved equal.

H. Vertical Bar Positioner: Steel or plastic by Dur-O-Wal or approved equal.

I. Mortar Plasticizer: Easy Spread by American Colloid Company or approved equal.

J. Water-Repellent Admixture: Concrete masonry unit integral water repellent admixture formulated by manufacturer to repel water, minimize efflorescence, and enhance mortar and concrete masonry unit bonding.

1. Product: Provide the following: Grace Construction Products, (800) 558-7066, www.dryblock.com, DRY-BLOCK Block Admixture or approved equal.

K. Water-Repellent Mortar Admixture for Masonry Construction: Mortar admixture complying with ASTM C 1384, formulated by manufacturer to repel water, minimize efflorescence, and enhance mortar and concrete masonry unit bonding.

1. Product: Provide the following: Grace Construction Products, (800) 558-7066, www.dryblock.com, DRY-BLOCK Block Mortar Admixture or approved equal.

L. Water-Repellent Mortar Admixture: Provide water-repellent mortar admixture with the following characteristics:

1. Water Permanence of Masonry, ASTM E 514: Capable of achieving a Class E Rating when evaluated using ASTM E 514 with the test extended to 72 hours, using the rating criteria specified in ASTM E 514-74.
2. Rate of Water Absorption, ASTM C 1403: Reduce minimum 50 percent compared to untreated specimen.

PART 3 EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 GENERAL

A. Provide jamb, header, lintel, bond beam, etc. units as required to complete the work. Lay only dry and unfrozen masonry units.

B. All exposed masonry shall be scoria aggregate, burnished finish unless noted otherwise on the drawings. Masonry not exposed to view may be smooth finished.

C. Discard any broken, chipped, or discolored masonry units.

D. Use masonry saws to cut and fit masonry units.

E. Lay units in running bond pattern with vertical joints located at center of masonry units in alternate course below.

F. Install concrete masonry using mortar containing water-repellent admixture using mortar containing water-repellent admixture in manufacturer's recommend proportion. Mix and handle mortar according to manufacturer's written instructions.

G. Lay concrete masonry units with completely filled bed and head joints. Butter ends of units with sufficient mortar to completely fill head joints.

H. Set units plumb, true to line and with level courses accurately spaced.

I. Adjust masonry unit to final position while mortar is soft and plastic.

J. Anchors, flashing accessories and similar devices shall be built in as masonry progresses.

3.2 JOINTS

A. Provide joints 3/8" nominal thickness and tooled unless shown otherwise on drawings.

B. Construct uniform joints.

C. Units shall be placed with sufficient pressure to extrude mortar and provide a tight joint.

3.3 REINFORCEMENT

A. Reinforcement shall be secured against displacement prior to grouting at a spacing not greater than 4 feet.

B. Provide 48 diameter lap for all rebar, except footing dowels, 24" minimum. Provide 6" minimum lap for all truss type joint reinforcing. Footing shall be 30 bar diameter lap with 24" minimum.

3.4 GROUTING

A. Grout all cells which are below grade.

B. Grout lintel blocks over masonry openings and each jamb of masonry openings.

C. Grout pours shall not exceed 4 feet in height.

D. Grout all cells solid which contain reinforcing.

3.5 POINTING AND CLEANING

A. At completion of unit masonry work, fill holes in joints and tool.

B. Cut out and repoint defective joints.

C. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.

D. Do not clean using strong acids, sandblasting, or high-pressure cleaning methods.

E. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

3.6 PROTECTION OF WORK

A. Protect sills, ledges and off-sets from mortar drippings or other damage during construction.

B. Remove misplaced mortar or grout immediately.

C. Cover top of walls with non-staining waterproof coverings when work is not in progress.

D. Provide adequate bracing during construction to prevent damage from wind loads.

3.7 WEATHER CONDITIONS

A. Do not place concrete masonry units when air temperature is below 20 degrees F.

B. For temperatures between 20 degrees F and 40 degrees F, sand and mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F. Mortar shall be maintained above 32 degrees F during placement.

C. Masonry shall be protected from freezing for 24 hours after placement.

## 3.8 FIELD QUALITY CONTROL

A. Concrete Masonry Units (CMU): Test in accordance with ASTM C 140-94a "Standard Test Methods of Sampling and Testing Concrete Masonry Units." Six units shall be sampled and tested for each lot of 10,000 units or less delivered to the job site. Twelve units shall be sampled from each lot of more than 10,000 units and less than 100,000 units.

B. Mortar: One sample, of six 2"x2"x2" cube specimens, shall be molded from each day's production. Test 2 specimens at 7 days age and 4 specimens at 28 days in accordance with ASTM C 109-95 "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Or [50-mm] Cube Specimens)."

C. Grout: Mold and test 4 test specimens in accordance with ASTM C 1019-89a "Standard Test Method for Sampling and Testing Grout" from each day's grout placement. See General Structural Notes for required strength.

END OF SECTION 04 2300

SECTION 051200 - STRUCTURAL STEEL

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section includes the fabrication and erection of structural steel.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Steel Joists - Section 05 21 00

B. Metal Decking - Section 05 30 00

C. Metal Fabrication - Section 05 50 00

1.03 QUALITY ASSURANCE

A. Qualifications of Fabricator: Fabricator shall have a minimum of 5 years experience in the fabrication of structural steel and have a current AISC Certification for the fabrication facility.

B. Qualifications of Erector: Erector shall have a minimum of 5 years experience in the erection of structural steel.

C. Qualifications of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.

D. Reference Standards:

1. American Society for Testing and Materials (ASTM)

a. ASTM A 36 A 992 Standard Specification for Carbon Structural Steel.

b. ASTM A 53-95 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.

c. ASTM A 307-94 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

d. ASTM A 325-94 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

e. ASTM A 500-93, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

2. American Welding Society (AWS), latest edition.

a. AWS D1.1-92 Structural Welding Code-Steel.

3. American Institute of Steel Construction (AISC), Steel Construction Manual, latest edition.

a. Specification for Structural Steel Buildings

b. AISC Code of Standard Practice

c. Specification for Structural Joints Using ASTM A 325 or A 490 , Classes 10.9 and 10.9.3.

1.04 SUBMITTALS

A. Shop Drawings: Submit shop drawings including complete details and schedules for fabrication and assembly of structural steel members. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Shop drawings shall not be made by reproduction of the Contract Drawings.

B. Provide setting drawings and directions for installation of anchor bolts and other anchorages to be installed by others.

C. Welder Certification: Submit affidavit stating that all welders are certified in accordance with AWS.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Support structural steel above ground on skids, pallets, platforms, or other supports.

B. Protect steel from damage.

C. Store packaged materials in original unbroken package or container.

D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.

E. Replace damaged shapes or members.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Steel Shapes, Plates, and Bars: ASTM A 36 and A 992.

B. Structural Steel Pipe: ASTM A 53, Type E or S, Grade B.

C. Structural Steel Tubing: ASTM A 500, Grade B, Fy = 46 ksi.

D. Anchor Bolts: ASTM A 307 or ASTM A 36

E. High Strength Tension Control Threaded Fasteners: Meet requirements of ASTM A 325.

F. Headed Anchor Shear Studs: By the Nelson Division of TRW.

G. Welding Electrodes: E 70 Series.

H. Shop Primer Paint: Fabricators standard rust inhibitive primer.

I. Non-Metallic, Non-Shrink Grout: Meets the requirements of Corp of Engineers specifications CRD-C621.

2.02 FABRICATION

A. Fabrication shall be in accordance with the AISC "Code of Standard Practice for Buildings and Bridges".

B. Connections: Weld or bolt shop connections as indicated on the approved shop drawings. Design connections to support reactions and forces where indicated on the drawings.

C. Shop Welds: Shall be visually inspected by the Fabricator's quality control department.

2.03 SHOP PAINTING

A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.

B. Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.

C. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:

1. SP-1 "Solvent Cleaning"

2. SP-2 "Hand Tool Cleaning"

D. Painting: After surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions. Provide one coat.

PART 3 EXECUTION

3.01 COORDINATION

A. Field Measurements: Verify all elevations, locations, and dimensions of surfaces to receive structural steel.

B. Anchor Bolts and Other Embedded Items: Verify locations and positions of anchor bolts and other embedded items used to support structural steel.

C. Correct any unsatisfactory conditions prior to erection of structural steel.

3.02 PREPARATION

A. Clean surfaces to receive structural steel prior to erection.

3.03 ERECTION

A. General: Erect structural steel in accordance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Field Assembly: Assemble structural steel accurately to the lines and elevations shown on the drawings. Align and adjust components accurately before fastening.

C. Temporary Bracing: Provide temporary bracing or guys to secure structural steel against wind, seismic, or construction loads. It is the responsibility of the Contractor to maintain stability of the structure during erection.

D. Field Bolted Connections: Install high strength tension control bolts in accordance with AISC Specifications for Structural Joints Using ASTM A325 and A490 Bolts and the manufacturer's instructions. Where clearance within a connection does not permit the use of tension control bolts, standard A325 bolts shall be used and inspected in accordance with the AISC Specification for Structural Joints.

E. Field Welding: Perform all welds in accordance with AWS.

F. Inspection of Field Welds: Perform visual inspection of all field welds. If any welds appear to be unsatisfactory, they shall be tested in accordance with ASTM E160 and/or replaced at the expense of the Contractor.

G. Gas Cutting: Do not use gas cutting torches in field to cut structural framing.

H. Do not enlarge unfair holes by burning. Ream holes that must be enlarged to admit bolts.

I. Field Touch-up Painting (Primer): Paint all bolts, washers, and nuts after connections have been tightened and checked. Paint field welds. Paint all abrasions in shop coat. Use same paint as for shop painting.

J. Grout Placement: Comply with the manufacturer's instructions.

K. Tighten anchor bolts after supported members have been positioned and plumbed.

END OF SECTION 051200

SECTION 052100 - STEEL JOISTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section includes the fabrication and erection of open web steel joists.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Structural Steel - Section 05 12 00

1.03 QUALITY ASSURANCE

A. Qualification of Fabricator: Fabricator shall be a member of the Steel Joist Institute.

B. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.

C. Reference Standards:

1. American Society for Testing and Materials (ASTM)

a. ASTM A 307-94 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

2. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders, 2005

1.04 SUBMITTALS

A. Certification: Submit manufacturer's certification that joists comply with SJI Specifications.

B. Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include mark, number, type, location and spacing of joists and bridging. Shop Drawings shall not be made by reproduction of the Contract Drawings.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Support structural steel above ground on skids, pallets, platforms, or other supports.

B. Protect steel from damage.

C. Store packaged materials in original unbroken package or container.

D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.

E. Replace damaged shapes or members.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Steel: Comply with SJI Specifications.

B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.

C. Steel Prime Paint: Comply with SJI Specifications.

### 2.02 FABRICATION

A. Fabricate steel joists in accordance with SJI Specification.

B. Extended Ends: Provide extended ends on joists as required complying with applicable SJI Specifications and load tables.

C. Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide an extended bottom chord element of sufficient strength to support ceiling construction. Extend ends to within 1/2" of finished wall surface unless otherwise indicated.

D. Bridging: Provide horizontal or diagonal type bridging for "open web" joists, as required by SJI Specifications.

E. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

F. Apply one shop coat of primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

## PART 3 EXECUTION

### 3.01 COORDINATION

A. Verify all elevation locations and dimensions of surfaces to receive steel joists. Furnish plates, angles, etc. as required to secure steel joists.

### 3.02 ERECTION

A. Place and secure steel joists in accordance with SJI Specifications, approved shop drawings, and as herein specified.

B. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

D. Fastening Joists: Field weld joists to supporting steel framework in accordance with SJI Specifications for type of joists used. Coordinate welding sequence and procedure with placing of joists unless noted on contract drawings. Bolt joists to supporting steel framework where required by SJI Specifications.

E. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

END OF SECTION 052100

SECTION 053000 - METAL DECKING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all metal decking complete in place as shown on the drawings, specified herein, and needed for a complete and proper installation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Structural Steel - Section 05 12 00

B. Steel Joists - Section 05 21 00

C. Lightgage Metal Framing - Section 05 40 00

1.03 QUALITY ASSURANCE

A. Reference Standards:

1. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.3 within the last 12 months.

2. American Society of Testing and Materials (ASTM) Standard Specification, latest edition.

a. ASTM A 570/ A 570 M-97 Standard Specification for Steel, Sheet and Strip, Carbon, Hot Rolled, Structural Quality.

b. A 611-97 Steel, Cold-Rolled Sheet, Carbon, Structural Quality.

c. ASTM A 653/ A 653M-97 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

3. American Welding Society (AWS), latest edition.

a. D1.3-92, Structural Welding Code - Sheet Steel

4. Steel Deck Institute.

a. SDI Design Manual for Floor Decks and Roof Decks

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories.

B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Shop Drawings shall not be made by reproduction of the Contract Drawings.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Support metal deck above ground on skids, pallets, platforms or other supports.

B. Protect metal deck from damage.

C. Store packaged materials in original unbroken package or container.

PART 2 PRODUCTS

2.01 MATERIALS

A. Metal Roof Deck: ASTM A 611, Grade C. See plans for type, size and finish.

B. Metal Floor Deck: ASTM A 570 with galvanized finish. See plans for type and size.

C. Finishes:

1. Painted: Manufacturer's baked-on, rust-inhibitive paint.

2. Galvanized: Conform to ASTM A 653, G60.

PART 3 EXECUTION

3.01 COORDINATION

A. All edge angle shall be in place with proper attachment prior to installation of metal deck. All roof and floor opening frames shall be installed prior to deck installation.

3.02 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein. Locate deck bundles to prevent overloading of structural members.

B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

C. Place deck units in straight alignment for entire length of run.

D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

E. Lap ends of deck units a minimum of 2" over supports.

F. Place deck units to permit proper attachment to the perimeter deck angle.

G. Do not use deck units for storage or working platforms until permanently secured.

H. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

I. Fasten deck units to steel supporting members as shown on the structural drawings.

J. Fasten side laps of units as called for on the structural drawings.

K. Care shall be exercised in the selection of electrodes and amperage to provide positive welds and to prevent high amperage blowholes.

L. Comply with AWS D1.3 requirements and procedures.

M. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

N. Install closure strips at all locations as recommended by the manufacturer to provide a complete installation.

O. Provide cleaning and touch-up painting of field welds, abraded areas and rust spots, as required for all exposed areas after erection and before proceeding with field painting.

END OF SECTION 053000

# SECTION 05 4000 - LIGHTGAGE METAL FRAMING

## PART 1 GENERAL

### 1.1 WORK INCLUDED

A. This section includes lightgage studs, joints and track, 20 gage or heavier, including bridging, and related accessories as indicated on the Contract Drawings and specified herein.

### 1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Structural Steel - Section 05 1200

B. Steel Joists - Section 05 2100

C. Drywall Studs - Section 09 2600

### 1.3 QUALITY ASSURANCE

A. Reference Standards:

1. American Iron and Steel Institute (AISI) Design of Cold Formed Steel Structural Members, 1980.
2. American Welding Society of (AWS) D1.3, 1992 Structural Welding Code.
3. American Society of Testing and Materials (ASTM).
    a. ASTM A 570/ A 570M-95 — Standard Specification for Steel, Sheet and Strip, Carbon, Hot Rolled, Structural Quality.
    b. ASTM A 611-94 — Standard Specification for Steel, Sheet, Carbon, Cold Rolled, Structural Quality.
    c. ASTM A 653/ A 653M-95 — Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process

### 1.4 SUBMITTALS

A. LEED REQUIREMENTS.
    i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Submit manufacturer's product information and installation instructions for each item of lightgage framing. Submit shop drawings for all prefabricated lightgage systems.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, and grade. Store off ground in a dry ventilated space or protect with suitable waterproof coverings.

PART 2 PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MATERIALS

A. Metal Framing:

1. All 12, 14, and 16 gage steel studs and joists shall be formed from steel that meets the requirements of one of the following standards with a minimum yield strength of 50,000 psi:

   a. Painted Material - ASTM A 570, Grade 50.
   b. Galvanized Material - ASTM A 653 Grade 50.

2. All 18 and 20 gage steel studs and joists; all track, bridging and accessories shall be formed from steel that meets the requirements of one of the following with a minimum yield strength of 33,000 psi:

   a. Painted Material - ASTM A 611, Grade C.
   b. Galvanized Material - ASTM A 653.

B. Material finishes: All stud and joist components shall be primed with paint meeting the performance requirements of TT-P-1636C, or shall be formed from steel having a G-60 galvanized coating or better.

2.3 FABRICATION

A. Framing components may be prefabricated into panels prior to erection. Prefabricated panels shall be square, with components attached to prevent racking. Handling and lifting of panels shall be done in a manner as to not cause distortion in any member.

B. All Framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.

PART 3 EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 INSTALLATION

A. Install metal framing systems in accordance with manufacturer's printed instructions and recommendations, unless otherwise indicated on Contract Drawings.

B. Install and align tracks accurately to layout at base and tops of studs. Secure tracks as indicated on Contract Drawings. Provide fasteners at corners and ends of tracks.

C. Install supplementary framing, blocking and bracing in metal framing system to support fixtures, equipment, etc. Comply with stud manufacturer's recommendations and industry standards, considering weight and loading of each item.

D. Secure studs to top and bottom tracks by welding at both inside and outside flanges unless noted otherwise. Weld multiple studs together with 1 inch of weld every 12 inch max on both sides of studs. Provide sill seal gasket on concrete at exterior foundation under wall track.

E. Frame wall openings larger than 2'-0" square with double studs at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.

F. Install horizontal bridging in stud system, spaced (vertical distance) at no more than 4'-0" o.c. Weld at each intersection.

G. Touch-up shop-applied protective coatings damaged during handling and installation. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces.

END OF SECTION 05 4000

# SECTION 05 5000 - METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK INCLUDED

A. Furnish and install all metal fabrications as shown on Drawings and as specified under this Section.

B. Definition: Metal fabrications include items made form iron and steel shapes, plates, bars, strips, pans, tubes, pipes and castings which are not a part of metal systems specified elsewhere.

C. Types of work in this section include metal fabrications for:

1. Rough hardware.
2. Bollards.
3. Steel railings.
4. Safety grip treads.
5. Steel Ladders.

### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 03 3000: CAST-IN-PLACE CONCRETE.
B. Section 05 2100: STRUCTURAL STEEL.
C. Section 05 2100: STEEL JOISTS.
D. Section 05 3100: METAL DECKING.
E. Division 7: FIREPROOFING.
F. Division 9: PAINTING.

### 1.3 REFERENCES:

A. The references listed below are declared to be a part of these specifications, the same as if fully set forth, except as modified herein. Unless specifically stated otherwise, the edition or revision of each document in effect at the beginning of work on this project shall be used.

B. American Society for Testing and Materials (ASTM):

1. ASTM A6 - General Requirements of Rolled Steel Plates, Shapes, Sheet Piling and Bars for structural Use
2. ASTM A36 - Structural Steel
3. ASTM A48 - Gray Iron Castings
4. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc, Coated, Welded and Seamless
5. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
6. TM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

7. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
8. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
9. ASTM A283 - Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
10. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
11. ASTM A325 - High-Strength Bolts for Structural Steel Joints
12. ASTM A366 - Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
13. ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products
14. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
15. ASTM A500 - Cold-Formed Welded and Seamless Steel Structural Tubing in Rounds and Shapes
16. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
17. ASTM A563 - Carbon and Alloy Steel Nuts
18. ASTM A569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled, Sheet and Strip, Commercial Quality
19. ASTM A570 - Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
20. ASTM A572 - High-Strength Low-Alloy Columbium-Vanadium Steel of Structural Quality
21. ASTM A611 - Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
22. ASTM A668 - Steel Forgings, Carbon and Alloy, for General Industrial Use
23. ASTM C827 - Change in Height at Early Stages of Cylindrical Specimens from Cementitious Admixtures
24. ASTM F436 - Hardened Steel Washers

C. American Welding Society (AWS)

1. AWS D1.1 - Structural Welding Code - Steel
2. AWS D1.3 - Structural Welding Code - Sheet Steel

D. American Institute of Steel Construction (AISC)

1. Work shall conform to the AISC Manual of Steel Construction and the Code of Standard Practice for Steel Buildings and Bridges.

E. Steel Structures Painting Council (SSPC)

1. SSPC-SP2 - Hand Tool Cleaning
2. SSPC-SP6 - Commercial Blast Cleaning

F. Bureau of Reclamation (BuRec)

1. BuRec Specification CTP-1 Specification for Coal-Tar Paint, CTP-1 Grade

G. Corps of Engineers (COE)

1. CRD-C 621 Specification for Non-Shrink Grout

1.4 DEFINITIONS:

A. Definitions in ASTM E985 for railing-related terms apply to this section.

1.5 QUALITY ASSURANCE:

A. Codes and Standards: Comply with the provisions of the latest edition or revision of the following codes, standards and specifications, except as otherwise shown and specified.

1. AISC "RFD Specification for Structural Steel for Building"
2. AISI "Specification for the Design of Cold-Formed Steel Structural Members".
3. AWS D1.1, "Structural Welding Code - Steel" and D1.3 "Structural Welding Code - Sheet Steel".
4. ASTM A6, "General Requirements for Delivery of Rolled Steel Plates, Sheet Piling and Bars for Structural Use".

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedures".

C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrications, where possible, to ensure proper fitting of the work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

D. Inserts and Anchorages:

1. Furnish inserts and anchoring devices which must be set in concrete for the installation of miscellaneous metal work. Coordinate delivery with other work to avoid delay.
2. See concrete section of these specifications for installation of inserts and anchorage devices.

E. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.6 SYSTEM PERFORMANCE REQUIREMENTS:

A. Structural Performance: Design, engineer, fabricate, and install metal fabrications to withstand the structural loads, as calculated by Structural Engineer, without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

1.7 SUBMITTALS:

A. LEED REQUIREMENTS.

i. “Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Manufacturer's Data: Manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products. Indicate by transmittal that copy of instructions has been distributed to the installer.

C. Shop Drawings: Submit shop drawings for the fabrication and erection of all assemblies of miscellaneous metalwork and non-ferrous architectural metalwork. Include profile, elevations, sizes, connections, reinforcing and accessories at required for complete installation. Show welded connections using standard AWS welding symbols.

1.8 PROJECT CONDITIONS:

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Deliver to site as required to avoid interruption of work.

B. Store on blocking under shelters with supports as necessary to avoid damage due to self-weight or superimposed loads.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MATERIALS:

B. Steel

1. Plates and Shapes: ASTM A36 unless otherwise shown. ASTM A572, grade 50 where shown.
2. Sheet: Use plain material unless galvanized material is specified:

a. Plain: ASTM A570, Grade 33, 36 or 40, or ASTM A611, Grade C or D
b. Galvanized: ASTM A446, Grade A, B, or C, coating designation G90

3. Structural Tubing: ASTM A500, grade B
4. Pipe: ASTM A53, type E or S, grade B, black or galvanized as shown.
5. Steel Plates to be Bent or Cold-Formed: ASTM A283, Grade C.
6. Steel Bars and Bar-Size shapes: ASTM A283, Grade D or ASTM A36.
7. Cold-Finished Steel Bars: ASTM A108
8. Bolts, nuts, washers:

a. High strength bolts: ASTM A325, type 1 or 2, direct tension indicating, plain or zinc coated as shown.
b. Standard bolts: ASTM A307, grade A for general use, grade B for use at flanged joints of piping systems, plain or zinc coated as shown.
c. Anchor bolts: Except as otherwise shown, L-shaped with minimum 3" hook, 8" embedment in concrete, 4" threaded projection, double nutted, ASTM A307 or A36, plain or zinc coated as shown.
d. Nuts: ASTM A563, type and grade as specified in ASTM A307 and A325, plain or zinc coated as shown.
e. Self-locking nuts: Prevailing torque type; IFI-100, grade A, plain or zinc coated as shown.
f. Flat and beveled washers: ASTM F436 plain or zinc coated as shown. Provide circular flat washers for general use and square beveled washers for use with American Standard beams and channels.
g. Lock washers: ANSI B27.1, spring type, plain or zinc coated as shown.

C. Cast Iron: ASTM A48, Class 35B or better.

D. Galvanizing for Hardware or Assemblages: ASTM A153 and ASTM A386.

E. Primer Paint:

1. For general use in shop and field: FS TT-P-31, brown
2. For touch-up of galvanized surfaces: FS TT-P-641
3. For aluminum to be in contact with steel: FS TT-P-645
4. For aluminum to be in contact with concrete: BuRec CTP-1

F. Non-Shrink Grout: Non-ferrous, non-shrink grout, pre-mixed, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, showing no shrinkage when tested in accordance with

COE CRD-C 621 and ASTM A827. Minimum compressive strength of 5,000 psi at 7 days when installed by the damp-pack method.

Products complying with the above requirements include the following:

1. Supreme Non-Shrink Grout by Cormix Construction Chemicals.
2. Masterflow 928 by Master Builders.
3. Five Star Grout by U.S. Grout Corporation.
4. Non-Ferrous, Non-Shrink Grout by the Burke Company.

G. Adhesive Anchors: Epoxy or polyester resin system consisting of adhesive, threaded studs and nuts. Adhesives may be contained in glass capsules or may be a one or two-part formulation injected into hole. Acceptable systems include but are not limited to the following:

1. PARABOND Capsule Anchors by Molly Fastener Group Division of Emhart Corporation:
2. HVA Adhesive Anchor System or HIT Doweling Anchor System by Hilti Fastening Systems;
3. Epcon System by ITW Ramset/Red Head.

H. Welded Studs

1. Type: "Nelson Fluxed Headed Anchor Studs", by Nelson Stud Welding Division, or equal.
2. Studs shall be automatically end welded in accordance with manufacturer's recommendations.

I. Miscellaneous Fasteners

1. Lag Bolts: FS FF-B-561, square head type.
2. Machine Screws: FS FF-S-02, cadmium plated steel.
3. Wood Screws: FS FF-S-111, flat head carbon steel.
4. Toggle Bolts: Tumble-wing type: FS FF-B-588, type, class and style as required.
5. Plain Washers: FS FF-W-92, round, general assembly grade carbon steel.
6. Lock Washers: FS FF-W-84, helical spring type carbon steel.

J. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

K. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized per ASTM A153.

L. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.3 FABRICATION - GENERAL:

A. Use materials of size and thickness shown, or, if not shown, of required size and thickness to produce adequate strength and durability in the finished product for the intended use. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for the various components of work.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent-metal corners without otherwise impairing the work.

C. Weld corners and seams continuously and in accordance with the recommendations of AWS. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

D. Form exposed connections with hairline joints which are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, use Phillips flathead (countersunk) screws or bolts.

E. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support for intended use of the work.

F. Cut, reinforce, drill and tap miscellaneous metal work as may be required to receive finish hardware and similar items of work.

2.4 STEEL FABRICATION:

A. General:

1. Conform to following standards of the American Institute of Steel Construction (AISC):

a. "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings".
b. "Code of Standard Practice for Steel Buildings and Bridges," with following exceptions:

1) Connections shall be shown on the Drawings except as specifically and individually approved otherwise by the Architect.

2. Welding shall conform to the AWS D1.1 "Structural Welding Code Steel" and AWS D1.3 "Structural Welding Code - Sheet Steel" and shall be performed by welders currently certified in accordance with AWS certification procedures to perform the type of welding required.
3. Mill bearing surfaces to true plane.
4. Shop connections: Welded, unless otherwise shown.
5. Field connections: Provide bolts for all field connections except where shown otherwise on Drawings.

    a. Use direct tension indicating high-strength bolts conforming to ASTM A325 unless shown or specified otherwise.
    b. Use and installation of high-strength bolts: Conform to "Specification for Structural Joints Using ASTM A325 or A490 Bolts", as approved by Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation, and published by AISC.

B. Shop Painting:

1. Paint all steel items which are not specified or shown to be galvanized except as specified below. Paint after fabrication is complete. Exception: if portions of assemblages will not be accessible to painting after fabrication, paint those portions before fabrication.
2. Remove oil and grease, dirt, rust, loose mill scale, and other foreign elements by "Commercial Blast Cleaning" in accordance with SSPC-SP6 or by "Hand Tool Cleaning" in accordance with SSPC-SP2 as required.
3. Apply one or more coats of primer paint of specified type in accordance with paint manufacturer's directions as required to achieve recommended coverage and coating thickness for items to be used in a corrosive environment. Use painting methods which will result in full coverage of joints, corners, edges and all exposed surfaces.
4. Omit shop prime coat from contact surfaces of connections, from surfaces to be field welded, from parts to be embedded in concrete, and other parts which will not be exposed to view or weather after construction is complete.

C. Galvanizing:

1. Galvanize after fabrication all steel members and assemblages which are shown or specified to be galvanized.
2. Galvanize each item as specified. If coating type and thickness is not specified, provide hot-dipped galvanized coating equivalent to a G90 coating as specified in ASTM A525.
3. Protection of dissimilar materials:

a. Aluminum surfaces in contact with steel shall be given one coat of zinc chromate primer in accordance with FS TT-P-645.
b. Aluminum surfaces in contact with concrete shall be given coat of alkali-resistant bituminous paint meeting requirements of BuRec Specification CTP-1 (coal tar paint).

4. Repair hot dip galvanizing with Galvilite Galvanizing Repair Compound as manufactured under ZRC Worldwide's ISO 9001 quality system (800) 831-3275.

2.5 MISCELLANEOUS METAL ITEMS:

A. General: Provide and install items listed below and shown on drawings together with anchorage, attachment and accessories necessary for a complete installation. Items listed are principal items only. See drawing details for items not specifically listed.

B. Carpenter's Iron Work:

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware are specified in Division 6 sections.
2. Manufacture or fabricate items of sizes, shapes and dimensions required.

C. Ledge, Shelf and Perimeter Angles and Shapes: Provide steel angels, shapes and plates as shown for the support of metal decking, joists, masonry and other items. Prime paint unless shown to be galvanized.

D. Framing Through Floors and Roofs: Provide steel framing, plain or galvanized as shown, at openings through floors and roofs. Except as otherwise shown, provide 4 x 4 x 3/8 angle framing at all sides openings with members perpendicular to supporting members to extend to and be supporting by first member at each side of opening. Extend member to walls as shown. Weld all connections. Grind smooth and flush with adjacent surfaces all welds in framing which will be exposed to view after construction is complete and as required for proper performance.

E. Beating Plates: Provide bearing plates for steel items bearing on masonry or concrete construction, made flat, free from wraps or twists and of required thickness and bearing area. Fabricate as detailed.

F. Guard posts, Bumper Posts, Bollards: Provide steel pipe conforming to ASTM A53, size as shown, primer painted unless shown to be galvanized.

G. Cast Iron Drainage, Manhole and Trench Covers, Miscellaneous Iron Castings:

1. Use: At locations shown or scheduled on drawings.
2. Configuration: Manufacturer's standard configuration with the following capacities.

    a. Castings to support vehicular traffic: Heavy duty grating capable of resisting HS20-44 loading.
    b. Castings to support pedestrian traffic: Capable of support 100 psf loading over entire surface of grating without exceeding allowable material stresses or 1/4" deflection at center span of grating.

3. Provide removable sections designed to be bolted to support framing with countersunk hex-headed bolts.
4. Provide manufacturer's standard frame on all sides of openings fabricated to receive connecting bolts.

H. Steel Ladders:

1. General: Fabricate ladders for the locations shown, with dimensions, spacing, details and anchorages as indicated. Comply with requirements of ANSI A14.3
2. Side rails: Continuous steel flat bars, 1/2 inch x 2-1/2 inches, with eased edges, spaced 18 inches apart or as shown.
3. Bar Rungs: 1 inch diameter pipe, spaced 12 inches o/c.
4. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
5. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" o.c. by means of welded or bolted steel brackets.

    a. Size brackets to support design dead and live loads indicated to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
    b. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back as shown to the structure to provide secure ladder access.

6. Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is filled with aluminum oxide grout.

I. Metal Nosings:

1. Fabricate stair nosings from structural steel shapes as indicated, of all welded construction with mitered corners and continuously welded joints. Provide anchors welded to nosings for embedding in concrete or masonry construction, spaced not

more than 6 inches from each curb end, 6 inches from corners and 24 inches o.c., unless otherwise indicated.

2. Install nosings in the following locations:

    a. Exterior locations as shown on drawings: Nickelcast, Cast on anchor integrally cast to underside. Curb Bar Style 950 as manufactured by American Safety Tread Co., Inc. or approved equal.

3. Manufacturers: Subject to compliance with requirements provide metal stair nosings by:

    a. American Safety Tread Co., Inc. 1(800)245-4881.
    b. Balco Metalines

J. Steel Railings and Handrails:

1. General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacing, and anchorage, but not less than that required to support structural loads.
2. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

    a. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

3. Form changes in direction of railing members as follows:

    a. By insertion of prefabricated elbow fittings.
    b. By radius bends of radius indicated.
    c. By mitering at elbow bends.
    d. By bending.
    e. By any method indicated above, applicable change of direction involved.

4. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
5. Provide wall returns at end of wall-mounted handrails, unless otherwise indicated.
6. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

7. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/8 inch steel plate welded to, and centered between, each railing post.
8. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

    a. For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.
    b. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 inch below finished surface of concrete.

K. Miscellaneous Steel Trim: Provide shapes and sizes as required. Except as otherwise noted, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work. Prime paint after fabrication unless shown to be galvanized or other metal finish.

2.6 CONCRETE FILL AND REINFORCING MATERIALS:

A. Concrete Materials and Properties: Comply with requirements of Division 3 section "Concrete Work" for normal weight, ready-mix concrete with minimum 28-day compressive strength of 3000 psi, unless higher strengths indicated.

B. Nonslip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rust-©14 proof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

C. Reinforcing Bars: ASTM A615, Grade 60, unless otherwise indicated.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

1. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 PREPARATION:

A. Prior to beginning installation of metal fabrications, inspect field conditions under which work is to be done. If conditions are not satisfactory, do not begin work until unsatisfactory conditions have been corrected to the satisfaction of the Contractor and the Architect. Beginning of installation represents Contractor's acknowledgment and certification that all conditions are satisfactory.

B. Furnish setting drawings, diagrams, templates, instructions and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site.

C. Thoroughly clean all parts which will be in contact.

D. Paint with specified paint all surfaces of dissimilar metals and any surfaces of aluminum fabrications which will be embedded in concrete.

3.3 INSTALLATION - GENERAL:

A. Install metal fabrication plumb and level or on slope as shown in their correct positions within specified tolerances.

B. Design, provide, install and maintain all temporary handrails, kickplates and other items as required by OSHA and as necessary to provide a safe workplace.

C. Use light drifting as necessary to draw holes together. Drifting to enlarge unfair holes is not permitted. If necessary to enlarge holes to make connections, use twist drills.

D. Weld steel members in accordance with AWS D1.1. Provide certification that all welders are currently qualified in accordance with AWS procedures.

E. Anchor handrails, ladders and miscellaneous items securely to supporting work as shown on the Drawings. Where attachments are not shown, anchor items using appropriate anchors subject to approval by the Architect.

F. Grout under baseplates to provide full bearing area after framing or equipment has been plumbed, leveled and aligned. Place grout in accordance with the manufacturer's directions using the damp-pack method.

G. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, lag bolts, wood screws and other connectors as required.

H. Cutting, Fitting and Placement:

1. Perform cutting, drilling and fitting required for the installation of miscellaneous metal items. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.
2. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch-up shop paint coat. Do not weld, cut or abrade surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

I. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made and methods used in correcting welding work.

3.4 INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS:

A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loading. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.
2. Non shrink, nonmetallic grout or anchoring cement.
3. Cover anchorage joint with a round steel flange attached to post as follows:

    a. Welded to post after placement of anchoring material.

4. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer's directions.

B. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

1. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

C. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with pre-drilled hole for exposed bolt anchorage.
2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
3. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

3.5 FIELD PAINTING:

A. Apply one or more coats of the primer paint specified to cleaned surfaces of bolts, to new welds and to abrasions to shop coat after erection. Apply as many coats as necessary to achieve protection of the metal surfaces at least equal to that provided by the shop paint.

B. Apply finish paints and coatings as specified in Division 9 Sections of these specifications.

3.6 PROTECTION AND REPAIR OF WORK:

A. Take all measures necessary to protect the work during the life of the contract.

B. If any portion of the work is found to be defective or is damaged by the Contractor's operations after it has been installed, it shall be repaired by the Contractor at his expense as directed by and to the satisfaction of the Architect. If, in the opinion of the Architect, the work has been damaged to the extent that satisfactory repairs are not possible or if repairs have been made which are not acceptable, the Contractor shall remove the damaged items and replace with new undamaged items.

3.7 METAL FINISHES SCHEDULE: Color as indicated on drawings or selected by Architect.

3.8 ADJUST AND CLEAN

A. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal is specified in a section within Division 9.

B. For galvanized surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05 5000

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide and install rough carpentry as shown on the drawings, as specified herein, and as needed for a complete and proper installation. This project shall be constructed in accordance with NFPA 5000, 2018 ED, which permits fire retardant treated wood in permanent partitions only.

1.2 REFERENCES:

A. Standards of the following as referenced:

1. American National Standards Institute (ANSI).
2. American Society for Testing and Materials (ASTM).
3. Federal Specifications (Fed. Spec.).
4. Underwriters' Laboratories, Inc. (UL).
5. Uniform Building Code (latest edition)

B. Grading rules and standards of the following apply to materials furnished under this section:

1. American Institute of Timber Construction (AITC).
2. American Lumber Standards Committee (ALSC).
3. American Plywood Association (APA).
4. National Forest Products Association (NFPA).
5. National Bureau of Standards (NBS).
6. Southern Pine Inspection Bureau (SPIB).
7. Southern Forest Products Association (SFPA).
8. West Coast Lumber Inspection Bureau (WCLIB).
9. Western Wood Products Association (WWPA).

C. Plywood grading rules:

1. APA: APA Design/Construction Guide, current edition.
2. NBS product standard PS-1-83, Construction (AITC).

1.3 SUBMITTALS:

A. LEED REQUIREMENTS.

i. “Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data:

1. Submit printed data for installation of sheathing materials.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Storage and protection:

1. Place materials in areas protected from weather immediately upon delivery to Project site.
2. Store materials minimum 6" above ground on blocking: Provide for adequate air circulation and ventilation.
3. Storing seasoned materials in wet or damp portions of building is prohibited.
4. Protect sheet materials from broken corners and damaged surfaces.
5. Stack framing lumber to ensure proper ventilation and drainage. Store against cover in well ventilated building where not exposed to extreme changes of temperature or humidity.

1.6 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Lumber Standards and Grade Stamps: U.S. Product Standard PS 20, American Softwood Lumber Standard and inspection agency grade stamps.

C. Construction Panel Standards: PS 1, U.S. Product Standard for Construction and Industrial Plywood; APA PRP-108.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MATERIALS:

A. General:

1. Dimensions: Indicated lumber dimensions are nominal. Actual dimensions conform to industry standards established by ALSC and the Rules Writing Agencies.
2. Provide materials required for Work under this section suitable for intent and purpose specified. Any species meeting code requirements acceptable unless otherwise specified. Sizes indicated are nominal. Conform to NBS product standard PS-20-70

(Reaffirmed 1981), "American Softwood Lumber Standard" for actual sizes. Provide S4S lumber, surfaced four sides, unless otherwise indicated.

3. Moisture content: 19% maximum at time of permanent closing in of building or structure, except as otherwise indicated.

B. Hardware

1. General:

a. Provide nails, bolts, nuts, washers, screws, expansion bolts, clips, power actuated fasteners, and similar hardware necessary for complete installation of indicated materials.
b. Provide hardware to adequately resist design loads and meet codes.
c. Provide hardware of proper type to secure materials to substrates encountered.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

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. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone**.**

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

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of piece.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
F. Application: Treat all rough carpentry and blocking unless otherwise indicated.

2.4 SOURCE QUALITY CONTROL:

A. Inspection:

1. Grade marks:

a. General: Identify all lumber and plywood by official grade mark of agency approved by ALSC Board of Review.
b. Lumber grading:

1) Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping, or combination designation, rules under which graded, where applicable, and condition of seasoning at time of manufacture.
2) Conform to PS 20-70 (Reaffirmed 1981) with amendments for grading of species used. Current edition of applicable association grading rules govern. All lumber 2" or less in thickness shall bear grade mark of an ALSC Board of Review approved agency.

c. Softwood Plywood: appropriate grade trademark of APA, indicate:

1) Type, grade, class and identification index.
2) Inspection and testing agency mark.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

1. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 ERECTION

A. Accurately lay out Work to provide correct openings to receive other trades.

1. Lay out Work in accord with allowable tolerances indicated in Article 3.03 below.
2. Cut wood framing and carpentry Work square or bearings, closely fitted, accurately set to required lines and levels, and rigidly secured in place.
3. Install all wood framing, necessary blocking, rough bucks, and furring, required by drawings and necessary for proper installation of millwork and other finish carpentry.

## 3.3 INSTALLATION

A. Blocking:

1. Provide nailers, blocking and grounds where required and to support all wall mounted fixtures (Owner and Contractor installed), modular casework (Owner and Contractor installed), and equipment (Owner and Contractor installed). Set work plumb, level and accurately cut. Wedge, align, and anchor blocking with nails or drywall screws through metal studs.
2. Coordinate blocking with locations of finishing materials, fixtures, specialty items, and trim (Owner and Contractor installed), and as required for other divisions of the specifications.

B. Wood framing: Comply with recommendations of NFPA Manual for House Framing, NFPA Recommended Nailing Schedule, and NFPA National Design Specifications for Wood Construction.

C. Plywood: Comply with recommendations of APA Design and Construction Guide - Residential and Commercial.

D. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with other work.

E. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.

F. Restore damaged components. Protect work from damage.

## 3.4 APPLICATION

A. Tolerances, unless indicated otherwise:

1. Location of dimensioned openings: +/-3/8".
2. Variation in rough opening size; +1/4" - -1/8".

## 3.5 SCHEDULE

A. Wood Treatment:

1. Preservative Treatment: AWPA C2 for lumber and AWPA C27 for plywood; waterborne pressure treatment. Provide for wood in contact with soil, attached to exterior face of concrete, attached to exterior face of masonry, dampproofing and waterproofing.
2. Fire-Retardant Treatment: AWPA C20 for lumber and AWPA C27 for plywood; non-corrosive type. Provide at all building locations and blocking for roof flashings. If wood treatment is not recommended by a manufacturer for specific materials the architect shall be notified immediately in writing.

    a. Use treatment that does not promote corrosion of metal fasteners.
    b. Use Exterior type for exterior locations and where indicated.
    c. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
    d. Use Interior Type A, unless otherwise indicated.
    e. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
    f. Application: Treat all miscellaneous carpentry, unless otherwise indicated.

END OF SECTION 06 1000

SECTION 06 1600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Sheathing joint-and-penetration treatment.
3. Flexible flashing at openings in sheathing.

B. Related Sections include the following:

1. Division 01 Section 3100 – Project Management & Coordination
2. Division 06 Section "Rough Carpentry Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 SUBMITTALS

A. LEED REQUIREMENTS

i. “Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

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

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 QUALITY ASSURANCE

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."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

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

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

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Comply with performance requirements in AWPA C27.

   1. Use treatment that does not promote corrosion of metal fasteners.
   2. Use Exterior type for exterior locations and where indicated.
   3. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
   4. Use Interior Type A, unless otherwise indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat all plywood, unless otherwise indicated.

2.4 EXTERIOR WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Product: Subject to compliance with requirements

a. Dens-Glass Gold by G-P Gypsum Corporation.
b. Securock Glass-Matt Sheathing by USG.

2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
3. Size: 48 by 120 inches (1219 by 3048 mm) for vertical installation.

2.5 FASTENERS

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

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

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

C. Power-Driven Fasteners: NES NER-272.

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

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

E. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach sheathing to comply with ASTM C 954.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and

complying with requirements for elastomeric sealants specified in Division 07 "Joint Sealants."

2.7 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.
c. MFM Building Products Corp.; Window Wrap.
d. Polygaurd Products, Inc.; Polyguard 300.
e. Protecto Wrap Company; PS-45.

C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 – EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 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.

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. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

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

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

## 3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

## 3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
1. Prime substrates as recommended by flashing manufacturer.

2. 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.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 06 1600

SECTION 06 4116 – CUSTOM PLASTIC LAMINATE CASEWORK

PART 1 - GENERAL

Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADA ABA AG) 2004 ED.

1.1 SUMMARY OF THE WORK: Furnish delivered to jobsite, unloaded, set in place, leveled and scribed, the work of this Section as indicated on the drawings and as specified and required for a complete installation.

1.2 SECTION INCLUDES:

A. Custom casework: high pressure decorative laminate finish

B. Countertops: high pressure decorative laminate finish

C. Countertops: Composite, Stainless Steel, Solid Surface or Quartz

D. Hardware customarily furnished by the casework manufacturer

E. Installation

1.3 RELATED SECTIONS

A. Rough Carpentry, Section 06 1000, wood blocking, and grounds within finished walls and above finished ceiling

B. Division 5, Metal Fabrications

C. Division 7, Joint Sealants

D. Division 10, Specialties

E. Division 11, Equipment

F. Division 12, Furnishings (Laboratory Casework)

G. Division 21-23, Mechanical Sections

H. Division 26-28, Electrical Sections

1.4 REFERENCES

A. Architectural Woodwork Institute, Architectural Woodwork Standards, edition 1

B. ANSI/BHMA A156.9 - Cabinet hardware

C. NEMA LD3 - High pressure decorative laminate

D. Particleboard – ANSI 208.1 (American National Standards Institute)

E. Softwood plywood – US Products Standards PS1

F. Hardboard – ANSI AHA 135.484 (American Hardboard Association)

G. PVA adhesive (polyvinyl acetate) white glue, Type II ASTM-D3110

H. Aliphatic adhesive (carpenter's glue) Type II

I. Solvent-based contact cement MMM-A-J1308

## 1.5 SUBMITTALS

A. LEED REQUIREMENTS.
   i. "Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. SHOP DRAWINGS:

1. Prior to commencement of work under this section, submit copies as required in Section 01 3300.
2. Submit plans and elevations indicating materials, profiles, assembly methods, joint details, fastening methods, and schedule of finishes. Include hardware cut sheets and lock schedules.
3. Plans and elevations shall show all adjacent wall mounted equipment including mechanical, electrical and special systems items. Coordination of these items is the responsibility of the casework manufacturer. Any field modifications due to conflict with other trades shall be completed at no additional cost to the owner.
4. Submit drawings with dimensions in units of feet and inches.
5. For countertops, show materials, finishes, edge and backsplash profiles, methods of joining and cutouts for plumbing fixtures, grommet locations and other items.

C. SAMPLES:

1. 1 each of plastic laminate color sample as indicated on drawings
2. 1 each of countertop (solid surface, quartz or stainless steel) as indicated on drawings
3. Submit one sample of each type of required hardware in specified finish.

## 1.6 QUALITY ASSURANCE

A. Perform work in accordance with AWI, Architectural Woodwork Standards, Current Edition.

B. Work in this Section shall comply with the specified Grade(s) or Work and Section(s) of the current edition of the Architectural Woodwork Standards.

C. Woodwork manufacturers shall be certified by the AWI Quality Certification

Program as competent to perform the work specified.

D. Certification shall be evidenced through the application of AWI Quality Certification labels and/or the issuance of an AWI letter of certification for the project.

E. Contractors and their personnel engaged in the work of this section shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in a timely manner to ensure uninterrupted progress. Deliver all products with protective covering to prevent damage. Promptly remove damaged materials from job site and make timely replacements.

B. Protect units from moisture damage according to AWI Quality Standards.

C. Environmental Limitations: Do not deliver or install wood work until building is enclosed, wet work is complete, and HVAC is operating and maintaining designed temperature and relative humidity levels for the remainder of the construction period.

1.8 COORDINATION

A. Coordinate work of this Section with other applicable trades.

B. Pre-cut rough-ins for plumbing, electrical and data wherever possible.

1.9 FIELD MEASUREMENTS

A. Where casework is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings.

1.10 WARRANTY.

A. Provide a written warranty that all casework materials and workmanship will be free from defects for a period of one year from the date of Substantial Completion of the project. Any defective work is to be repaired or replaced at no cost to the Owner.

PART 2 PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 APPROVED MANUFACTURERS:

A. The following manufacturers are approved for use based upon their being current participants in the Quality Certification Program (QCP) of the Architectural Woodwork Institute (AWI). If other manufacturers are current participants in the QCP, they may submit for Prior Approval as approved manufacturers:

1. Albuquerque Cabinets, Inc.: 4800 Hawkins NE, Albuquerque, NM 87109.
2. Calmar Manufacturing Co. Inc (Tru-Bilt brand): Calmar, Iowa - Represented by Institutional Products, LLC 230 Cynthia Loop NW, Suite C, Albuquerque, NM 87114.
3. Casework Technologies, Ltd. Co.: 709 Haines Ave. NW, Albuquerque, NM 87102.
4. O.G.B. Architectural Millwork: 3711 Paseo Del Norte, Suite B, Albuquerque, NM 87113.
5. TMI Systems Design Corporation: Dickinson, North Dakota. Represented by Construction Specialties Suppliers, 801 Ranchitos NW, Albuquerque, NM 87114.
6. Westmark Casework: Tacoma, Washington - Represented by A.C.I.E., 4800 Hawkins NE, Albuquerque, NM 87109.
7. P&M Caseworks LLC PO Box Albuquerque, NM
8. Jaynes Structures Millwork: 2906 Broadway NE, Albuquerque NM

2.3 SHEET MATERIALS

A. SOFTWOOD PLYWOOD: Graded in accordance with AWI Grade Custom.

B. WOOD PARTICLEBOARD AND/OR FIBERBOARD: Shall be Industrial Grade Medium Density, complying with current ANSI A208.1 9 (particle board) or ANSI A208.2 (fiberboard), and shall be a “45 lb” board.

C. WOOD FIBERBOARD FOR MOISTURE APPLICATIONS: Substrate for all countertops with sinks shall be 3/4” MEDEX NC as manufactured by SierraPine complying with ANSI A208.2-1994, “45 lb” board.

D. THERMOSET DECORATIVE OVERLAY: Particleboard or medium density fiberboard with surface of thermally fused, melamine–impregnated decorative paper complying with LMA SAT-1. Color: White.

E. COMPOSITE COUNTERTOPS: As scheduled on Drawings, subject to compliance with manufacturers requirements.

2.4 HIGH PRESSURE DECORATIVE LAMINATE

A. AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering high pressure decorative laminate that may be incorporated into the work include:

1. As noted on drawings.

2.5 LAMINATE COLORS AND PATTERNS

A. As indicated on drawings.

2.6 HARDWARE

Substitutions for the following products shall be submitted for approval prior to bidding in accordance with the requirements of Section 01 6300 Product Substitution Procedures. Substitutions after the bid will not be allowed.

A. HINGES

a. Classrooms, work rooms, food services areas & other public use spaces, provide one of the following (quantity of hinges per door as required by the manufacturer):

1. RPC – 5-knuckle overlay hinges 2-3/4" height, Nickle-plated hinge
2. Or approved manufacturer

b. Offices, conference rooms and other private use spaces provide one of the following (quantity of hinges per door as required by the manufacturer):

1. GRASS - Tiomos 120, Soft-closing, Nickle-plated hinge & mounting plate
2. Or approved manufacturer

B. PULLS

a. Door and drawer pulls shall be back mounted, solid metal, 4 inches long, 5/16 inch in diameter wire pulls with round safety corners and surfaces eliminating the possibility of garments and equipment from getting caught. Satin nickel finish.

C. LOCKS

a. Provide on all doors and drawers unless noted otherwise on drawings. Brand: TIMBERLINE Cam Lock, Model CB-080 through 199 series. Locks to have a Bezel. Strike plates used where appropriate.

b. Keying Requirements: All locks in a single room shall be keyed alike. Locks shall be keyed different from room to room. Provide 2 master keys.

D. LATCHES: EPCO Model number 1018-N. Use on inactive door opposite locks.

E. DRAWER SLIDES: Drawer slides for all standard drawers:

a. ACCURIDE - #3832E Box Drawer Slide (Basis of design)
b. BLUM
c. GRASS

d. MEPLA
e. Or approved manufacturer

F. OVERSIZED DRAWER SLIDES: Drawer slides for all large format style cabinets, 24 inches or greater wide, shall be regular extension epoxy coated by one of the following.

a. BLUM 230E; 100 lb. Bottom Mount drawer slide with stay-close detents.
b. GRASS 6610; 100 lb. Bottom Mount drawer slide with stay-close detents.
c. MEPLA-AFIT AL 1700; Bottom Mount drawer slide.

G. CASEWORK SHELF SUPPORTS: Bainbridge Mfg, 5mm dual pin part #3220WH

H. HORIZONTAL DIVIDER SUPPORTS: Hafele 5mm steel wire ("magic wire"). Furnish in size appropriate to shelf size.

I. WARDROBE CABINET HARDWARE:

a. CLOSET ROD: Knape & Vogt #750 I Regular. Chrome-look finish.
b. ROD FLANGES: Knape & Vogt #734 & #735 per rod. Chrome-look finish.
c. ROD CENTER SUPPORTS: Knape & Vogt #1195. White.
d. HOOKS: IVES #582 dual hook. Chrome-look finish.
e. MIRROR: 12" x 12" x 1/4" All edges covered with chrome or molded PVC trim. Fasten to back side of cabinet door with mirror clips.

J. COUNTERTOP WIRING GROMMETS: 2 1/2"diameter with covers. Color black unless otherwise noted.

K. CABINET DOOR RESTRAINT: 8" long, braded wire with PVC coating. Furnish and install on cabinet doors adjacent walls and other areas where opening is required to be restricted to 90 degrees. Install at top of door.

## PART 3 – EXECUTION

### 3.1 LEED REQUIREMENTS

1. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

### 3.2 FABRICATION - CABINET COMPONENTS

A. GENERAL:

1. Comply with the AWI Architectural Woodwork Standards (latest edition) Custom Grade.

2. Reference Section 400-G-3, Identification of Parts, for the criteria of exposed and semi-exposed surfaces.
3. Cabinet width dimensions are not to exceed 32" for both wall cabinets and base cabinets. Cabinets that exceed 32" shall have a center support. Sink base cabinets and Oversized drawer cabinets will be the only exceptions.
4. Private use spaces cabinetry style shall be constructed per Section 400-G-7, A; Flush Overlay.
5. Public use spaces cabinetry style shall be constructed per Section 400-G-7, B; Reveal Overlay.
6. Furnish and install filler panel scribed to wall as required for a continuous built-in appearance. Filler panel shall match the adjacent cabinet surface.
7. Seal all fixed cabinet components to adjacent wall surfaces.
8. Cover all exposed fasteners inside cabinet with matching color cover caps. FastCap (888) 443-3748 or equivalent.

B. DRAWERS:

1. Drawer fronts shall be 3/4" thick particleboard overlaid with high-pressure plastic laminate on both faces. Edges are banded with 3mm PVC with outer edges 1/8" radius. PVC edge shall match the face.
2. Steel Drawer Systems: Drawer bottoms and backs shall be 3/4" thick thermo fused melamine. Color to match cabinet interior. Edges are banded with .5mm PVC color to match cabinet interior.

3. Built Drawer Boxes:

    a. Drawer sides, sub front and backs shall be 1/2" thick minimum thermofused melamine. Color to match cabinet interior. Edges are banded with .5mm PVC color to match cabinet interior.
    b. Drawer bottoms shall be 1/2" thick minimum thermofused melamine. Color to match cabinet interior. Sides are rabbeted to accept bottom and bottom is to be glued and screwed as well as supported by screws from the bottom mount slides.

C. DOORS: Doors shall be 3/4" thick particleboard overlaid with a high-pressure plastic laminate on both faces. Edges are banded with 3mm PVC with outer edges 1/8" radius. PVC edge shall match the face.

D. CABINET ENDS, TOPS & BOTTOMS:

1. All panels shall be constructed with 3/4" particleboard as the core material.
2. At Semi-exposed (see AWI standards for definition and locations) ends, tops or bottoms the particleboard shall be overlaid with thermofused melamine on the exterior face.
3. At Exposed (see AWI standards for definition and locations) ends, tops or bottoms, the particleboard shall be overlaid with a high pressure decorative laminate on exposed faces. The inside color shall match the cabinet interior with the face color to match

exterior color. The front edges shall be banded with .5mm PVC edge shall match the face.

4. In cabinets with doors, the interior surfaces of the particleboard shall be overlaid with either high pressure laminate cabinet liner or thermofused melamine. The color shall match the melamine surfaced back color. The front edges shall be banded with .5mm PVC to match exposed face color or as selected by the Architect from the colors submitted.
5. In open cabinets (without doors), the interior surfaces of the particleboard shall be overlaid with high pressure decorative to match exposed exterior color. The front edges shall be banded with .5mm PVC to match exposed face color or as selected by the Architect from the colors submitted.
6. All end panels shall be drilled for adjustable shelf supports with .5mm diameter holes on 32mm (1 1/4") centers. For shelves up to and including 30" depth, two vertical sets of holes shall be provided at each end panel. For shelves over 30" deep, three vertical sets of holes shall be provided at each end panel.

E. FIXED AND ADJUSTABLE SHELVES:

1. Semi-exposed Shelves: Regardless of cabinet width, all shelves shall be 1" thick particleboard overlaid with thermofused melamine on top and bottom faces. Color to match cabinet interior.
2. Exposed Shelves: Regardless of cabinet width, all shelves shall be 1" particleboard overlaid with high pressure decorative laminate. Color to match exterior unless otherwise noted on the drawings.
3. All four edges of shelves and front edge of fixed shelves shall be banded with .5mm edge banding in color to match shelf color.

F. CABINET BACKS:

1. All semi-exposed cabinet backs shall be 3/4" thick minimum thermofused melamine. Color to match cabinet interior.
2. All exposed backs shall be 3/4" thick minimum particleboard overlaid with a high-pressure plastic laminate. Color to match exterior for exposed backs.
3. Provide removable backs for service access where shown on the project drawings.
4. All backs shall be full bound by all sides, tops and bottoms of the cabinet.

G. DIVIDERS AND PARTITIONS:

1. Vertical dividers and partitions shall be 3/4" particleboard overlaid with thermofused melamine on both faces when semi-exposed and high pressure decorative laminate for exposed surfaces. The exposed edges shall be banded with .5mm PVC to match the other case edges.
2. Fixed Horizontal Dividers: Where indicated on the drawings, dividers less than 6" apart and less than 12" wide shall be 1/4" tempered hardboard grooved into adjacent cabinet members. The edges shall be sanded and entire shelf clear sealed.
3. Adjustable Horizontal Dividers: Where indicated on the drawings, dividers shall be 3/4" particleboard overlaid with thermofused melamine on both faces when semi-exposed and high pressure decorative laminate for exposed surfaces. Dividers shall be

grooved to accept steel “magic wire” supports. The exposed edges shall be banded with .5mm PVC to match the other case edges

H. CABINET TOE BASES:

1. Cabinet bases shall be 4” standard height made in continuous lengths to ensure straight, level and true line of casework. The standard core materials shall be 3/4” particleboard. In rooms with floor drains, the core material shall be “Medex” MDF board or equal.
2. Bases shall be unfinished and ready for scheduled base finish to be applied.

I. OVERSIZED (FLAT FILE) CABINETS:

1. Drawer slides shall be as required in hardware section 2.6.
2. Drawer sides, sub front and backs shall be 1/2” thick minimum thermofused melamine. Color shall match cabinet interior. Edges shall be banded with .5mm PVC color to match cabinet interior.
3. Drawer bottoms shall be 1/2” thick minimum thermofused melamine. Color shall match cabinet interior. Sides shall be rabbeted to accept bottom and bottom is to be glued and screwed as well as supported by screws from the bottom mount slides.
4. Oversized drawers over 24” wide shall have 2 pulls per drawer face.
5. Provide a paper curl stop on each drawer box located at the top back of the drawer box. Stop shall be 4” wide by 1/4” thick melamine panel and shall be screw attached.

J. FIXED CLOSET /STORAGE SHELVING:

1. Exposed Shelves: Regardless of shelf width, all shelves shall be 1” thick particleboard overlaid with thermofused melamine on top and bottom faces. Color to be white. Provide 1X wood nailer as ledger board. Shelf shall have 2x continuous wood support at leading edge. Vertical supports to be 1x hardwood supports at no more than 36” on center, mortised into shelf. All exposed surfaces to be overlaid with edge banded thermofused melamine to match shelf. Seal all shelving units to adjacent surfaces.

3.3 FABRICATION - COUNTER TOPS

A. GENERAL:

1. Comply with the AWI Quality Standards (latest edition) Custom Grade.
2. Decorative laminate counter tops shall be PF42 NEMA grade laminate with .020” backing sheet bonded to 3/4” particleboard substrate. Adhesives shall be either Type II PVA or contact cement depending on the size of the materials and job conditions.
3. Decorative laminate color selections shall be as noted on drawings
4. Counter top thickness shall be as noted in Section B. below.
5. Where tops and back splashes in which sinks occur, utilize an industrial grade particle board or fiberboard with a 24 hour thickness swell factor of 5% or less and a 24 hour water absorption factor of 10% or less.
6. Counter tops shall be furnished in the longest lengths possible. When joints are required, they shall be factory prepared with a minimum of three 1/4” joint bolts each. Joints shall be field assembled with waterproof sealant to ensure stable and rigid construction. Avoid joints within 24” of sinks or knee spaces.

7. Seal all countertop units to adjacent surfaces.
8. Countertop types are in locations shown on drawings, all types may not be used.

B. COUNTERTOPS:

1. 180 Degree Wrap Post Forming Decorative Laminate Counter Tops with Integral Backsplash:

    a. Overall counter top thickness shall be 1 1/4" with buildup added to the substrate. A 1/4" wide x 1/4" deep drip groove shall be cut in the underside of the top in from the leading edge of the counter top. Standard overhang from cabinet body along front shall be 1 1/2". Exposed end overhang shall be 1/2".
    b. Post-formed counter tops shall be PF42 NEMA grade laminate with .020" backing sheet bonded to 3/4" particleboard substrate. This laminate shall be heated and then wrapped around the substrate as designed.
    c. Back splashes shall be 3/4" thick and 4" high self-edged, unless specified otherwise.

2. Stainless-Steel Countertops:

    a. Formed from 0.109 in. stainless-steel sheet; reinforced with steel shapes or steel plate, with minimum 1-1/2" flanged edges.
    b. Size and location as indicated on drawings
    c. Back splashes shall be 3/4" thick and 4" high integral with the top.
    d. All exposed outside corners of countertops shall be ½" radius minimum.
    e. Finish:

        1) Grind and polish surfaces to produce uniform finish, free of cross scratches.
        2) Run gran of directional finishes with long dimension of each piece.
        3) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
        4) Directional Satin Finish: No. 3

3. Solid-Surface-Material Countertops

    a. Manufacturers as indicated on drawings or prior approved equivalent.
    b. Colors and patterns as indicated on drawings.
    c. Provide countertops with the following front and backsplash style:
        1) Front: 1-1/2" laminated, straight, slightly eased top, polished
        2) Backsplash: Straight, slightly eased at corner, polished
        3) Endsplash: Matching backsplash
    d. Countertops: 1/4" thick, solid surface material laminated to 3/4" thick particleboard (water resistant in wet areas) with front edge built up with 3/4" thick solid surface material.
    e. Backsplash: 3/4" thick, solid surface material.
    f. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1) Fabricate with loose backsplashes for field assembly.

4. Quartz Countertops

a. Manufacturers as indicated on drawings or prior approved equivalent.
b. Colors and patterns as indicated on drawings.
c. Provide countertops with the following front and backsplash style:
    1) Front: 1-1/2" laminated, straight, slightly eased top, polished
    2) Backsplash: Straight, slightly eased at corner, polished
    3) Endsplash: Matching backsplash
d. Countertops: 3/4" thick, quartz with front edge built up with same material.
e. Backsplash: 3/4" thick, solid surface material.
f. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Install over 3/4" particle board (water resistant in wet areas). Comply with quartz material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
    1) Fabricate with loose backsplashes for field assembly.

## 3.4 EXAMINATION

A. Verify adequacy of in wall backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work

C. Before installing architectural woodwork, examine shop fabricated work for completion and complete work as required, including back priming and removal of packing.

D. Condition building and woodwork to average prevailing humidity conditions in installation areas before installing.

## 3.5 INSTALLATION

A. Install work in accordance with AWI Quality Standards (latest edition).

B. Set and secure materials and components in place, plumb and level. Shim as required with concealed shims.

C. Scribe work abutting other components or work. Refinish cut surfaces or repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates per AWI Standards. Secure to grounds, strapping and blocking with countersunk, concealed fasteners with blind nailing where possible for a complete installation.

E. CABINETS: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

F. TOPS: Anchor securely to base units and other support systems as indicated. Caulk space between top/backsplash and wall or between top and adjacent cabinet with specified sealant.
   1. Install countertops level to a tolerance of 1/8" in 8'-0"
   2. Fasten solid surface & quartz countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

## 3.6 ADJUSTING AND CLEANING

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

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

## 3.7 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to fabricator and installer that ensures that woodwork is without damage or deterioration at the time of Substantial Completion.

END OF SECTION – 06 4116

# SECTION 06 6450 - FIBERGLASS REINFORCED PLASTIC PANELS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Fiberglass reinforced polyester panel system for adhesive mounting.

B. Moldings, adhesive, and joint sealants.

### 1.2 RELATED SECTIONS

A. Section 09 2900 – Gypsum Board Assemblies.

### 1.3 REFERENCES

A. ANSI/AHA A135.5 - Prefinished Hardboard Paneling; current edition.

B. ASTM D 256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; current edition.

C. ASTM D 523 - Standard Test Method for Specular Gloss; current edition.

D. ASTM D 570 - Standard Test Method for Water Absorption of Plastics;

E. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics; 1997 current edition.

F. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer; current edition.

G. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; current edition.

H. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; current edition.

I. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; current edition.

J. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; current edition.

K. ASTM D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; current edition.

L. ASTM D 2197 - Standard Test Methods for Adhesion of Organic Coatings by Scrape Adhesion; current edition.

M. ASTM D 2486 - Standard Test Method for Scrub Resistance of Wall Paints; current edition.

N. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; current edition.

O. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; current edition.

1.4 SUBMITTALS

A. LEED REQUIREMENTS.

i. “Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Adhesives

B. Selection Samples: For each finish specified, one complete set of color chips representing manufacturer's full range of available colors and patterns.

C. Maintenance Instructions: Deliver to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MANUFACTURERS

A. Acceptable Manufacturer: Marlite; 202 Harger Street, Dover, OH 44622. ASD. Tel: (330) 343-6621. Fax: (330) 343-7296. Email: info@marlite.com www.marlite.com

B. Requests for substitutions will be considered in accordance with provisions of the Bidding Documents.

2.3 APPLICATIONS

A. Install panels in the following locations:

1. Kitchen and corridors leading to kitchen
2. Janitors closets
3. Locations indicated on drawings

2.4 PANEL SYSTEM

A. Plastic Panel System: Factory finished panels, trim, sealant, and accessories.

B. Panels: Marlite FRP Panels; fiberglass reinforced polyester, USDA approved for incidental food contact.
1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E 84 (Class A/I).
2. Surface Texture: Gently pebbled, high-gloss.
3. Thickness: 3/32 inch (2.4 mm), nominal.
4. Width: 48 inches (1200 mm).
5. Height: 120 inches (3048 mm).
6. Flexural Strength: 10,000 psi (69 MPa), when tested in accordance with ASTM D 790.
7. Flexural Modulus 3,100 psi (213 MPa), when tested in accordance with ASTM D 790.
8. Tensile Strength: 7,000 psi (48 MPa), when tested in accordance with ASTM D 638.
9. Tensile Modulus: 1,600,000 psi (11032 MPa), when tested in accordance with ASTM D 638.

10. Barcol Hardness: 35, when tested in accordance with ASTM D 2583.
11. Impact Resistance: 7.2 ft-lb/in (1260 N/m), when tested in accordance with ASTM D 256, Izod method.
12. Coefficient of Thermal Expansion: 0.0000157 in/in/degree F (0.0000283 mm/mm/degree C), measured in accordance with ASTM D 696.
13. Water Absorption: 0.72 percent, when tested in accordance with ASTM D 570.
14. Specific Gravity: 1.8, when tested in accordance with ASTM D 792.
15. Color: As noted on drawings or selected by Architect from manufacturer's standard selection.

C. Panel Trim: Extruded PVC, in manufacturer's standard colors.

1. Outside corners, inside corners, edge trim, and division molding.
2. Base Molding: Design that simplifies installation and helps seal wall panel system, with factory made corners and splices.
3. Borders: 4 inch (100 mm) wide decorative strips made of same material as panels.

D. Sealant: Marlite Silicone Sealant; gunnable silicone rubber.

1. Color: White, low gloss.

PART 3 EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

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

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.3 PREPARATION

A. Take panels out of cartons and allow to acclimatize to room conditions for at least 48 hours prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.

D. Protect existing surfaces from damage due to installation.

3.4 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use the adhesives recommended by the panel manufacturer unless prohibited by local regulations; obtain manufacturer's approval of alternative adhesives. Apply adhesive per manufacturer’s recommendations.

C. Install continuous bead of silicone sealant in each joint and trim groove and between trim and adjacent construction, maintaining 1/8 inch (3mm) expansion space.

D. Avoid contaminant of panel faces with adhesives, solvents, or cleaners; clean as necessary and replace if not possible to repair original condition.

E. Protect installed products until completion of project.

F. Touch-up, repair or replace damaged products after Substantial Completion.

END OF SECTION 06 6450

# SECTION 07 1000 - UNDER-SLAB VAPOR BARRIER/RETARDER

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Products Supplied Under This Section

1. Vapor Barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs on grade.

B. RELATED SECTIONS

1. Section 01 3100 Project Management and Coordination
2. Section 03 3000 Cast-in-place Structural Concrete

### 1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E 1745-11, (2011) Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
2. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials
4. ASTM 1643-11, (2011) Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

B. American Concrete Institute (ACI)

1. ACI302.2R-06 *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials*

### 1.3 SUBMITTALS

A. LEED REQUIREMENTS.

i. “Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Quality Control/ Assurance

1. Manufacturer's samples, literature
2. Product certificates signed by the manufacturer of the products certifying that their products comply with specified requirements.
3. Manufacturer's installation instructions for placement, seaming the pipe boot installation.

1.4 SUBMITTALS

A. Product Review
   1. Independent laboratory test results showing compliance with the specified requirements (woven plastics are not permitted).
   2. Substitutions: See Section 01 6300 – Product Substitutions Procedures

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MATERIALS

A. Vapor Barrier (performance based specification). When the specifications of different sections conflict, the contractor shall perform to the most restrictive provision.

   1. Vapor Barrier membrane must have the following properties.

      a. Permeance Ratings as per ASTM E-96 or ASTM F-1249

         i. New material: Lass than 0.01 perms [grains/(ft²*hr*in-Hg)]
         ii. After mandatory conditioning as per ASTM E-154 Sections 8, 11, 12, & 13: Less than 0.01 perms [grains/(ft²*hr*in-Hg)]

      b. Strength: ASTM E-1745 Class A
      c. Minimum thickness: 15 mils
      d. Basis of Design: Stego Wrap 15-mil Vapor Barrier by Stego Industries LLC
      e. Acceptable Vapor Barrier Products (must comply with minimum performance requirements listed):

         i. Stego Wrap 15-mil Vapor Barrier by Stego Industries LLC (Basis of Design).
         ii. VaporGaurd by Reef Industries
         iii. Vaporflex by Layfield
         iv. Prior approved equal complying with all specified requirements

2.3 ACCESSORIES

A. Seam Tape

1. Tape must have the following qualities:
2. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower Seam Tape

    a. Stego Tape by Stego Industries LLC

B. Vapor Proofing Mastic

1. Mastic must have the following qualities:

    a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower Mastic
    b. Stego Mastic by Stego Industries LLC

C. Pipe Boots

1. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

D. Perimeter/edge seal:

1. Stego Crete Claw by Stego Industries LLC, (887) 464-7834 www.stegoindustries.com

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

1. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 PREPARATION

A. Ensure that subsoil is approved by architect or geotechnical firm

1. Level and tamp or roll aggregate, sand or tamped earth base.

3.3 INSTALLATION

A. Install Vapor Barrier/Retarder:

1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98 (2005).

    a. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.

b. Extend vapor barrier over footings and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.
c. Extend vapor barriers in crawl spaces 6” minimum from top of exterior grad beams.
d. Seal vapor barrier to slab perimeter/edge using Stego Crete Claw and remove dirt, debris, and mud from Crete Claw prior to concrete placement.
e. Overlap joints 6 inches and seal with manufacturer's tape.
f. Apply tape/Crete Claw to a clean and dry vapor barrier.
g. Seal all penetrations (including pipes) per manufacturer's instructions.
h. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
i. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 07 1000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Perimeter wall insulation (supporting backfill).
2. Concealed building insulation.
3. Exposed building insulation.
4. Vapor retarders.

B. Related Sections include the following:
1. Division 3 Section "Cast-in-Place Concrete."
2. Division 4 Section "Reinforced Unit Masonry" for insulation installed in cavity walls and masonry cells.
3. Division 7 Section “Masonry Wall Insulation”
4. Division 7 Section "Bituminous Damproofing" for insulation installed with waterproofing.
5. Division 7 Section “Roofing" for insulation specified as part of roofing construction.
6. Division 9 Sections "Gypsum Board Assemblies" for installation in metal-framed assemblies of insulation specified by reference to this Section.
7. Division 21- 23 Sections "Duct Work Insulation” and "Piping Insulation."

1.3 SUBMITTALS

A. LEED REQUIREMENTS.
i. “Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product indicated.

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

D. Research/Evaluation Reports: For foam-plastic insulation.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method

indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Fire-Resistance Ratings: ASTM E 119.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect Plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Extruded-Polystyrene Board Insulation:

a. DiversiFoam Products.
b. Dow Chemical Company.
c. Owens Corning.
d. Tenneco Building Products.
e. InsulFoam.

2. Glass-Fiber Insulation:

a. CertainTeed Corporation.
b. Johns Manville Corporation.
c. Knauf Fiber Glass.
d. Owens Corning.

3. Perimeter Fire-Containment Systems:

a. United States Gypsum Co.

2.3 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.
1. Performed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:

1. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m), unless otherwise indicated.

C. Unfaced, Flexible Glass-Fiber Batt Insulation: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:

1. Nominal density of not less than 1.5 lb/cu. ft. (24 kg/cu. m) nor more than 1.7 lb/cu. ft. (26 kg/cu. m), thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
2. Combustion Characteristics: Passes ASTM E 136.

D. Foil-Faced, Flexible Glass-Fiber Batt Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III; faced on one side with foil-scrim-kraft vapor retarder; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:

1. Nominal density of not less than 1.5 lb/cu. ft. (24 kg/cu. m) nor more than 1.7 lb/cu. ft. (26 kg/cu. m), thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

2.4 VAPOR RETARDERS

A. Polyethylene Vapor Retarder: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.5 AUXILARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

1. Adhesively Attached, Spindle-Type Anchors:

a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
b. Eckel Industries of Canada Limited; Stic-Klip Type N Fasteners.
c. Gemco; Spindle Type.

2. Adhesively Attached, Angle-Shaped, Spindle-Type Anchor:

a. Gemco; 90-Degree Insulation Hangers.

3. Insulation-Retaining Washers:

a. AGM Industries, Inc.; RC150.
b. AGM Industries, Inc.; SC150.
c. Gemco; Dome-Cap.
d. Gemco; R-150.
e. Gemco; S-150.

4. Anchor Adhesives:

a. AGM Industries, Inc.; TACTOO Adhesive.
b. Eckel Industries of Canada Limited; Stic-Klip Type S Adhesive.
c. Gemco; Tuff Bond Hanger Adhesive.

B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
2. Spindle: Copper-coated, low carbon steel, fully annealed, 0.105 inch (2.67 mm) in diameter, length to suit depth of insulation indicated.

C. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
2. Spindle: Copper-coated, low carbon steel, fully annealed, 0.105 inch (2.67 mm) in diameter, length to suit depth of insulation indicated.

D. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

## PART 3 – EXECUTION

### 3.1 LEED REQUIREMENTS

1. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table
    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

### 3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

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

### 3.3 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

### 3.4 INSTALLATION, GENERAL

A. Comply with insulation manufacturer’s written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.

C. Extend insulation or thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove deleterious projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

F. Install foam sill seal gasket between concrete foundation and exterior sill plate.

## 3.5 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

1. If not indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.

## 3.6 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Install foil-faced, flexible glass-fiber batt insulation exposed to plenum areas

E. Install unfaced flexible glass-fiber insulation in building cavities which are not exposed to plenum areas

F. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

G. Install board insulation on concrete or CMU substrates by adhesively attached, spindle-type insulation anchors as follows:

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

H. Stuff glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m). Inject foam insulation into inaccessible cavities.

## 3.7 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder 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 not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.

C. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.

D. 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 retarder.

E. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.8 PROTECTION

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

END OF SECTION 07 2100

SECTION 07 4100 – METAL SOFFIT PANEL - FLUSH

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes
   1. Preformed, prefinished soffit panels.
   2. Fasteners.

B. Related Sections
   1. Section 06 1000 - Rough Carpentry
   2. Section 07 6200 - Sheet Metal Flashing and Trim
   3. Section 07 9200 - Joint Sealants

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM A167: Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
   2. ASTM A653: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by the Hot-Dip Process
   3. ASTM D226: Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. Architectural Sheet Metal Manual

1.3 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

1. Product Data: Manufacturer's product literature for the roofing specified.
2. Shop Drawings: Indicate thickness and dimension of parts, flashing and anchoring methods, and detail and location of joints; including joints necessary to accommodate thermal movement.
3. Samples
   a. 2 samples of each type of panel assembly, 12 inch by 12 inch minimum.
   b. 1 sample of each finish in color or colors selected, 3 inch by 5 inch minimum.
4. Affidavit certifying that the material meets the requirements specified.

**Comment [SBS1]:** KEEP INF.?

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 5 years' experience in manufacturing metal panels similar to those specified.

B. Installer Qualifications: Acceptable to panel manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site in manufacturer's original crating, properly labeled for identification and installation purposes. Store materials in accordance with panel

manufacturer's recommendations. Handle materials carefully to avoid damage to panels and finishes.

1.6 WARRANTY

A. Project warranty refers to Conditions of the Contract for project warranty provisions. Manufacturer's warranty: submit, for Owner's acceptance, manufacturer's standard warranty documents executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under Contract Documents.
B. The Contractor shall warrant the materials to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by paint manufacturer's standard multi-year warranty. The warranty shall be in writing and shall be signed by the manufacturer.
C. Materials Manufacturers: Repair or replace defective materials for a period of two (2) years.
D. Panel System Installer: Repair or replace products or components which fail due to faulty workmanship for a period of two (2) years.
E. Painted Finish: Coatings Manufacturer and applicator to warrant paint for a period of twenty (20) years after the Effective Date, the factory applied finish applied by the applicator.
    a. WILL NOT chip, crack or peel (lose adhesion) but does not include minute fracturing which may occur in proper fabrication of building parts.
    b. WILL NOT chalk in excess of ASTM D-4214-89 number eight (8) rating, determined by the procedure outlined in ASTM D-4214-89 specification test.
    c. WILL NOT change color more than five (5) Delta-E Hunter units (square roof/wall of the sum of square Delta L, Delta a, and Delta b) as determined by ASTM method D-2244. It is acknowledged that fading or color changes may not be uniform if the surfaces are not equally exposed to the sun and elements.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MANUFACTURER

A. Firestone Metal Products
B. Roll Fab Metal Products
C. Alternate systems by other manufacturers/fabricators are to be submitted to the architect not less than 10 working days prior bid.

2.3 PANEL TYPE

A. UNA-CLAD UC-500 Flush Seam Panels, roll formed steel soffit panels.

2.4 PANEL MATERIALS AND FABRICATION

A. Steel Panels: ASTM A653, 24-gauge, G90 (lock-forming quality), extra smooth, tension-leveled, galvanized steel, minimum spangle.
B. 24 gauge.

C. Form panels in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.
   1. Panel Depth: 1 inch.
   2. Panel Width: 12 inches.

F. Fabricate panels with an interlocking leg (male/female interlocking joint design).

2.5 ACCESSORIES

A. Fasteners: Concealed, non-corrosive, 5/8 inch self-tapping sheet metal screws for securing to metal substrate.

2.6 FINISHES

A. Coil-Coated or Spray-Applied Fluorocarbon Resin
   1. Color: Selected by Architect/Engineer from manufacturer's standard colors.
   2. Number of Coats: Minimum 2-coats as recommended by manufacturer dependent on color selection.
   3. Provide factory applied strippable plastic film for protection during fabrication and installation.

PART 3 – EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

   i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Examine the areas and conditions under which materials are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Surfaces to receive panels shall be even, smooth, sound, clean, dry, free of ice and snow, and free from defects.

3.3 PREPARATION

A. Obtain field measurements prior to completion of manufacturing and finishing. When field measurements are not possible, provide method of installation that will allow minor adjustment in the field.

3.4 INSTALLATION

A. Install panel system plumb, level and true, in accordance with manufacturer's instructions, final shop drawings, and SMACNA Architectural Sheet Metal manual and standard practices.

B. Completed system shall be free from overbending, deforming, stretching. distortion, waves, and buckles.

3.5 ADJUSTING AND CLEANING

A. Repair panels with minor damage.

B. Remove panels damaged beyond repair and replace with new panels to match adjacent undamaged panels.
C. Clean exposed panel surfaces promptly after installation in accordance with recommendations of panel and coating manufacturers.
D. Remove protective film immediately after installation.

END OF SECTION 07 4100

SECTION 07 4265 THERMAL WALL SYSTEM (Continuous Exterior Wall Insulation) CI

PART 1 - GENERAL

1.1 SUMMARY

A. Provide continuous insulation, air barrier, and water barrier in the following exterior wall assemblies:

1. Metal Panel Systems on steel stud, concrete masonry unit or concrete walls
2. Brick cavity wall on steel stud, concrete masonry unit or concrete walls
3. Cement plaster exterior finish on steel stud, concrete masonry unit or concrete walls

B. Section Includes:

1. Aluminum Foil Clad Foam-Plastic Board Insulation
2. Glass Faced Foam-Plastic Board Insulation

1.2 RELATED SECTIONS

A. Section 01 3100 – Project Management and Coordination

B. Section 04 2113 - Brick Veneer Masonry

C. Section 04 2300 - Reinforced Unit Masonry

D. Section 07 2726 - Fluid Applied Water & Air Barrier

E. Section 07 4212 - Aluminum Honeycomb Panel System

F. Section 07 4213 - Metal Wall Panel System

G. Section 07 4214 - Single Skin Flat Metal Wall Panel System

H. Section 07 4216 - Insulated Metal Panel System

I. Section 07 4243 - Aluminum Composite Panel System

J. Section 07 4244 - Aluminum Composite Rain Screen System

K. Section 09 2240 - Three Coat Stucco System

1.3 REFERENCES

A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.

1. Test Method for breaking Load and Flexural Properties of Block-Type Thermal Insulation ASTM C203
2. Test Method for comprehensive Properties of Rigid Cellular Plastics ASTM D1621
3. Test Method for Apparent Density of Rigid Cellular Plastics ASTM D1622
4. Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging ASTM D2126
5. Test Method for Water Vapor Transmission of Materials ASTM E96/E96M
6. National Fire Protection Association (NFPA) 285: Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus

1.4 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product indicated.

C. Submit Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product verifying qualities of insulation components meet or exceed specified requirements.

D. Submit Field Inspection and Field-Testing Reports in accordance with Field Quality Control requirements.

E. Manufacturers printed installation instructions for each type of material to be used.

F. Samples: Submit the following material samples:

   1. 12” square insulation panels of each type and thickness of insulation specified
   2. Insulation fasteners
   3. Joint tape minimum of 12” long
   4. Flashing tape minimum of 12” long and of width specified
   5. Thru-wall flashing minimum of 12” long and of width specified

G. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES

H. Mock-Up: See section 03-3100 Project Management and Coordination for Building Assemblies Mock-up requirements.

1.5 QUALITY ASSURANCE

A. Source Limitations: Provide each type of building insulation and related accessories from one single manufacturer.

B. Installer Qualifications:
   1. Contractor shall provide evidence of having completed 3 projects of similar size and scope in the past 3 years.
   2. Contractor shall provide evidence of certification by the rigid insulation manufacturer as having been properly trained in the proper installation of the submitted products.

C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

D. Assembly Fire Propagation Characteristics: Provide results of tests performed on wall assemblies tested by manufacturer in accordance with NFPA 285.

E. Pre-Installation Meeting: Prior to start of insulation installation review and document insulation installation methods and procedures including:

   1. Participants
   2. Substrate conditions
   3. Manufacturers installation guidelines
   4. Construction schedule
   5. Governing regulatory requirements and requirements for insurance
   6. Review field quality control procedures

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project Site before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

   i. Submittal Requirements for LEED v4 Materials and Resources Credits.

ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 INSULATION

A. Continuous Insulation:

1. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C1289, Type I, Class 1, with maximum flame-spread and smoke-developed indexes of ≤ 25 and ≤ 450, respectively, per ASTM E84.
    a. Minimum Compressive Strength ≥ 25 psi when tested per ASTM D1621
    b. Minimum Tensile Strength ≥ 1000 when tested per ASTM C209
    c. Minimum Flexural Strength ≥ 40 psi when tested per ASTM C203
    d. Water Vapor Transmission ≤ 0.03 perms per inch when tested per ASTM E96
    e. Water Absorption Maximum ≤ 1% by volume when tested per ASTM C209
    f. Dimensional Stability, Maximum ≤ 0.05% length and width, and ≤ 3.5% thickness when tested per ASTM D2126
    g. Recycled Content: Pre-consumer recycled content not less than 3.4%

2. Glass faced (at cement plaster locations), Polyisocyanurate Board Insulation: ASTM C1289, Type I, Class 1, with maximum flame-spread and smoke-developed indexes of ≤ 25and ≤ 450, respectively, per ASTM E84.

    a. Minimum Compressive Strength ≥ 25 psi when tested per ASTM D1621
    b. Minimum Tensile Strength ≥ 1000 when tested per ASTM C209
    c. Minimum Flexural Strength 40 psi when tested per ASTM C203
    d. Water Vapor Transmission ≤ 0.95 perms per inch when tested per ASTM E96
    e. Water Absorption Maximum ≤ 0.1277% by volume when tested per ASTM C209
    f. Dimensional Stability, Maximum ≤ .2% length and width, and ≤ 3.0% thickness when tested per ASTM D2126
    g. Recycled Content: Pre-consumer recycled content not less than 3.4%

3. Stabilized R-Value: Min 6.5 per inch (see drawings for thickness)

B. Basis of Design Firestone Building Products Co., Carmel, IN. www.firestonebpco.com. Upland Corporation (505-266-3800). Subject to compliance with requirements, provide the following:

1. Enverge CI Foil Exterior Wall Insulation manufactured by Firestone Building Products LLC.
2. Enverge CI Glass Exterior Wall Insulation manufactured by Firestone Building Products LLC.

C. Acceptable Manufacturers:

1. Dow Thermax CI
2. Hunter XCI
3. Rmax EcoMax CI
4. Substitutions: See Section 01 6300 Product Substitution Procedures

D. Adhesive for Bonding Insulation: Polyurethane construction adhesive with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates and as recommended by insulation manufacturer. Acceptable products include:

1. LN 950 as manufactured by Liquid Nails Adhesive.

2.3 INSULATION FASTENERS

A. For mechanical attachment over wood or steel framing provide the following as applicable:

1. Rodenhouse Grip-Lok® Auto Feed fastening system fasteners of length long enough to penetrate framing a minimum of 1 inch.
2. Rodenhouse Thermal Grip® ci washers with Grip Deck fasteners of length long enough to penetrate framing a minimum of 1 inch.
3. Wind-Lock ci-Lock plastic washer with coated fasteners of length long enough to penetrate framing a minimum of 1 inch

B. For mechanical attachment over masonry and concrete back-up provide the following:

1. Rodenhouse Inc. Plasti-Grip® PMF fasteners

C. Adhesive:

1. Polyurethane construction adhesive

a. Liquid Nails LN 950

D. Insulation Board Joint Tape: Aluminum foil tape approved by insulation board manufacturer.

1. Acceptable products include:

a. 4” wide Shurtape AF 100 manufactured by Shurtape Technologies, LLC
b. 4” and 6” wide Shurtape AF 975 manufactured by Shurtape Technologies, LLC
c. 4” and 6” wide Alumibond EB - AB 040-50 manufactured by Eternabond

E. Flashing Membrane

1. EPDM Compatible System

    a. Enverge 40 mil EPDM FlashGard Thru-Wall Flashing in 12”, 16”, 18”, 20”, 24”, and 36” widths as applicable as manufactured by Firestone Building Products LLC
    b. Enverge 60 mil EPDM FlashGard Preformed; end dams, inside corners, outside corners as manufactured by Firestone Building Products LLC
    c. Bonding Adhesive as manufactured by Firestone Building Products LLC
    d. Splice Wash as manufactured by Firestone Building Products LLC
    e. 7877 Spray Adhesive/Primer as manufactured by Firestone Building Products LLC
    f. 1.5” Butyl tape
    g. Termination bar
    h. Coated drive pin
    i. AP Fastener
    j. Water Block Seal S-20

2. Elastomeric Bitumen Compatible System

    a. Enverge Air and Vapor Barrier Self Adhered in 12” and 6” widths as manufactured by Firestone Building Products LLC.
    b. Enverge LVOC Primer as manufactured by Firestone Building Products LLC
    c. Enverge Corner Guard as manufactured by Firestone Building Products LLC

3. Sealant: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates and a demonstrated compatibility with adjacent wall components and flashings. Acceptable products include:

    a. EPDM Compatible System: Lap Sealant HS as manufactured by Firestone Building Products LLC
    b. Elastomeric Compatible System: Elastomeric Sealer as manufactured by Firestone Building Products LLC

## PART 3 - INSTALLATION

### 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 PREPARATION

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

## 3.3 INSTALLATION, GENERAL

A. Install insulation with the long edge horizontal and either side to the exterior.

B. Install in as large of pieces as possible to minimize joints.

C. Offset successive courses of insulation by a minimum of one stud space in framed installations or 16 inches in solid back-up installations.

D. Abut wall insulation tightly together both horizontally and vertically, and at all openings.

E. Comply with insulation manufacturer’s written installation instructions.

F. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

G. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

H. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths.

I. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

1. Stagger successive layers a minimum of 16” both vertically and horizontally so joints in successive layers do not align.

## 3.4 INSTALLATION ON MASONRY BACK-UP

A. Mechanical Fastener Installation:

1. Fasten insulation to wall using manufacturer’s acceptable integral plastic washers and fasteners as applicable for type of back-up and insulation thickness.
2. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with plastic masonry fasteners at 24” o.c. both horizontal and vertical.

## 3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Comply with manufacturer’s written instructions.

B. Fasten insulation to framing using manufacturer's acceptable screws and washers as applicable for type of framing.

1. Install field fasteners at 16" o.c. vertically and 16" o.c. horizontally in the field of the board.
2. Install edge fasteners at 12" o.c. around perimeter of each board and at window and door openings.

## 3.6 FOR WATER BARRIER INSTALLATIONS

A. Use manufacturer's acceptable, compatible membrane flashing to seal all:

1. Joints between continuous insulation and adjacent materials.
2. Interruptions of the water barrier such as at base of wall, over window sills, window and door heads, shelf angles and duct penetrations.
3. Joints between the water barrier and roofing materials.

B. Use manufacturer's acceptable 4" wide aluminum foil tape in a shiplap configuration to seal all:

1. Board-to-board joints
2. Fastener heads

C. Use manufacturer's acceptable 6" wide aluminum foil tape in a shiplap configuration to seal all:

1. End joints
2. Thru-wall penetrations such as window and door jambs, pipe and duct penetrations

## 3.7 PROTECTION

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

B. Do not leave continuous insulation uncovered and exposed to UV for longer than an aggregate of 60 days between storage and uncovered installation.

## 3.8 PROJECT CLEAN UP

A. Removal all packaging and properly recycle.

B. Remove all scrap materials and properly dispose of offsite

END OF SECTION 07 4265

SECTION 07 54-19 - 72 MIL INDUCTION WELDED PVC SYSTEM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SCOPE OF WORK

A. Furnish and install a 72 mil minimum, white, polyester scrim reinforced, PVC elastomeric sheet roofing membrane system. Membrane shall be a high molecular weight PVC polymer membrane. Installed system shall include; inducted welded plates & fasteners, insulation, flashing, sealants and all accessories and labor necessary for a complete insulated sheet roofing assembly.

B. Furnish and install this membrane roofing system in strict accordance with Drawings and Specifications approved by Roof Systems Manufacturer. If conflicts in application arise, material will be installed in accordance with the manufacturer's strictest recommendations.

C. Related Sections:
1. Section 06 1000- Rough Carpentry
2. Section 07 6200 – Sheet Metal Flashing and Trim
3. Section 07 7100 – Manufactured Roof Specialties
4. Section 07 9000 – Joint Sealant

1.03 REFERENCES

A. NFPA 5000, 2018 ED

B. ASTM – American Society for Testing and Materials.

C. Factory Mutual (FM) Engineering Corporation - Roof Assembly Classifications.

D. ASCE-7- American Society of Civil Engineers-Wind Load Pressure Calculation Procedures

E. NRCA – National Roofing Contractors Association.

F. SMACNA – Sheet Metal and Air Conditioners National Association.

G. Underwriters Laboratories (UL) - Fire Hazard Classifications.

H. FS – Federal Standard

I. ANSI / SPRI ES-1 - (see also, NFPA 5000, 2018 ED)

1.04 BIDDER'S REPRESENTATION

A. A large part of the value of this work is contained in the bidder's and the bidder's proposed manufacturer's capacity to provide long-term responsibility for the satisfactory performance

of the roof. A 20-year, no dollar limit warranty for the benefit of the Owner is required. To that end, the following requirements are essential provisions of this specification:

1. By offering a bid for this work, the bidder certifies that he has visited the site and determined that all the conditions of the surrounding and underlying work are consistent with his proposed manufacturer's requirements for the specified warranty. In the event that the bidder discovers any condition of the surrounding and underlying work that would prevent him or his manufacturer from providing the specified warranty, he shall report it to the design professional not less than ten days prior to the bid opening.
2. By offering a bid for this work, the bidder certifies that he has examined the Contract Documents, can meet all imposed time completion requirements and has found all the details and requirements of the scope of work are complete and consistent with his proposed manufacturer's requirements for the specified warranty. In the event that the bidder discovers any detail or requirement in the Contract Documents that would prevent him or his manufacturer from providing the specified warranty, he shall report it to the design professional not less than ten days prior to the bid opening.
3. By offering a bid for this work, the bidder certifies that he can, within ten calendar days of a notice of award from the Insurer, provide a surety bond for the performance of the work, a surety bond for payment of labor and materials, and a specimen warranty certificate from the manufacturer whose system that is proposed to be used on the project.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. The manufacturer of the roofing system shall be the actual manufacturer of the roofing materials. The insulation and the component materials can be made by others, all testing requirements and implied warranties must be verifiable and labeled under the roofing manufactures name. All manufactures and sub manufactures shall have not less than fifteen (15) years experience in the production of thermoplastic membrane roof systems and their components. Manufacturer must provide approved uplift testing for induction welded roof systems.
2. The manufacturer shall certify the scrim reinforced PVC membrane meets the physical properties specified.
3. The contractor shall include a certification from the manufacturer, on the manufacturer's letterhead, that the proposed membrane, insulation and accessories will be covered in the warranty by the manufacturer of record.

B. Installer Qualifications

1. Applicator: A company approved by Manufacturer, and specializing in single-ply roofing systems with at least twenty (20) installations of thermoplastic, scrim reinforced membrane and 5 installations of heat inducted systems. The crew shall be composed of experienced installers skilled in this roof assembly. The contractor shall provide a superintendent /foreman on site full time that is aware of all project aspects and authorized to make on site decisions as required. The contractor will be required to properly staff the project at all times to meet all schedules and production rates.

C. Inspections

1. Manufacturer's Technical Representative: The manufacturer of the roofing system shall be required to attend the roof pre-installation conference to accept the conditions of the work and to perform interim inspections during installation. After the roof installation is complete, the manufacturer's technical representative, unrelated to the sales department of the manufacturer, shall inspect the work and inform (by written report) the design professional, contractor, Insurer/Insurer's consultant and the installer of defective/incomplete work to be remedied. Those areas indicated shall be corrected to the full satisfaction of the design professional, Insurer, and manufacturer. Copies of all inspection reports from the manufacturer shall be promptly submitted to the design professional and the roofing consultant. The manufacturer shall submit written acceptance of the project to the design professional in issuance of the weather-tightness warranty and that the system has been installed according to the Manufacturer's published specifications and details. Report describing inspections, corrective actions and certifying manufacturer's acceptance of installation shall be submitted to the Architect in accordance with Section 01400 - Quality Requirements.

2. Roofing Consultant: The owner reserves the right to retain, at the owner's expense, an independent consultant service to review construction documents and provide full-time inspection of the roofing system installation. The inspector shall have free access to inspect and test all items related to the project and the work area. The consultant/inspector will be responsible for accepting the installed roofing on behalf of the Insurer, and will also provide an 11 month inspection. The roofing contractor/general contractor will keep the consultant informed of all schedules, delays and inspections of the manufacturer (2 week notice)

D. Work shall conform to:

1. NRCA Roofing and Waterproofing Manual, Latest Editions.

2. SMACNA Architectural Sheet Metal Manual, 2003 Edition.

3. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.

4. IBC International Building Code: related current code requirements.

5. ASCE-7- American Society of Civil Engineers-Wind Load Pressure Calculation Procedures and requirements.

6. Factory Mutual Engineering Corporation (FM): Roof assembly classification with a minimum of a wind uplift fastening pattern based on FM 1-75. Property Loss Prevention Data Sheets 1-28 and 1-29, latest Edition, to include perimeter and corner enhancements.

## 1.06 SUBMITTALS

A. Provide in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Shop Drawings: Submit shop drawings indicating;

a. Roof size, location, and type of penetrations as required for the following.

b. Roof assembly composition and attachment to deck.

c. Insulation assembly and cricket layout plan with cross sections and slope of tapered insulation.

d. Insulation fastening patterns that are required to conform to wind uplift

design based on FM 1-75 insulation fastening requirements at the field, including enhancements at perimeter and corners.

e. Roof perimeter and corner areas as defined by FM Loss Prevention Data Sheet 1-28 with the width dimensioned for each roof section.

f. Complete set of details for all perimeters, drains, penetration and roof accessories flashings and terminations and manufacturer's published installation procedure details. All termination details must conform to project specifications and detail drawings provided.

g. All roof related sheet metal items submitted in conformance with the submittal requirements of Sheet Metal Flashing & Trim specification section, as well as SMACNA approved designs. Flashings at roof perimeters shall be certified ANSI / SPRI ES-1 details. (See currant IBC Section 1504.5).

2. Product Data Submittals:

a. Provide technical product data sheets on ALL materials and accessories that are to be used in the roof assembly and associated with the roof including UL product listing and FM System listing for each type of insulation. The data sheets should be clearly marked where choices occur for type and thicknesses.

b. The Insulation manufacturer shall certify a warranty to the membrane manufacturer in order to meet the complete system warranty.

c. For fasteners that are to penetrate into, or through, pressure preservative treated lumber use stainless steel, hot dipped galvanized coated or provide certification from manufacturer that coating is compatible with preservative used for wood treatment.

d. Manufactures acknowledge letter showing the requirements of attachment, required products, acceptance of details and assemblies.

e. Provide a complete phone list and resumes of all superintendents and foremen that will be on the projects as out lined in spec section 2.1, B.

3. Fire Resistance: Provide roofing system, insulation, and component materials that have been tested for application and slopes indicated and are listed by UL for Class A external fire exposure over decks specified herein. Provide confirmation in submittal package.

4. Wind Uplift: Provide rigid insulation, roofing system, and component materials as specified and that have been tested as a complete system for application for the structural deck and slopes for this project. The system needs to be listed in Factory Mutual Research Approval Guide. Provide attachment to the deck that meets FM 1-75 membrane/insulation fastening requirements. Submit data that confirms this requirement and submit the required fastening patterns.

5. Copy of certificate documenting manufacturer's approval of installer as required in Paragraph 1.4-B-1.

6. Copies of test reports showing compliance with requirements as specified in Paragraph 2.02.

7. Samples:

a. 12 inch square minimum sample of roofing membrane including lap seam

b. Sample RhinoBond Plate and fastener provided by the membrane manufacturer.

8. Provide copy of manufacturers' printed installation instructions and current recommendations.

9. Provide manufacture's notice of approval for warranty, or other manufacturer's signed document which verifies that:

   a. The roof system proposed for this project qualifies for their 20 year N.D.L. total system warranty and with the roof system composition listed.

   b. The installed roof will meet Class A fire rating.

   c. The roof system as installed will meet the specified performance requirements. A listing of the fastening patterns and attachment that meet tested FM 1-75 fastening requirements for the field, perimeter, ridge and corner areas for the project roof decks should be included.

10. Provide copy of warranties required in Paragraph 1.6 for review and approval by design professional. Warranty shall include a minimum wind speed warranty of 90 mph.

11. Provide proposed Over Night seal detail including product data sheets.

12. Provide a complete phone list and resumes of all superintendents and foremen that will be on the projects as out lined in spec section 2.1, B. Turn in no later than at Pre-Roof Meeting.

1.07 WARRANTY

A. Manufacturer's Warranty: Provide roofing manufacturer's total system leak-tight 20-year labor and 20-year material "No Dollar Limit Warranty," including insulation and all components. The warranty shall contain no exclusion or limitation for improper installation, damage from water that ponds, or does not drain freely. Provide all details necessary to qualify for manufacturer's "No Dollar Limit Warranty" and the manufacturer will respond within 48 hours and repair, within five (5) business days, any leaks in the roofing assembly for the warranty period stated above at no cost to the owner, unless the leak is determined to be caused by others. The warranty shall cover wind speeds up to and including 90 mph.

B. Roofer's Guarantee: Provide written guarantee from the Contractor stating that the Contractor will respond within 24 hours and repair within five (5) business days, any leaks in the roofing assembly for 2 years at no cost to the owner.

1.08 PRE INSTALLATION CONFERENCE

A. Conduct a pre-installation conference prior to commencing work of this section at project site under provisions in Division 1 Section "Project Management and Coordination". Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.

2. Be prepared to discuss the total number of work days planned to totally complete the roof project including all associated metal work, and what the working schedule will be.

3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

6. Review structural loading limitations of roof deck during and after roofing.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system or whose work will interface with the roof assembly as part of the building envelope.

8. Review governing regulations and school safety requirements.

9. Review temporary protection requirements for roofing system during and after installation.

10. If not already submitted, Provide a complete phone list and resumes of all superintendents and foremen that will be on the projects as outlined in spec section 2.1, B

1.09 DELIVERY, STORAGE, HANDLING

A. Deliver products to site in unopened containers showing brand names and instructions.

B. Store and protect temperature sensitive products in 55° to 72°F environment prior to usage. Store flammable or toxic material according to label instruction.

C. Store each product in weather protected environment, clear of ground and moisture. All insulation and cover boards shall be covered and protected from the elements including, but not limited to, moisture, ultra violet rays and wind, by using secured breathable tarpaulins. The tarpaulins are to be re-secured at the end of each day.

D. Mark wet, damaged & defective materials and remove from site the same day

1.10 JOB SITE CONSIDERATIONS (CAUTIONS AND WARNINGS)

A. Keep all adhesives, sealants and cleaning materials away from ALL ignition sources (i.e., torches, flames, fire, sparks, etc.).

B. Consult container labels and Material Safety Data Sheets for specific safety instructions for all products used on the project.

C. All bonding, splicing, and sealing surfaces must be free of dirt, moisture, and any other contaminants.

D. When the outside temperature is below 40°F (4.44°C), certain combinations of temperature and humidity may cause condensation on the surface of the Membrane Bonding Adhesive. If this condition occurs, do not mate the surfaces. Immediately stop the adhering process until the ambient air conditions no longer causes condensation. When the moisture on the adhesive completely evaporates, apply additional Bonding Adhesive and proceed.

E. If Bonding Adhesive is used, temperature must be 40°F (4.44°C) and rising for the material to perform as designed.

F. Do not use open flame sources (i.e., propane torches, etc.) to expedite drying of adhesives, sealants, etc. Allow to air dry only.

G. Do not thin or modify any materials.

H. Deliver materials to job site in their original containers as labeled by the manufacturer.

I. Follow directions for protection of materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified.

J. Care should be used when installing fasteners to avoid possible conduits and other piping in and under the deck.

K. Fumes from adhesive solvents may be drawn into the building during installation, through rooftop intakes. Refer to the Technical Information Sheet "Recommended Guidelines for Application of Roofing Materials to an Occupied Building" in the manufactures manual for specific guidelines.

L. Store the membrane in the original undisturbed plastic wrap in a cool shaded area and cover with light-colored, breathable tarpaulins, in a manner to protect it from damage. Membrane that has been exposed to the elements for approximately 12 hours or more must be prepared with (Splice Wash) prior to hot air welding.

M. PVC is a reflective membrane. Adequate UV eye protection is necessary during installation.

N. Do not use oil base or bituminous base roof cement with PVC Membrane.

O. Contact Manufactures Technical Services and provide procedures for installing the membrane during temperatures less than 40°F (4.44°C).

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. Roof System shall be a UL Class A rated system and attached to the deck in accordance with wind uplift designs based on FM I-75 fastening requirements including corner and perimeter enhancements for induction welded systems.

B. The minimum fastening pressures as per classifications by Underwriters Laboratories Inc. As a Class A roof covering.

i. Roofing System Shall be installed in accordance with ASCE-7-wind uplift requirements for

1) ASCE-7-10
2) Geographical location exposure- B
3) Wind Speed- 137 MPH 3 second gust wind speed zone
4) Risk Category- III
5) NFPA 5000, 2018 ED
6) Zones
   a. Zone 1 Field- 42.4 psf
   b. Zone 2 Perimeter- 71.0 psf
   c. Zone 3 Perimeter- 106.8 psf

C. At all times the job must be staffed with trained employees in the system specified. There must be a superintendent in charge of the project at all times. The superintendent must be onsite as required to make sure the installation is completed properly and for all meetings. There must be a trained foreman on each project full time overseeing all aspects of the installation.

2.02 MEMBRANE

A. Induction Welded, minimum 72 mil, polyester scrim reinforced PVC membrane.

B. Approved Manufacturers:

1. Sika Sarnafil S-327 Membrane
2. Seaman Corporation Fibertite Xtreme membrane
3. Johns Manville – JM PVC (KEE) Membrane Polyester reinforced
4. Carlisle – Sureflex KEE

C. Requests for approval shall be submitted a minimum of 10 days prior to bid, in order to give the Owner Adequate time to review the proposal. The request shall be a complete package as noted below. Requirements to obtain consideration for approval of product include: (submit on Manufacturers letterhead)

1. Complete specification with details for Designers review, along with certification from Manufacturer of substitute membrane that proposed material and system is in compliance with the requirements of this specification.
2. Proof of experience as a manufacturer of the proposed membrane, with a minimum of five (5) years experience with thermoplastic membrane.
3. Provide manufacturer certification that membrane contains no liquid plasticizers, and must be high molecular weight PVC polymers.
4. Provide manufacturers listing of common chemicals that may affect the membrane or the roof system in general.
5. Verification of UL Class A and FM system rating with a membrane attachment and maximum sheet width, in order to minimize seams on the roof. Every roll of membrane shall be UL labeled.
6. Provide adequate background information to the owner, to demonstrate that manufacturer has the capability to service, and back the Warranty for the term herein specified.

2.03 ROOF MEMBRANE

A. Membrane Sheet Material: Membrane shall be 72 mil minimum thickness, white PVC membrane polyester reinforced. There shall be a minimum of 20 mils of PVC membrane above the scrim and the weathering surface of the roof. The PVC sheet physical properties must be actual tested properties of the sheet, not typical or hypothetical values. Membrane must meet or exceed the physical properties of ASTM 4434 for PVC roofing membranes.

2.04 RELATED MATERIALS

A. Flashing: Same membrane as Roofing. For field fabricated vent stacks, pipes and corners provide unreinforced 55mil minimum uncured white PVC.

B. Bonding Adhesive: Standard bonding adhesive provided by Manufacturer to hold flashings in place. Do not apply in seam areas.

C. PVC Coated Metal: as detailed in the plans; otherwise, use specified galvanized metal or color finished metal as detailed.

D. Sealant: Provide to serve as water cut-off mastic, penetration pocket sealer, and to caulk PVC edge to metal. Provide cut edge sealant.

E. Primer: For preparing contaminated membrane for hot-air welding.

F. Seam Caulk: Shall be provided for the purpose of sealing any non encapsulated edge of

reinforced membrane.

G. Overnight Seal: As provided by Manufacturer. All seals must be maintained every night.

H. Sealants: Sealants not a part of the Roofing System shall be compatible with PVC materials and applied according to manufacturer's instructions. Acceptable sealants are one part polysulfide and one part urethane.

I. Mechanical Fasteners: Manufacturer provided fasteners designed for use on Project roof deck based on requirements of induction welded PVC membrane assemblies. Where installation incorporates insulation within the system, provide fasteners with anti-blackout devices as required by each manufacturer. .

J. Polyurethane Insulation Foam Adhesive: One part or two part as recommended by the Manufacturer to adhere insulation in place and applied to meet wind uplift requirements.

K. Foam Backer Rod: Provide acceptable foam backer rod materials for expansion joints or other building envelope interfaces.

L. Nailers: No. 2 or better, treated if required by code.

M. Seam Cleaner: Use a surface cleaner at dirty or contaminated membrane prior to heat weld.

N. Termination Bar: As provided by manufacturer and fastened 6" O.C. with caulking behind the compression point and on top of caulking tray.

O. Pipe Boots & Corners: Provide O.055 inches pre-molded unsupported PVC flashing at 1" to 6" diameter pipes and at inside and outside corners.

P. Edge Metal Systems: As specified in Section 07 62 00 – Sheet Metal Flashing and Trim and/or as detailed in plans.

Q. Counterflashings: As specified in Section 07 62 00 – Sheet Metal Flashing and Trim. Regardless of manufacturer's requirements or details, two piece counter flashings shall be installed.

R. Where plastic drain strainers exist replace with new cast Iron baskets

S. Clean drains and pipes to insure that blockage doesn't exist.

T. Walk Pad: Provide heavy embossed tread pad by PVC manufacture. Recycled products will be provided where possible.

U. T-Joint Covers shall be installed on all T- Joints.

## 2.05 ROOF INSULATION PRODUCTS

### A. INSULATION

1. Description: Roof insulation consisting of a closed cell Polyisocyanurate foam core meeting ASTM Standard Specification

    a. ASTM C1289-16, Type 2, Class 1: Insulation faced with glass fiber reinforced cellulosic felt facers on both major surfaces

2. Nominal Size is 48"x 48" for insulation adhesive application, and 48"x 96" for mechanically attached application.

3. Provide a minimum of two layers of insulation. Minimum of 20 psi compressive strength, square edge

4. All R-Values must be based on the new LTTR ASTM C1289-13e1 standards.

B COVERBOARD

1. Cover board shall be either of the following as approved by membrane manufacturer for total system warranty, induction weld criteria and roof system code requirements, see drawings.

   a. ¼" DensDeck Prime/Securerock, or equal

   b. ½" High Density Polyisocyanurate, 150 psi compressive strength

C INSULATION ATTACHMENT

1. Mechanical Fasteners:

   a. Attach insulation using Fasteners and Insulation Plates in accordance with the manufacturer's Induction Welded assembly to comply with the wind uplift design based on FM 1-75 as detailed in the specifications above. In a multi-layer insulation assembly, the type and thickness of the top layer of insulation determine fastening pattern. Insulation fasteners shall penetrate the top of the flutes and shall be sufficient to penetrate deck a minimum of ¾" for steel and 1" for wood and concrete. Structural concrete decks must be pre-drilled with a 7/32" carbide drill bit to a depth ½" deeper than the fastener engagement. Roofing contractor is liable for replacing fasteners that extend beyond the bottom of the flutes.

   b. Reference Standard: SAE 1022, Heat Treated.

   c. Product/Producer: Heavy Duty (HD) fasteners.

   d. Provide fasteners sufficient to produce FM I-75 uplift resistance attachment patterns to the deck.

D. JOB REQUIREMENTS

1. Roof Plan Sheets A-102 Key Note 1:

   a. Install new tapered polyisocyanurate insulation in a minimum of 1 ½" start with R-30 insulation, coverboard as specified and install new PVC induction welded roof assembly. Refer to drawings and details for specified conditions and locations.

2. Roof Plan Sheets A-101 Key Note 1A:

   a. Install new polyisocyanurate insulation in a minimum of 2 layers with R-30 insulation, coverboard as specified and install new PVC induction welded roof assembly. Refer to drawings and details for specified conditions and locations.

3. Crickets On All Roofs

   a. Polyisocyanurate Crickets: Installed crickets must provide at least a ¼" per foot reverse slope. Crickets drawn on drawings are shown for intent only. All crickets should be installed at a maximum 3 to 1 length to width ration and increased as necessary to provide positive drainage.

**Comment [RA1]:** Modify this section to meet the job requirements

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Install membrane and accessories in accordance with plans, specifications and manufacturer's specifications and current recommendations following the most stringent requirement of the

three.

B. Do not expose the building and materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day

C. Protect building surfaces against damage from roofing work.

## 3.02 DECK EXAMINATION AND PREPARATION

A. Inspect roof decks for deficiencies and report to the Design Professional immediately any deficiencies. Do not proceed with installation of roof, until all deficiencies have been corrected. Start of roofing shall constitute acceptance of deck.

1. Verify that deck is supported, secured and free of depressions.
2. Verify that metal deck surfaces are dry and free of snow or ice.
3. Verify that roof openings, curbs, pipes, sleeves, ducts & vents through roof are solidly set and wood nailers are in place
4. On roofs to be recovered, remove and replace any wet roofing and insulation, and remove base flashings, penetration flashings, gravel surfacing, blisters and ridges.
5. On roofs to be replaced, remove all roofing to the deck. Clean deck of all debris.

## 3.03 PHASED CONSTRUCTION & COMPLETION REQUIRMENTS

D. Phased construction will not be permitted on this project.

E. Once roofing operations are started, the roofing application, including all associated metal work, must be continuous and finalized with all punch lists completed in the number of work days calculated from the following overall production rates:

1. 700 SF/Day (3,500 SF/40 hr Work Week) Completion Rate based on a 5 day 40 hour work week, or
2. 875 SF/Day (3,500 SF/40 hr Work Week) Completion Rate based on a 4 day 40 hour work week.

Unless the Contractor's failure to complete the roof portion of the Work within this time limit is justified for reasons allowed under the Contract, the Contractor shall reimburse the Owner for all related expenses incurred by the Owner due to such failure. These expenses may include, but not be limited to, the additional costs to Owner for related roof consulting and observation services.

## 3.04 WOOD NAILER LOCATION AND INSTALLATION

A. Install wood nailers at roof edges, metal flashings, gutters, and elsewhere as shown on Drawings and approved shop drawings or as required by system manufacturer Install wood nailers as follows:

1. Nailers are to be installed as per ANSI / SPRI ES-1 compliance
2. Treated Wood Fasteners: All fasteners used in wood that has been pressure treated with preservatives must be hot dipped galvanized coated, stainless steel or approved in writing by the fastener manufacturer for use in treated wood.
3. Chemical treating wood nailer for fire resistance or other purposes may affect the performance of the PVC Membrane and accessories. Consult Manufacturer's Technical

Services Department regarding compatibility.

4. Discard units of material with defects that might impair quality of work and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.

4. The nailer height must match the total thickness of insulation. Where tapered insulation is used, the wood nailer must be tapered so that it will always be flush at the point of contact with the insulation (refer to Details). Set nailers to required levels and lines with members plumb and true.

5. Top of perimeter nailers shall be uniformly flush with the top of insulation.

6. Nailers shall be installed with 1/4" gap between ends of adjoining pieces.

7. Nailers shall be fastened in accordance with the following schedule:

    a. Fasteners in 6” or wider (nominal) lumber shall be installed in two (2) rows, staggered one-third of nailer width. Listed spacings indicate distance between fasteners in adjacent rows.

    b. Treated Wood Fasteners: All fasteners used in wood that has been pressure treated with preservatives must be hot dipped galvanized coated, stainless steel or approved in writing by the fastener manufacturer for use in treated wood.

    c. Corner fastener spacing is ½ of the perimeter spacing (double the fasteners) and shall extend 8 Ft maximum from all outside building corners.

    d. Where two or more nailers are installed, each nailer shall be fastened independently.

    e. Over all deck types, the bottom nailer shall be fastened using the specified fasteners and 5/8” diameter washers. Countersink washers and fasteners level with top of wood using spade bit or similar method. Fasten subsequent nailers, where specified, using the specified screws without washers.

    f. Nailer attachment shall meet a minimum uplift resistance of 200 lbs.

    g. A Fastener shall be 4” in from both nailer ends.

    h. Nailer Attachment Schedule (unless noted otherwise on the drawings)

| **Attachment Substrate** | **Perimeter Fastener Spacing (Maximum)** |
|---|---|
| Structural Concrete | 12” o.c. |
| CMU (fastener into solid material) | 12” o.c. |
| Steel Deck | 12” o.c. |
| Wood | 12” o.c. |

3.05 INSULATION INSTALLATION

A. Install Insulation: Install only as much insulation as can be covered with roofing membrane and completed before the end of the day's work or before the onset of inclement weather.

B. Stagger Insulation Joints: All joints are to be staggered. When installing multiple layers of insulation, all joints between layers should be staggered.

C. Fit Insulation: Neatly fit insulation to all penetrations, projections, and nailers. Insulation should be loosely fitted, with gaps greater than 1/4" being filled with acceptable insulation. Under no circumstances should the membrane be left unsupported over a space greater than 1/4". Tapered or feathered insulation should be installed around roof drains so as to provide

proper slope for drainage.

D. Crickets/Saddles:

1. Crickets on plans are shown for intent only. The contractor is responsible for installing the crickets with a sufficient length to width ratio to provide positive drainage to drains/scuppers. The maximum length to width (L:W) ratio for various roof slopes are:

**SADDLES AND CRICKETS**

| Roof Slope | Saddle/Cricket Material Slope | Maximum L:W Ratio |
|---|---|---|
| 1/8 | 1/4 | 3:1 |
| 1/4 | 1/2 | 3:1 |
| 3/8 | 3/4 | 3.5:1 |
| 1/2 | 1 | 4:1 |
| 3/4 | 1.5 | 4:1 |
| 1 | 2 | 4:1 |

Do not exceed the maximum ratios. The ratios can be decreased if needed to provide positive drainage.

2. If the crickets are overlaid with a layer of insulation, a row of fasteners should be applied along the cricket valley line to insure the overlay conforms to the cricket configuration. If the crickets are installed on top of all insulation, a tapered edge strip sized from the cricket edge height down to 0" shall be installed.

E. Insulation Attachment to Deck:

1. Attach insulation using Fasteners and Insulation Plates in accordance with the manufacturer's Induction Welded assembly to comply with the wind uplift design based on FM 1-75 as detailed in the specifications above. In a multi-layer insulation assembly, the type and thickness of the top layer of insulation determines the fastening pattern.

2. Fastener lengths shall be sufficient to penetrate into the deck a minimum of ¾" for steel and 1" for wood and concrete. Structural concrete decks must be pre-drilled with a 7/32" carbide drill bit to a depth ½" deeper than the fastener engagement.

3. On exposed metal decks the insulation fasteners shall only penetrate into the deck top flange and shall not extend below the bottom of the flutes into the building interior. Roofing contractor is liable for replacing fasteners that extend beyond the bottom of the flutes

4. On exposed wood decks the fasteners must not penetrate through or split the exposed wood. Roofing contractor is liable for replacing fasteners and any damaged wood ceilings, including the wood finish, resulting from fasteners penetrating through the wood.

3.06 MEMBRANE INSTALLATION

A. Starting at the low point of the roof, place the membrane panels without stretching over the acceptable substrate that is clean and free of debris. Position subsequent membrane sheets in the same manner, overlapping the ends of adjoining sheets a minimum of 3" and side laps a minimum of 6". Install panels to insure that laps shed water. Allow membrane to relax at

least 30 minutes before attachment or splicing. In colder weather allow for longer relax time. Install membrane without wrinkles and without gaps or fish mouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions.

B. Where PVC Membrane has been cut to expose reinforcing membrane, PVC Cut Edge Sealant is to be used to encapsulate exposed edge.

C. Calibrate each induction welding tool in accordance with membrane roofing manufacturer's instructions to appropriate level for weather conditions. Run destructive weld tests before starting each day and after any significant change in the air temperature, and as required by manufacturer's instructions if requirements are greater.

D. Weld membrane to attached Rhino Plates using induction welding tools as recommended by manufacturer, following specified pattern provided by manufacturer. All plates should be welded prior to moving onto a new section. All plates that have damage, asphalt, glues or other defects must be replaced prior to welding.

E. On a daily basis follow manufacturer's direction for verifying that all induction welding are fully bonded to the membrane.

F. For corners and perimeters follow enhancement patterns as specified for FM 1-75 uplift design requirements.

G. Perimeter fastening at all parapets, curbs and ducts, is to form an air/water barrier by turning the field membrane perimeter up onto vertical walls, etc., and terminate with a metal termination bar (term bar) fastened 6" or 8" O.C., depending on how termination bar is pre-punched. Butyl sealant is to be applied behind membrane at termination bar to provide compression seal. Seal corners with manufacturer's appropriate sealant. Leave a ¼" gap between ends of term bar, and do not bend a term bar around a corner.

H. Secure the membrane at all locations where the membrane goes through an angle change of 1" in 12".

I. All membrane fasteners are subject to the requirements in 3.05.E.2, 3 &4.

3.07 MEMBRANE LAP SPLICING

A. Calibrate automatic welder in accordance with membrane roofing manufacturer's instructions to appropriate level for weather conditions. Run destructive weld tests before starting each day, after any significant change in the air temperature, and as required by manufacturer's instructions if requirements are greater

B. Lap splice areas that have been contaminated, or unwrapped or exposed for 12 hrs or more, must be wiped down with a clean white cloth dampened with manufacturer's splice wash prior to heat welding and allow to completely dry.

C. All field and flashing splices on the horizontal surface shall be completed using an automatic heat welder that has been designed for hot air welding of PVC membranes.

D. Hand held welders are only to be used on vertical welds or where an automatic welder is not practical or cannot be used.

E. Seams made with the automatic welder shall be a minimum of 1-1/2" wide. Seams made with hand welders shall be a minimum of 2" wide. Use 2" side silicone or silicone coated steel hand rollers to assure proper mating of surfaces as hand heat welding proceeds.

F. Probe all completed welds daily using a slotted screwdriver, or a dulled cotter pin puller type tool, to verify seam integrity. Do not probe welds until they have had time to cool to ambient conditions. Any welds found to be insufficiently welded need to be repaired on a daily basis. Any seam voids, or insufficient welds, that are 2” or less in length are to be repaired with a patch.

3.08 FLASHING - PENETRATIONS

A. General:

1. Flash all penetrations passing through the membrane.
2. The flashing seal must be made directly to the penetration.
3. The penetration must be thoroughly cleaned prior to applying the flashing.

B. Pipes, Round Supports, etc.

1. Flash with Pre-Molded PVC Pipe Flashings where practical.
2. Flash using PVC unsupported Flashing membrane to form a field fabricated flashing only when Pre-Molded Flashing is not practical.
3. At top section of flashing apply Manufacturer’s Water Block sealant between pipe and membrane and compress with a stainless steel clamp.
4. Once flashing is installed, seal around top of flashing with Manufacturer’s All Purpose sealant.

C. Flexible Pipe/Conduit Penetrations:

1. Provide a weather tight goose neck conduit for flexible pipe/conduit penetrations secured to the deck. Flash in accordance with Manufacturers Details.

D. Pipe Clusters

1. Provide an insulated roof penetration housing vault by Roof Penetration Housing, LLC (www.roofpenetration housings.com, 1-800-994-0945) or equal, unless detail specifically in the drawings. Each contractor trade (HVAC, Electrical, Plumbing, etc.) shall provide the appropriate exit seals for their specific level of responsibility. Install per manufacturer’s requirements and provide their 20 year warranty and certification of ICC 2015 compliance to the owners.
2. Pitch pans are to be avoided. Prior approval from the Design Professional is required for each pitch pan use. If penetration pockets are approved, all piping must be thoroughly cleaned and a minimum clearance of 1" between the penetrations and all sides must be provided. Secure penetration pockets per Manufacturers recommendations. Fill penetration pockets with Pourable Sealer, so as to shed water.
3. Fill penetration pockets with Pourable Sealer, so as to shed water.

E. Flexible Piping Penetrations

1. Provide Roof Penetration Housing Vault for flexible piping, or a weather tight gooseneck with roof outlet angled downward at a minimum of 45º and secured to the deck. Outlet to be sealed with foam insulation and coated with elastomeric sealant. unless detail specifically in the drawings.

2. Flash in accordance with Drawings and Manufacturers Details.

F. Roof Drains

1. Existing drain bowls and rings are to be cleaned and inspected. Broken drain bowls, clamping rings or missing strainers, clamping rings, and bolts are to be replaced. All lead flashings in the drain bowl must be removed.

2. Replace plastic parts with new Cast iron drain parts and strainers.

3. Provide a clean even finish on the mating surfaces between the clamping ring and the drain bowl.

4. Taper insulation around the drain to provide a smooth transition from the roof surface to the drain.

5. Place water stop sealant on top of drain bowl where the clamping ring seats below membrane.

6. Install the roof drain clamping ring and clamping bolts. Tighten the clamping bolts to achieve uniform compression.

7. All drains are to be water tested below the pipe connection to the bowl or if further testing of the drain system is noted in the drawings.

G. Scuppers

1. Provide new PVC coated welded watertight scuppers.

2. Set welded watertight scupper in Water Block Seal and secure to the structure.

3. Flash in accordance with Manufacturers and Plan details.

H. Expansion Joints

1. Install as shown on roof drawings in accordance with Manufacturers details.

3.09 FLASHING - WALLS, PARAPETS, MECHANICAL EQUIPMENT CURBS, SKYLIGHTS, etc.

A. General: Using the longest pieces practical, flash all walls, parapets, curbs, etc., a minimum of 12" high per Details. When special situation flashings will not achieve a minimum 8" finished flashing height, contact manufacturer for recommended details and approvals and notify specifier/owner of conditions and provide acceptance letter from Manufacturer.

B. Flashing Substrates: All flashing substrates are to consist of, or be overlaid with 5/8" minimum CDX plywood or fire treated if code requires.

C. Apply PVC Bonding Adhesive at about the same time to both the membrane flashing and the surface to which it is being bonded so as to allow approximately the same drying time. Apply Bonding Adhesive by rolling the adhesive on to the mating surfaces evenly, avoiding globs or puddles.

D. Roll the flashing into the adhesive evenly and carefully so as to minimize wrinkles.

E. To ensure proper contact, compress the flashing to the substrate with a stiff push broom.

F. Provide membrane flashing termination directly to the vertical substrate as shown in Plan Details. At a minimum:

1. Apply water block sealant behind membrane in top area,
2. Attach termination bar 6" or 8" O.C., depending on how termination bar is pre-punched, leaving a ¼" gap between joints of termination bar. Fasten no more than 1" from termination bar ends.
3. Do not bend termination bar around corners.
4. Cutoff excess PVC flashing above termination bar.
5. Apply manufacturer's all-purpose sealant in caulking receiver at top of termination bar, tooling the sealant to facilitate water runoff.
6. Install 2-piece counterflashing with reglet/receiver set in water block sealant against the wall, fastened 12" O.C. and for surface mounted type, apply manufacturer's all-purpose sealant in the caulking receiver and tool to facilitate water runoff.

G. Install PVC T-Joint covers at all field and flashing splice T-joint intersections.

H. Install intermediate flashing attachment for walls greater than 24" at 24" increments.

## 3.10 FLASHING - ROOF EDGE METALS

A. Flash all roof edges using materials as outlined in specifications and Plan Details. All roof edge attachment to meet ANSI/SPRI ES-1requirements.

B. Use manufacturers coated PVC metal for drip edge, scuppers and similar terminations as shown in plan details. Exposed metal color to be selected by Architect.

C. Field membrane at a minimum is to extend over nailer and down outside face at least ¾" past bottom of wood nailer.

## 3.11 ROOF WALKWAYS

A. Walkways shall be the Roofing Manufacturer's PVC Walkway material or specified walking and platform systems.

B. Walkways shall be installed in a neat, orderly fashion where indicated on roof plan or in specifications. Chalk line walkway location on roof membrane, and position walkway in place using a chalk line as a guide.

C. Install walkway with sufficient gaps so as not to impede drainage. Do not cover field seams with walkways leaving enough space to properly repair the field seam if needed. If there is a situation where the seams are located in an area that needs to be covered with the walk pad, do the following:

a. Probe and repair the seam as needed.
b. Clean and weld a 6" membrane strip over the seam
c. Probe and repair the 6" strip welds as needed.
d. Apply edge sealant as needed.
e. Install the walk pad over the reinforced seam as needed.

D. Heat weld the perimeters of the walkway material to the PVC membrane per Manufacturers requirements. Place two rows of walk pads 36" wide minimum along three sides of working

side of HVAC units and other serviced equipment. Place two rows of walk pad 36” wide minimum along access side(s) of all roof hatches, roof ladders, and other roof access points, and3.12

## 3.12 FIELD QUALITY CONTROL

A. Perform a water test of all roof drains once the roof is complete. The test, shall be coordinated with the Owner and conducted by the Contractor in the presence of Design Professional. Owner’s Roofing Observer and Owner’s Representative.

B. The water test shall include the following procedure:

a. Contractor shall provide and/or arrange for necessary equipment, supplies, water, etc. as needed to perform this test.

b. Drain bowl testing:
   1) Test drain piping for leaks
   2) Test the membrane seal to drain bowl tested with water brought up 2” above immediate roof level.

c. All crickets are to be tested for proper drainage and holding of water in cricket valley and surrounding membrane field.

## 3.13 CLEAN-UP

A. Clean all contaminants from building and surrounding areas.

B. Remove bituminous, EPM residue, or other markings from finished surfaces.

C. In areas where finished surfaces are soiled by work of this Section, consult Manufacturer of membrane for cleaning advice and conform to their instructions

D. Remove trash, debris, equipment from project site and surrounding areas.

E. Repair or replace damaged building components or surrounding areas to the satisfaction of the building owner.

F. Chemical spills, including bonding adhesive and membrane cleaner, should be cleaned immediately. Areas contaminated by chemicals should be inspected for permanent damage and may require removal and replacement, at no additional cost to the Owner.

END OF SECTION

# SECTION 07 61 13 – STANDING SEAM METAL ROOF SYSTEM

## PART 1 – GENERAL

### 1.0 SUMMARY

A. Scope of Work:

1. Provide a complete roof system of roofing panels, fasteners, clips, flashing, closures, sealants and miscellaneous accessories. Metal roof pitches vary, Work includes all metal roof areas shown, including those with a low slope (less than 2:12). Contractor will verify that all Warranty requirements are met for all slope applications.

B. Section Includes:

1. Mechanically seamed, standing seam metal roof system for sloped roofs.
2. All related components, Pre-fabricated custom roof curbs, flashings, sealants and accessories required for the installation of a watertight assembly.
3. Rigid insulation, underlayment, fasteners, clips, and trim.
4. Snow retention system.

C. Related requirements:

1. Drawings and general provisions of Contract, including General and Supplementary Conditions, general project requirements, and Division 1 Specification Sections, apply to this Section.
2. Other related Sections including, but not limited to, Flashing and Sheet Metal, Joint Sealers, and Painting.

### 1.1 BIDDER'S REPRESENTATION

A. A large part of the value of this work is contained in the bidder's and the bidder's proposed manufacturer's capacity to provide long-term responsibility for the satisfactory performance of the roof. A 20-year, no dollar limit warranty for the benefit of the Owner is required. To that end, the following requirements are essential provisions of this specification:

1. By offering a bid for this work, the bidder certifies that he has visited the site and determined that all the conditions of the surrounding and underlying work are consistent with his proposed manufacturer's requirements for the specified warranty. In the event that the bidder discovers any condition of the surrounding and underlying work that would prevent him or his manufacturer from providing the specified warranty, he shall report it to the design professional not less than ten days prior to the bid opening.

2. By offering a bid for this work, the bidder certifies that he has examined the Contract Documents, can meet all imposed time completion requirements and has found all the details and requirements of the scope of work are complete and consistent with his proposed manufacturer's requirements for the specified warranty. In the event that the bidder discovers any detail or requirement in the Contract Documents that would prevent him or his manufacturer from providing the specified warranty, he shall report it to the design professional not less than ten days prior to the bid opening. After the work has been awarded, no additional concessions will be paid to the contractor for modifications to details required to meet manufacturer's warranty.

3. By offering a bid for this work, the bidder certifies that he can, within ten calendar days of a notice of award from the Insurer, provide a surety bond for the performance of the work, a surety bond for payment of labor and materials, and a specimen warranty certificate from the manufacturer whose system that is proposed to be used on the project.

1.2 QUALIFICATIONS

A. Manufacturer Qualifications

1. The manufacturer shall have had at least fifteen (15) years experience in design professional roofing design and installation. The manufacturer shall have a permanent, stationary, indoor production facility

B. Installer Qualifications

1. The installer shall have had a minimum of five (5) years experience in the installation of metal roofing. The installer shall be a manufacturer-certified applicator.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. QUALITY ASSURANCE:

1. Codes and Standards: comply with the following codes and standards including current editions, and revisions.

a. 2009 IBC and NM Building Code.
b. SMACNA: "Architectural Sheet Metal Manual," Sheet Metal and Air Conditioning Contractors National Association, Inc.

B. Provide certified test results by a recognized testing laboratory or agency in accordance with specified test methods for each system.

C. Air Infiltration: Provide roof panel system with no air leakage when tested in accordance with ASTM E 283 at pressure differentials up to 1.57 psf.

D. Fire Resistance: UL Class “A”

E. Wind Uplift: ASTM E-1592, Wind Uplift: Class FM-I-75.

F. Manufacturers’ Certification:

1. Provide all necessary elements, members, hardware and connections for a complete roofing system to meet the requirements of all applicable codes, including UL Class 90 uplift rating, and the requirements of the contract documents.

1.4 PHASED CONSTRUCTION & COMPLETION REQUIREMENTS

A. Phased construction will not be permitted on this project.

B. Once actual roofing operations are initiated at the project site, the roofing application must be continuous and finalized with all punch lists completed at a rate of 5 squares per day. This requirement is independent and coincides during the established Contract Time as described under General Conditions of the Contract.

1.5 SUBMITTALS

A. LEED REQUIREMENTS.

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Shop Drawings: Architectural details show design concept and relationship of retrofit roof to other conditions. It is the responsibility of the Installer to prepare detailed shop drawings that adapt proposed roof system and configuration of roof system to conditions of this project and specified requirements. Shop drawings shall be reviewed by manufacturer’s Technical Department before submittal to Architect. Installer shall recommend and make detail modifications if necessary and as required to insure a proper watertight system.

1. Indicate dimensions, panel layout, method of anchorage, and details of eaves, fascia, and joints with adjacent construction.

C. Product Data: Submit Product data including manufacturer's product specifications, complete set of standard & nonstandard details, certified product test results, FM fastening patterns, fastener product sheet, cricket layouts, accessory product data information, installation instructions, sealant and closure installation instructions, and general recommendations, as applicable to materials and finishes for each component and for a total system.

1. Provide snow retention system layout and details as approved by snow retention system manufacturer per snow requirements at the project site.

D. Samples for initial selection purposes:

1. Submit color samples in form of manufacturer's color charts or chips showing full range of colors, textures, and patterns available for roof panels with factory-applied finishes.

E. Samples for verification purposes:

1. Provide sample panel, 12 inches long by actual panel width in profile, style, color, and finish selected.
2. Provide sample trim, 12 inches minimum in length of profile, color, and finish selected.
3. Include clips, battens, fasteners, closures, snow retention system, and other panel accessories.

F. Certificate or test reports showing compliance of system to meet performance requirements specified.

G. Manufacturer’s certification of installer qualifications.

H. Copy of system warranty required by specifications.

1.6 INSPECTIONS

A. After the roof installation is complete, the manufacturer’s technical representative, unrelated to the sales department of the manufacturer shall inspect the work and inform (by written report) the design professional, contractor, owner/owners consultant and the installer of defective/incomplete work to be remedied. Those areas indicated shall be corrected to the full satisfaction of the design professional, Owner, and manufacturer. The manufacturer shall submit written acceptance of the project to the design professional to issuance of the weather-tightness warranty and that the system has been installed according to the Manufacturer's published specifications and details.

B. Inspections shall be performed at each transition of roof detail encountered for each phase of roofing for the duration of the project. An experienced, full-time employee of the manufacturer, with experience in similar inspections over the past two years, must conduct each inspection.

C. The Owner reserves the right to retain, at the Owner’s expense, an independent consultant service to review construction documents and provide full-time inspection of the roofing system installation. The inspector shall have free access to inspect and test all items related to the project and the work area. The consultant/inspector will be responsible for accepting

the installed roofing on behalf of the owner. The roofing contractor will keep the consultant informed of all schedules, delays and inspections of the manufacture.

1.7 PRE-INSTALLATION CONFERENCE

A. Conduct a pre-installation conference at project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following: Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.

    a. Scope of Work and Installation procedures.
    b. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
    c. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    d. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
    e. Review structural loading limitations of roof deck during and after roofing.
    f. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
    g. Review governing regulations and school safety requirements.
    h. Review temporary protection requirements for roofing system during and after installation.
    i. Weather conditions forecast.

1.8 WARRANTY

A. Metal panel manufacturer will, upon final acceptance for project, furnish a total system leak-tight warranty covering the following:

    1. Metal substrate against rupture, structural failure and perforation due to normal atmospheric corrosion exposure for a period of 20 years.
    2. Finish with Kynar 500 or Hylar 5000 against peeling, flaking, chipping, chalking and fading (within industry standards) for a period of 20 years, or Galvalum, as specified by the design professional.
    3. Manufacturer’s Warranty: Provide roofing manufacturer's total system leak-tight 20-year labor and 20-year material. "No Dollar Limit Warranty,” including insulation, all components, shall contain no exclusion or limitation for improper installation; or damage from water that ponds, or does not drain freely. Provide all details necessary to qualify for manufacturer’s “No Dollar Limit Warranty” and the manufacturer will

respond within 48 hours and repair within 5 business days, any leaks in the roofing assembly for the warranty period stated above at no cost to the Owner, unless the leak is determined to be caused by others. Warranty shall include 72 mph wind speed.

4. Roofer's Guarantee: Provide written guarantee from the Contractor stating that the Contractor will respond within 24 hours and repair within 5 business days, any leaks in the roofing assembly for 2 years at no cost to the Owner.

PART 2 – PRODUCTS

2.0 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.1 ACCEPTABLE MANUFACTURERS

A. Products of the following manufacturers are acceptable and are listed in this Section to establish requirements for product type, characteristics, performance, and quality.

B. Requests to use alternate systems must be submitted in writing to the project designer at least ten (10) days prior to the bid date. Performance requirements, certified statements, samples, and descriptive data must be included in this submittal per Part 1 of this specification for designer review and approval.

C. Manufacturers:

1. Standing Seam Metal Roof:

a. Innovative Metals Company (IMETCO)
b. Berridge Manufacturing Company
c. MBCI
d. Firestone UnaClad.

2. Metal Roof Underlayment:

a. W. R. Grace and Company, Cambridge, Massachusetts. Phone: 617.498.4470.
b. Owens Corning-WeatherLock –High temperature underlayment

3. Pre-Fabricated Custom Roof Curbs:

a. LMCurbs, Longview, Texas. Phone: 800.284.1412 (or equal as acceptable by Roof Manufacturer and approved by Owner/Architect, and Roofing Consultant).

4. Snow Retention System:

a. Acceptable Manufacturer: TRA Snow and Sun Inc. Roof Accessory Systems: 1657 S. 580 East P. O. Box 682; American Fork, UT 84003; Tel: 801-756-8666; Fax: 801-756-7891; Web: www.trasnowandsun.com

b. Acceptable Manufacturer: Rocky Mountain Snow Guards Inc. 2055 S. Raritan St. Unit B; Denver, CO 80223; Tel: 720-618-1648; Web: www.rockymountainsnowguards.com

c. Or approved equivalent.

## 2.2 METAL PANELS

A. Mechanically seamed, standing seam metal roof with concealed fasteners and factory applied sealants.

1. 22 Gauge zinc coated or aluminum zinc coated steel.
2. Roof Profile: 1 ½" high at the rib, 17" wide panel.
   a. Basis of Design: Imetco Twin-Loc 1.5
3. Seam: Mechanically double lock at 180 degrees. Single lock seams at 90 degrees are not acceptable.
4. Panels shall be continuous from roof ridge to eave. No exceptions.
5. Panel ends turned up behind Z strip to form a water dam.

B. Factory Finish: The coating system shall have been performance-tested in accordance with ASTM procedures.

1. Prefinished Metal shall be Hot-Dipped Galvanized - ASTM A446-85 Grade C G90 Coating A525-86 24 Gauge core steel or prefinished Galvalume - ASTM 792-86 AZ-55.
2. Unfinished Metal shall be Grade C Galvalume ASTM 792-86, AZ 55, "Satin Finish."
3. Finish shall be full strength Kynar 500 Fluoropolymer coating applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.70 to 0.90 mil over 0.25 to 0.35 mil prime coat, to provide a total dry film thickness of 0.95 to 1.25 mil. Bottom side shall be coated with primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesion, flexibility, and longevity as specified by the Kynar 500 finish supplier.

4. Strippable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed before installation.
5. Color: Unless noted on drawings, selected by Architect and approved by Owner from manufacturer's full range including premium metallic silver colors.

C. Soffit Panel:

1. Profile: 1" high, 15" wide panel with v-groove at 5" on center.
2. Material: 24 gauge, galvalume or galvanized with Kynar 500 or Hylar 500 coating.
3. Color: Unless noted on drawings, selected by Architect and approved by Owner from manufacturer's full range including premium metallic silver colors.

D. Fascia and Trim:

1. Profile: As required for closures and as indicated in drawings.
2. Material 22 gauge, galvalume or galvanized with Kynar 500 or Hylar 500 coating.

E. Valley material must be a full width sheet with a built-in hem and secondary edge hem refer to the valley detail in drawings.

F. Metal Gutters and Downspouts:

1. Profile: downspouts 6 inch square and gutters as shown on drawings.
2. Material 22 gauge, galvalume, or galvanized with Kynar 500 or Hylar 500 coating.

## 2.3 MATERIALS

A. Board Insulation – Polyisocyanurate

1. Type: Closed cell polyisocyanurate insulation board, FS HH-I-530.
2. Thickness: achieve R-38 minimum (cured R-value where applicable).
3. Minimum compressive strength: 20 psi.
4. Board size: 48 by 96 inches.
5. Maximum water absorption: 2.5 percent by volume in accordance ASTM D2842.
6. Minimum thermal resistance, R value 7.25 per inch at 75 degrees F.
7. UL listed for Class A construction.
8. Edge: Square.

B. Cover board:

1. ½ - inch CDX, fire treated plywood.

C. Underlayment:

1. Waterproof Membrane Underlayment: Cold-applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of rubberized asphalt adhesive equal to Grace Ice and Water Shield, Peel and Stick Membrane. Membrane shall conform to the following physical properties:

    a. Polyethylene surface: Embossed slip resistant.
    b. Thickness: 40 mils.
    c. Roll width: 36 inches.
    d. Low temperature flexibility: Unaffected at minus 32 degrees F.
    e. Minimum tensile strength: 250 PSI.
    f. Minimum elongation: 250 percent.
    g. Permeance: 0.05 perms maximum.

2.4 ACCESSORIES

A. Secondary framing: Provide decking supports, furring channels, eave struts, bracing, base and sill angles, and other secondary framing as indicated on Drawings and approved shop Drawings. Comply with Light Gauge Structural Institute Guide Specifications. Utilize roll-formed sections. Brake formed section are not acceptable.

B. Insulation board fasteners: Self tapping with cap plate appropriate for fastening on metal decks as recommended by roofing system manufacturer. Factory approved for specific application. Length as required for thickness of insulation material and penetration of metal deck.

C. Hold down clips: Galvanized steel concealed type attachment clip that does not require any penetration of panels. Clips rated and spaced per manufacturers tested FM I-75 patterns.

    1. Floating clip: Two part assembly with base clip with 18 gage base clip and 24 gage upper clip. Upper clip formed with return to engage base clip and male rib of roof panel.

    2. Fixed clip: One piece 22 gage assembly.

D. Fasteners: #10-#16 (by length required per metal roof manufacturer), self-drilling, self-tapping, hex washer head, plated steel screws. Three fasteners per clip per metal roof manufacturer.

E. Bearing plates: 20 gage or heavier if required to meet the uplift requirements, 3 by 5 inches minimum, coated steel plate.

F. Flashings, closure pieces, ridge cap and fascia, eave and other trim: Same material, thickness, and finish as panel unless otherwise indicated. Break form to profiles shown on Drawings.

G. Closure strips: Galvanized Z shapes to match height of panel legs.

H. Sealants: as recommended by manufacturer for specified application.

I. Snow Retention System (Basis of Design: T.R.A. Mage Inc. – Clamp-on Snow Fence): Seam attached bars, amount, Locations and layout as per Snow Retention System Manufacturer for the location of the building. Written documentation is required by the manufacture of these requirements before installation can occur. The minimum requirement is two rows per slope, and above pipe penetrations; refer to Drawings.

J. All accessories and components shall be per Roof Manufacturer instructions and requirements.

PART 3 – EXECUTION

## 3.0 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table
    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.1 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in a dry and undamaged condition and unloaded per the manufacturer’s instructions. Deliver roofing materials in original manufacturer’s unopened containers (including prefabricated accessories) with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipping, storage and handling.

B. The installer shall inspect materials for damage and stains upon arrival. Reject and remove physically damaged, stained or marred material from project site.

C. Store all materials clear of ground and moisture with weather protective covering to keep them dry per the manufacturer’s recommendations. Storage accommodations shall provide for drainage, good air circulation, protection from surface staining, wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances. Maintain availability of equipment on site to off-load and store prefinished metal coils as they are delivered to Project Site.

D. Handle materials to prevent damage to surfaces, edges and ends of roofing sheets, sheet metal items and substructural framing members. Use gloves when handling and installing unprotected panels in order to avoid soiling surface of panels. Protect field fabricated panels from wind-related damage.

E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

F. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of roof deck.

3.1 ENVIRONMENTAL REQUIREMENTS

A. Install roofing materials only when surfaces are clean, dry, smooth and free of snow or ice.

B. Do not apply roofing during inclement weather or when ambient conditions will not allow proper application. Consult manufacturer’s technical specifications on cold weather application.

3.2 EXAMINATION

A. The roofing contractor shall be responsible for suitable substrate to accept the new roof system.

B. Installer of standing seam metal roofing system shall examine substrate and conditions under which roofing work is to be performed and shall notify the Architect immediately of unsatisfactory conditions. Do not proceed with roofing work until unsatisfactory conditions have been corrected in manner acceptable to installer and manufacturer.

C. Before roofing work may begin, the design professional shall conduct a pre-roofing coordination meeting. It shall be attended by the Owner’s representative, the PSFA representative, the general contractor, the roofing contractor and all other subcontractors who have any components of their work on or penetrating the roof. The participants shall:

1. As much as is possible by visual inspection and by the cutting of core samples, verify that surfaces and site conditions are ready to receive work.
2. Examine roof deck to determine that it is sufficiently rigid to support roofers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
3. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to insure drainage. Examine substrate to determine that surface is in a suitable condition for roofing work.
4. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and cant strips, wood nailing strips and reglets are in place. Verify that all curbs and penetrations have been laid out and installed with adequate vertical and horizontal clearance as required by the manufacturer to provide the specified warranty.
5. The condition of surface to receive roof insulation shall be firm, clean, smooth, and dry. Do not start roof application until defects have been corrected.

## 3.3 PREPARATION OF SUBSTRATE

A. Verify demolition required and that roof surface is clean and ready to receive underlayment and new roof system. Repair and/or replace all water damaged substrate.

B. Disconnect Roof Equipment as required for new roof installation.

## 3.4 RIGID INSULATION INSTALLATION

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

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

C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

D. Trim surface of insulation where necessary so completed surface is flush and does not restrict flow of water.

E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

1. Cut and fit insulation within ¼ inch (6 mm) of nailers, projections, and penetrations.

F. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

G. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together and fasten to roof deck.

1. Fasten cover boards according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

## 3.5 UNDERLAYMENT INSTALLATION

A. Install new waterproof membrane underlayment over substrate as per manufacturer instructions.

B. Apply underlayment membrane in fair weather at temperatures of 40 degrees F or higher.

C. Remove dirt, loose fasteners and other protrusions from roof surface. Protrusions from the deck area must be removed. Surface shall have no voids, damaged, or unsupported areas.

D. Install underlayment perpendicular to slope of roof with 3.5 inches minimum side laps and 6 inches minimum end laps.

E. Start installation at lower edge of roof. Peel back 1 to 2 feet of release paper to start installation. Continue to pull release paper from membrane as it is unrolled.

F. Press membrane in place. Firmly roll edges with hand roller.

G. At high point of curved roof center top membrane strip to overlap both adjacent strips.

H. Do not leave underlayment membrane exposed for lengthy period of time. Exercise care not to puncture or tear underlayment barrier with subsequent roofing operations.

3.6 METAL ROOF SYSTEM INSTALLATION

A. Install roof panels and related components in accordance with manufacturer's instructions and standards of workmanship as approved by Architect and Roofing Consultant.

B. Do not cut panels, flashings or components with torch or any heat producing blades or tools.

C. Install starter and edge flashings prior to panels.

D. Do not allow panels or trim to come in contact with dissimilar materials. Separate dissimilar metals with bitumininous coating or rubberized asphalt underlayment.

E. Select fasteners and space hold down clips to accommodate requirements of Warranty requirements. Maximum spacing of clips shall be 48 inches.

1. Roof panels: Attach clips to through underlayment and rigid insulation into structural steel decking. All attachments shall allow for thermal expansion and contraction of the roofing panels.
2. Locate first and last fastening clips 3 inches minimum from panel ends. Align intermediate fastening clips at recommended spacing.
3. Face-fasten roof panels at top to restrict thermal expansion and contraction to one direction. Do not face-fasten both ends.
4. Align fasteners vertically and horizontally.

5. Use proper tools to obtain uniform compression for positive seal without rupture of neoprene washer.

F. Joint sealers: Install gaskets, joint fillers, and sealants of type recommended by manufacturer and as indicated on Drawings and approved shop drawings and as required for weatherproof installation.

1. At end laps install tape sealant.
2. Install weather seal under ridge cap.
3. Flash and seal panels at intersections with other materials. Provide weathertight closure pieces.
4. Seal the top and bottom of metal closures with butyl tap [7/8" x 1/8" (22mm x 3mm)] and sealant.

G. Place panels so that flanges interlock with clips and flanges of adjacent panels.

H. Mechanically seamed panels: Seam panels and battens together with electric-powered seaming machine supplied by the manufacturer to ensure side lap weathertightness in accordance with manufacture instructions.

I. Secure panels without waves, buckles, or deflections. Ensure panels are level, plumb, and accurately aligned with structure and adjacent components.

J. Do not install bent, dented, or scratched panels. Remove and replace panels damaged during installation.

K. Install closures, Pre-Fabricated Custom Roof Curbs, flashings, fascias, and other trim as detailed on Drawings and approved shop drawings and as required to ensure weather tightness.

L. Install Snow Retention System as per roof manufacturer's recommendations.

M. Re-Connect roof equipment and test to ensure equipment is working properly.

N. Do not allow traffic on completed roof. If required, provide cushioned walk boards.

O. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation and abuse by other trades. The general contractor shall be responsible for protecting the roofing from wet cement, plaster, and painting operations. The installer shall provide walk boards in heavy traffic areas to prevent damage to the panels.

P. Notify Architect, Roofing Consultant and Owner to arrange for final inspection and acceptance of the work performed.

## 3.7 INSTALLATION TOLERANCES

A. Alignment with structure and adjacent elements, levelness, and plumbness: 1/4 inch in 20 feet.

B. Offset of adjoining faces and matching profiles: 1/8 inch.

## 3.8 CLEANING AND PROTECTION

A. Clean exposed surfaces of work promptly after completion of installation. To prevent rust staining on finished surfaces, immediately remove filings produced by drilling or cutting.

B. Clean roof in accordance with manufacturer's recommendations.

C. Clean exposed surfaces of roofing and accessories after completion of installation. Leave in clean condition at Date of Substantial Completion for Project. Touch up minor abrasions and scratches in finish.

D. Touch up exposed fasteners using paint furnished by roofing panel manufacturer and matching exposed panel surface finish. Replace panels and other components of work, which have been damaged beyond repair by means of finish touch-up or similar minor repair.

E. Remove all scrap and construction debris from the site.

F. Wipe down each area after installation is complete fro final acceptance.

END OF SECTION 07 6113

# SECTION 07 6200 – SHEET FLASHING AND TRIM

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Flashings, counterflashings, sheet metal roofing flashings, scuppers, gutters, downspouts, edge strips, formed wall flashing and trim and other fabricated sheet metal items.

B. Pre-cast concrete splash pads.

### 1.2 RELATED SECTIONS

A. Section 06 1000 – Rough Carpentry

B. Section 07 4180 – Induction Welded TPO Roofing

C. Section 07 4190 – Induction Welded PVC Roofing

D. Section 07 7200 – Roof Accessories

E. Section 07 9200 – Joint Sealants

F. Section 09 9100 – Painting

### 1.3 PREFERENCES

A. ASTM 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1997.

B. ASTM B 32 - Standard Specification for Solder Metal; 1996.

C. ASTM 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 1997a.

D. ASTM 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 1993.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2003, Sixth Edition.

F. NRCA – The NRCA Architectural Sheet Metal and Metal Roofing Manual, Latest Editions.

1.4 SUBMITTALS

A. LEED REQUIREMENTS.

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Shop Drawings: Provide for all shop and pre-manufactured fabricated items. Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Submit color chart for pre-finished materials.

C. Submit roof manufacturer's certification that metal fasteners and sealants are acceptable to roof manufacturer.

D. Product Data Sheets on all products.

E. For fasteners that are to penetrate into, or through, pressure preservative treated lumber use stainless steel, hot dipped galvanized coated or provide certification from manufacturer that coating is compatible with preservative used for wood treatment.

F. Submit copies of all warranties.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual and The NRCA Architectural Sheet Metal and Metal Roofing Manual requirements and standard details and Manufacturer's requirements, except as otherwise indicated.

B. Install all sheet metal so as not to allow water infiltration into building.

C. Prevent contact with materials which may cause discoloration or staining.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials which may cause discoloration or staining.

1.7 WARRANTIES:

A. 20 year coating warranties on all coated metals

B. 20 year N.D.L. watertight installation warranty on all coping

C. All copings and edge metals must meet ES-1 Code requirements

PART 2 PRODUCTS

2.1 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 SHEET MATERIALS

A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; 0.033 inch (22 gage) thick steel; pre-finished fluorocarbon coating system unless noted otherwise on the drawings.

B. Membrane coated metal is to be used as shown in plans and roof membrane specification section.

2.3 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers. For fasteners that are to penetrate into, or through, pressure preservative treated lumber use stainless steel fasteners, hot dipped galvanized coated fasteners or coated fastener that is certified by manufacturer that coat is compatible with preservative used for wood treatment.

B. Underlayment:

1. ASTM D 2178, glass fiber roofing felt.
2. Self adhering polymer modified bituminous sheet equal to W. R. Grace Ice and Water Shield

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Zinc chromate alkyd.

E. Sealant:

1. One-part polyurethane caulking where the caulking is exposed to sunlight and used as a fill between components.
2. Non-skinning butyl caulking where caulking is required between components and is placed in compression and is not exposed to sunlight.

F. Plastic Cement: ASTM D 4586, Type I.

G. Solder: ASTM B 32; Sn50 (50/50) type.

2.4 FABRICATION GENERAL

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside ½ inch.

D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricated corners:

1. Metal corners are to be soldered/welded water tight at curb metal cover flashings.
2. Other, metal corners are to be folded and mitered together with the folded metal sealed water tight with sealant between the folds. Seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward ¼" or ½"inch (6 mm) and hemmed to form drip.

G. All metal roof counterflashings are to be 2-piece (reglet with flashing insert). All metal flashing and reglet corners are to be mitered, folded, caulked and pop riveted in a watertight manner. The reglet/receiver mitered corners are to be fabricated with legs no longer than 18".

## 2.5 GUTTER AND DOWNSPOUT FABRICATION

A. Gutters: SMACNA Architectural Sheet Metal Manual, Material gauge and profile shall be as indicated on the Drawings. The finish shall match metal roof panels or shall be as indicated on the Drawings. Each gutter joint will be cleaned, primed and covered with either a 6" wide strip of uncured EPDM glued in place in accordance with manufacturer's recommendations with the edges sealed with recommended seam caulk, or a 6" wide strip of weather resistant Eternabond.

B. Downspouts: See Drawings for profile and details. Material finish shall match metal roof panels and be fabricated from 22 gauge metal, or as indicated on the drawings.

C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 5 years in accordance with SMACNA Architectural Sheet Metal Manual. Material finish shall match metal roof panels, and be fabricated from 22 gauge metal; or as indicated on the drawings.

D. Accessories: Profiled to suit gutters and downspouts.

1. Anchorage Devices: In accordance with SMACNA requirements.
2. Gutter Supports shall be indicated on the Drawings.
3. Downspout Supports: Brackets.

E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

F. Downspout Boots: Steel.

1. At grade level and accessible to public: Eight foot high 16 gage primed steel. Wrap with metal with same finish as downspouts.
2. Inaccessible to public: Two foot high 16 gage primed steel. Wrap with metal with same finish as downspouts.

G. Seal metal joints.

2.6 COPING FABRICATION

A. Coping will be prefabricated from 22 gauge iron sheet metal with material finish matching metal roof panels, or as indicated on the Drawings.

B. Cover and splice plates will be installed.
C. Coping will be tapered to drain water to the inside.

D. Coping corners are to be mitered, sealed and pop riveted with 30” maximum outside legs. Pop rivets are to penetrate through sealant.

E. Coping Tee joints are to be fabricated with a 5’ top of the Tee and a 30” leg inserted under the top of the Tee, sealed and pop-riveted. Pop rivets are to penetrate through sealant.

2.7 SOFFIT PANEL AND FASCIA

A. Soffit Panel:

1. Profile: 1" high, 15" wide panel with v-groove at 5" on center.
2. Material: 24 gauge, galvalume or galvanized with Kynar 500 or Hylar 500 coating.
3. Color: Selected by Architect and approved by Owner from manufacturer's full range including premium metallic silver colors.

B. Fascia and Trim:

1. Profile: As required for closures and as indicated on drawings.
2. Material 22 gauge, galvalume or galvanized with Kynar 500 or Hylar 500 coating.
3. Color: Selected by Architect and approved by Owner from manufacturer's full range including premium metallic silver colors.

PART 3 EXECUTION

## 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table
    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

## 3.3 PREPARATION

A. Install starter, edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing pain.

## 3.4 GENERAL INSTALLATION

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA and NRCA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall opening components such as windows, doors and louvers.

B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

C. Apply plastic cement compound between asphalt primed metal flashings, felt flashings and per NRCA standards.

D. Fit flashings tight in place. Make mitered corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

## 3.5 COUNTERFLASHING INSTALLATION

A. All metal roof counterflashings are to be 2-piece (reglet/receiver with flashing insert). Counterflashings attached to metal and where slip metal is needed at mechanical curbs, one (1) piece may be used unless Drawings indicate otherwise.

B. Masonry and saw cut reglets: Insert masonry reglets to form tight fit. Secure saw cut reglets in place with appropriate wedges installed. Seal joint with one part polyurethane caulking.

C. Surface mounted flashing receiver: Set receiver into non-skinning butyl caulk and fasten reglet to wall 12" O.C through butyl caulk. Seal top of receiver with one part polyurethane caulking. For stucco stop type reglet: fasten reglet to wall 12" O.C.

D. All metal flashing receiver and reglet lap joints are to be lapped 3" and are to be caulked water tight with polyurethane caulking between the two pieces. The two pieces are to fit flush with one another. Wind clips 1" wide are to be installed spaced approximately 3'4" O.C.

E. All metal flashing and reglet corners are to be mitered, folded, caulked and pop riveted in a watertight manner. The reglet/receiver mitered corners are to be fabricated with legs no longer than 18".

F. When masonry and stucco stop reglets are to be installed by other trades, insure that they are fully informed on installation requirements.

3.6 COPING INSTALLATION

A. Where coping abuts a high wall, a splice plate with edge flanged up and out will be installed against wall in non-skinning butyl sealant. A wall abutment flashing trimmed to fit tight around the splice plate will then (1) be installed in sealant insuring the two corners at the splice plate are completely sealed with the sealant, (2) fastened to the wall and (3) sealed around the edges. Coping will be set in four rows of non skinning butyl sealant on the splice plate as described above leaving a ¼" separation between coping and wall.

B. Coping butt joints are to have both a 6" wide splice plate and 6" wide cover plate at each joint. Separation between coping joints shall be ¼". On each side of the splice plate there is to be two full rows of non-skinning butyl caulking. Under each side of the cover plate there is to be one row of non-skinning butyl caulk. If the parapet is sloped, 2 pop rivets on the uphill side of the cover plate will be installed through the cover plate, through the butyl caulk

END OF SECTION 07 6200

# SECTION 07 7100 – MANUFACTURED ROOF SPECIALTIES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Roof mounted pipe supports

B. Pipe and vent flashing

### 1.2 RELATED SECTIONS

A. Section 05 1200 – Structural Steel

B. Section 07 4180 – Induction Welded TPO Roofing

C. Section 07 4190 – Induction Welded PVC Roofing

D. Section 07 6200 – Sheet Metal Flashing and Trim

E. Section 07 9200 – Joint Sealers

### 1.3 REFERENCES

A. ASTM D 2822 - Standard Specification for Asphalt Roof Cement; current edition

B. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; Current Edition.

### 1.4 SUBMITTALS

A. LEED REQUIREMENTS.

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

C. Manufacturer’s Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

### 1.5 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual details.

PART 2 PRODUCTS

2.1 LEED REQUIREMENT

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits

2.2 MANUFACTURERS

A. Pipe and vent flashing

1. The Bilco Company
2. Nustrom

B. Roof mounted pipe supports

1. Copper B-Line
2. Micro Industries

a. RAH Series Pipe Support (Basis of Design)
b. Mapa Products

PART 3 EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.3 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.

C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION 07 7100

SECTION 07 7200 – ROOF ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof hatches.
2. Roof tie downs.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Division 06 Section "Rough Carpentry" for wood blocking, and wood nailers.
3. Division 07 low-slope roofing Sections for roofing accessories.
4. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-fabricated metal flashing and counterflashing, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
5. Division 07 Section "Roof Specialties" for fascia, copings, and gravel stops.

1.2 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

D. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

E. Samples: For each type of exposed factory-applied color finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.

F. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

1. With Architect's approval, adjust location of roof accessories that would interrupt roof drainage routes.

1.7 WARRANTY

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

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 2.2 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.

## 2.3 METAL MATERIALS

A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.

C. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755/A 755M.

   1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coated.
   2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 (Class AZM150) coated.
   3. Exposed Finishes: High-Performance Organic Finish (2-Coat Fluoropolymer): Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

D. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and mill finish.

E. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use, mill finished.

F. Stainless-Steel Shapes or Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 or Type 316, No. 2D finish.

G. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.

H. Steel Tube: ASTM A 500, round tube, baked-enamel finished.

I. Galvanized Steel Tube: ASTM A 500, round tube, hot-dip galvanized to comply with ASTM A 123/A 123M.

J. Galvanized Steel Pipe: ASTM A 53/A 53M.

## 2.4 MISCELLANEOUS MATERIALS

A. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, 1 inch (25 mm) thick.

B. Wood Nailers: Softwood lumber, fire rated pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

D. Polyethylene Sheet: 6-mil- thick, polyethylene sheet complying with ASTM D 4397.

E. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.

F. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

G. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

H. Elastomeric Sealant: ASTM C 920, polyurethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

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

J. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

## 2.5 ROOF HATCHES

A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated single-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware. Curb flashing to be able to clamp onto membrane when inserted into flashing.

1. Manufacturers:

a. Bilco Company (The).

b. J.L. Industries, Inc.
c. Milcor Inc.; a Gibraltar Company.
d. O'Keeffe's Inc.

2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
3. Type and Size: Single-leaf lid, 30 by 36 inches.
4. Curb and Lid Material: Galvanized steel sheet, 0.079 inch thick.

a. Furnish Galvanized: Mill phosphatized for field painting.
b. Finish for Aluminum: Clear anodic.

5. Insulation: Cellulosic-fiber board.
6. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
7. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
8. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
9. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate hatch curbs with height consultant.
10. Hardware: Galvanized steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.

a. Provide 2-point latch on covers larger than 84 inches (2130 mm).
b. Provide remote-control operation.

11. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.

a. Meet ANSI A14.3 and OSHA requirements.
b. Height: 42 inches (1060 mm) above finished roof deck.
c. Material and Finish: Steel tube, galvanized.
d. Diameter: Pipe with 1-5/8-inch OD tube.

## PART 3 - EXECUTION

### 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

### 3.2 EXAMINATION

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

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
2. Verify dimensions of roof openings for roof accessories.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.3 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories to fit substrates and to result in watertight performance.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Roof Hatch Installation:

1. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.
2. Attach safety railing system to roof hatch curb.
3. Attach ladder safety post according to manufacturer's written instructions.

F. Heat and Smoke Vent Installation: Locate, install, and test heat and smoke vents according to NFPA 204.

1. Check heat and smoke vent for proper operation. Adjust operating mechanism as required.

G. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

3.4 TOUCH UP

A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 09 painting Sections.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.5 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION 07 7200

SECTION 07 8413 - PENETRATION FIRESTOPPING

PART 1 – GENERAL

Comply with NFPA 5000, 2018 ED

1.1 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Floors
2. Roofs
3. Walls and partitions
4. Smoke barriers

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for construction of openings in concrete slabs and walls.
2. Division 7 Section "Building Insulation" for safing insulation and accessories.
3. Division 21 thru 23 Sections specifying duct and piping penetrations.
4. Division 26 thru 28 Sections specifying cable and conduit penetrations.

1.2 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated floor assemblies.
3. Fire-resistance-rated roof assemblies.

B. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.3 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of through-penetration firestop system product indicated.

C. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

   1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing

and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi component materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Through-Penetration Firestop System Schedule at the end of Part 3.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A/D Fire Protection Systems Inc.
2. DAP Inc.
3. Firestop Systems Inc.
4. Hilti Construction Chemicals, Inc.
5. Instant Firestop Mfg. Inc.
6. International Protective Coatings Corp.
7. Isolatek International.
8. Nelson Firestop Products.
9. NUCO Industries.
10. RectorSeal Corporation (The).
11. Specified Technologies Inc.
12. 3M Fire Protection Products.
13. Termco.
14. United States Gypsum Company.

## 2.3 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

    a. Slag-/rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Fillers for sealants.

2. Temporary forming materials.

3. Substrate primers.
4. Collars.
5. Steel sleeves.

## 2.4 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.5 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table
    i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

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

3.3 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Cleaning opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

3.4 THROUGH-PENTRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve, fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

## 3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

## 3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems with No Pentrating Items: Comply with the following:

1. Available UL-Classified Systems: C-AJ- C-BJ- F-A- W-J- W-L-.
2. Type of Fill Materials: One or more of the following:

a. Latex sealant.
b. Silicone sealant.
c. Intumescent putty.
d. Mortar.

C. Firestop Systems for Metallic Pipes, Conduit, or Tubing: Comply with the following:

1. Available UL-Classified Systems: C-AJ- C-BJ- C-BK- F-A- F-B- F-C- W-J- W-K- W-L-.
2. Type of Fill Materials: One or more of the following:

    a. Latex sealant.
    b. Silicone sealant.
    c. Intumescent putty.
    d. Mortar.

D. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing : Comply with the following:

1. Available UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L-.
2. Type of Fill Materials: One or more of the following:

    a. Latex sealant.
    b. Silicone sealant.
    c. Intumescent putty.
    d. Intumescent wrap strips.
    e. Firstop device.

E. Firestop Systems for Electrical Cables: Comply with the following:

1. Available UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L-.
2. Type of Fill Materials: One or more of the following:

    a. Latex sealant.
    b. Silicone Sealant.
    c. Intumescent putty.
    d. Silicone foam.

F. Firestop Systems for Cable Trays: Comply with the following:

1. Available UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-K- W-L-.
2. Type of Fill Materials: One or more of the following:

    a. Latex sealant.
    b. Intumescent putty.
    c. Silicone foam.
    d. Pillows/bags.

G. Firestop Systems for Insulated Pipes: Comply with the following:

1. Available UL-Classified Systems: C-AJ- C-BJ- F-A- F-C- W-J- W-L-.
2. Type of Fill Materials: One or more of the following:

a. Latex sealant.
b. Intumescent putty.
c. Silicone foam.
d. Intumescent wrap strips.

H. Firestop Systems for Miscellaneous Electrical Penetrants : Comply with the following:

1. Available UL-Classified Systems: C-AJ- F-A- W-L-.
2. Type of Fill Materials: One or more of the following:

a. Latex sealant.
b. Intumescent putty.
c. Mortar.

I. Firestop Systems for Miscellaneous Mechanical Penetrations: Comply with the following:

1. Available UL-Classified Systems: C-AJ- F-C- W-J- W-L-.
2. Type of Fill Materials: One or both of the following:

a. Latex sealant.
b. Mortar.
c. Intumescent wrap strips.
d. Firestop device.
e. Intumescent composite sheet.

END OF SECITON 07 8413

SECTION 07 9200 – JOINT SEALANTS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

B. This Section includes sealants for the following applications:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

    a. Control and expansion joints in cast-in-place concrete.
    b. Control and expansion joints in unit masonry.
    c. Joints in glass unit masonry assemblies.
    d. Joints between different materials listed above.
    e. Perimeter joints between materials listed above and frames of doors and windows.
    f. Control and expansion joints in ceiling and overhead surfaces.
    g. Other joints as indicated.
    h. Joints in exterior plaster system.

2. Exterior joints in the following horizontal traffic surfaces:

    a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
    b. Control and expansion joints.
    c. Joints between different materials listed above.
    d. Other joints as indicated.

3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings where indicated.
    c. Tile control and expansion joints.
    d. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    f. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    g. Other joints as indicated.

4. Interior joints in the following horizontal traffic surfaces:

    a. Control and expansion joints in cast-in-place concrete slabs.

b. Control and expansion joints in tile flooring.
c. Other joints as indicated.

C. Related Sections include the following:

1. Division 4 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Division 7 Section "Firestopping" for fire-resistant building joint-sealant systems.
3. Division 8 Section "Glazing" for glazing sealants.
4. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
5. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
    a. Each kind of exterior sealant and joint substrate indicated.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.

4. 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.

    1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 SUBMITTALS

A. LEED REQUIREMENTS.
    i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each joint-sealant product indicated.

C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

E. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Provide pull test after sealant has cured. Provide pull test for each sealant required and for each material sealant system is applied to. Three tests per material.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1. Provide 5 year warranty for all sealants, except where noted otherwise
2. Provide 20 year warranty for silicone sealants.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.

B. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.3 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.4 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

B. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.5 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.

2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.
2. Type O: Open-cell material.

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

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 – EXAMINATION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.3 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

a. Concrete.
b. Masonry.
c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

a. Metal.
b. Glass.
c. Glazed surfaces of ceramic tile

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

## 3.4 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

4. Cover all backer rods with sealant by end of day.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

F. Install sealants by proven techniques to 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 provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealants from surfaces adjacent to joint.
2. Tool sealants dry. Do not use solvents.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

## 3.5 CLEANING

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

## 3.6 PROTECTION

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

## 3.7 ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Medium-Modulus Neutral-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products:

a. 791; Dow Corning.
b. 795; Dow Corning.

c. HiFlex 393; NUCO Industries, Inc.
d. PSI-631; Polymeric Systems, Inc.
e. SM5731 Poly-Glaze; Schnee-Morehead, Inc.
f. SM5733 Poly-Glaze; Schnee-Morehead, Inc.
g. Spectrem 2; Tremco.
h. Tremsil 600; Tremco.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
7. Applications: Glazing Systems, metal to metal seams.

B. Mildew-Resistant Silicone Sealant: Where joint sealants of this type are indicated, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes, and that comply with the following:

1. Products: Available products include the following:

a. 786 Mildew Resistant; Dow Corning.
b. Sanitary 1700; GE Silicones.
c. NuFlex 302; NUCO Industries, Inc.
d. 898 Silicone Silicone Sanitary Sealant; Pecora Corporation.
e. PSI-611; Polymeric Systems, Inc.
f. Tremsil 600 White; Tremco.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Coated glass, color anodic aluminum, galvanized steel, and ceramic tile.

6. Applications: All Interior Wet Locations

C. Multicomponent Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products: Available products include the following:

    a. Vulkem 922; Mameco International.
    b. Dynatrol II; Pecora Corporation.
    c. Flexiprene 2000; Polymeric Systems, Inc.
    d. Sikaflex – 2c NS; Sika Corporation.
    e. DYmeric 511; Tremco.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25
4. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.
5. Use Related to Exposure: NT (nontraffic).
6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
7. Applications: Exterior masonry control joints, and all other exterior locations.

D. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products: Available products include the following:

    a. Vulkem 255; Mameco International.
    b. Sikaflex – 2c SL; Sika Corporation.
    c. SL 2; Sonneborn Building Products Div., ChemRex Inc.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T(traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated.
6. Applications: Horizontal exterior surfaces and horizontal surfaces in the parking area.

3.8 LATEX JOINT-SEALANT SCHEDULE

A. Latex Sealant LS-#: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products: Available products include the following:

    a. Chem-Chalk 600; Bostik Inc.

b. NuFlex 330; NUCO Industries, Inc.
c. LC 160 All Purpose Acrylic Chaulk; Ohio Sealants, Inc.
d. AC-20; Pecora Corporation.
e. PSI-701; Polymeric Systems, Inc.
f. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
g. Tremflex 834; Tremco.

2. Applications: All non moisture interior locations.

END OF SECTION 07 9200

# SECTION 08 1113 – HOLLOW METAL DOORS AND FRAMES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

B. Fire-rated steel doors and frames.

C. Thermally insulated steel doors.

D. Steel glazing frames.

E. Accessories, including glazing, louvers, and matching panels.

### 1.2 RELATED SECTIONS

A. Section 08 7100 - Finish Hardware.

B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

C. Section 09 9100 - Painting: Field painting.

### 1.3 REFERENCES

A. ANSI/CABO A117.1 - American National Standard for Buildings and Facilities - Providing Accessible and Usable Buildings and Facilities; Council of American Building Officials; Current Edition.

B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; Current Edition.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; Current Edition.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; Current Edition.

E. ASTM C 236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box; Current Edition.

F. ASTM 336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings; Current Edition.

G. ASTM E 413 - Classification for Rating Sound Insulation; Current Edition.

H. ASTM E 1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; Current Edition.

I. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition (ANSI/DHI A115 Series).

J. NAAMM HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; Current Edition.

K. NAAMM 862 - Guide Specifications for Commercial Security Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; Current Edition.

L. NAAMM HMMA 865 - Guide Specifications for Swinging Sound Control Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; Current Edition.

M. NFPA 80 - Standard for Fire Doors and Windows; National Fire Protection Association; Current Edition.

N. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; Current Edition.

O. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; Current Edition.

1.4 SUBMITTALS

A. LEED REQUIREMENTS

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

D. Samples:
   1. Doors: Show vertical-edge, top, and bottom construction; core construction; glazing and hinge and other applied hardware reinforcement.
   2. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

E. Product Schedule: For doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Indicate access control for both rough-in and complete installation. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

F. Product Test Reports: For each type of door and frame assembly, for tests performed by a qualified testing agency.

G. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MANUFACTURERS

A. Steel Doors and Frames:

1. Ceco Door Products.
2. Commercial Door and Hardware, Inc.
3. Republic Builders Products.
4. Steelcraft Manufacturing Co.
5. Substitutions: See Section 01 6300 – Product Substitution Procedures

2.3 DOORS AND FRAMES

A. Requirements for All Doors and Frames:

1. Accessibility: Comply with ANSI A117.1.
2. Door Top Closures: Flush with top of faces and edges.

3. Door Edge Profile: Beveled on both edges.
4. Door Texture: Smooth faces.
5. Glazed Lights: Non-removable stops on non-secure side; flush type, sizes and configurations as indicated on drawings.
6. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
8. Finish: Factory primed, for field finishing. All internal and external surfaces of hollow metal frames to be factory primed.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.4 STEEL DOORS

A. Exterior Doors:

1. Grade: NAAMM HMMA 862.

a. Face Sheets: 14 gauge, (.067 inches).

2. Core: Polystyrene foam.
3. Thickness: 1-3/4 inches.
4. Top Closures for Outswinging Doors: Flush with top of faces and edges.
5. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
6. Texture: Smooth faces.
7. Insulating Value: U-value of .09, when tested in accordance with ASTM C 236.
8. Weatherstripping: Separate, see Section 08 7100.

B. Interior Doors, Non-Fire-Rated:

1. Grade: NAAMM HMMA 862.

a. Face Sheets: 16 gauge (.053 inches).

2. Core: Cardboard honeycomb.
3. Thickness: 1-3/4 inches.
4. Texture: Smooth faces.

C. Interior Doors, Fire-Rated:

1. Grade: NAAMM HMMA 862.

    a. Face Sheets: 16 gauge (.053 inches).

2. Fire Rating: As indicated on Door and Frame Schedule, with temperature rise ratings as required by code, tested in accordance with NFPA 252, 2018 ED.

    a. Provide units listed and labeled by UL.
    b. Attach fire rating label to each fire rated unit.

3. Core: Mineral fiberboard.
4. Texture: Smooth faces.

D. Interior Doors, Sound-Rated:

1. Grade: NAAMM HMMA 865.

    a. Face Sheets: 16 gauge (.053 inches).

2. STC Rating: 35, calculated in accordance with ASTM E 413, tested in accordance with ASTM E 336 or ASTM E 1408.
3. Core: Polyurethane.
4. Texture: Smooth faces.
5. Sound Seals: Separate; see Section 08 7100.

E. Panels: Same construction, performance, and finish as doors.

2.5 STEEL FRAMES

A. General:

1. Comply with the requirements of grade specified for corresponding door.

    a. ANSI A250.8 Level 3 Doors: 14 gage frames for interior openings.
    b. ANSI A250.8 Level 4 Doors: 12 gage frames for exterior openings.

2. Finsih: Same as for door.
3. Provide 22 gage mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
5. Frames wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
6. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.

7. All frames shall be installed with anchors to suit wall construction. A minimum of 3 jamb anchors on each side of frame, and 2 base anchors per frame shall be supplied and installed.

B. Exterior Door Frames: Face welded, seamless with joints filled.

1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
2. Weather stripping: Separate, see Section 08 7100.

C. Interior Door Frames, Non-Fire-Rated: Fully welded type.

D. Interior Door Frames, Fire-Rated: Fully welded type.

1. Fire Rating: Same as door, labeled.

E. Sound-Rated Door Frames: Knock-down type.

F. Mullions for Pairs of Doors (where scheduled): Removable type, of profile similar to jambs.

G. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

H. Transom Bars: Fixed, of profile same as jamb and head.

2.6 ACCESSORY MATERIALS

A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.

B. Glazing: As specified in Section 08 8000, factory installed.

C. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited. Locations as indicated on drawings.

D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities

2.7 FINISH MATERIALS

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
2. Apply Prime Finish to all surfaces of hollow metal frames.

PART 3 – EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions. Seal frame to all adjacent surfaces.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/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, leaving surfaces smooth and undamaged.

        a. At fire-protection-rated openings, install frames according to NFPA 80.
        b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
        c. Install frames with removable glazing stops located on secure side of opening.
        d. Install door silencers in frames before grouting.
        e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
        f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
        g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

    2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

        a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

    3. Metal-Stud Partitions: Grout Solid.
    4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
    5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
    6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
    7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
    8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame in ceiling space unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to

provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80, 2016 ED.
3. Smoke-Control Doors: Install doors according to NFPA 5000, 2018 ED.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

## 3.4 ADJUSTING AND CLEANING

A. Final adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. 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.

END OF SECTION 08 1113

# SECTION 08 1416 - FLUSH WOOD DOORS

## PART 1- GENERAL

Comply with ADA ABA AG, 2004 ED.

### 1.1 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated, non-rated, and acoustical.

### 1.2 RELATED SECTIONS

A. Section 08 1113 – Hollow Metal Doors & Frames

B. Section 08 7100 – Finish Hardware.

C. Section 08 8000 – Glazing.

### 1.3 REFERENCES

The references listed below are declared to be a part of these specifications, the same as if fully set forth, except as modified herein. Unless specifically stated otherwise, the edition or revision of each document in effect at the beginning of work on this project shall be used.

A. ASTM E 336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.

B. ASTM E 413 - Classification for Rating Sound Insulation.

C. ASTM E 1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems.

D. AWI P-200 - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute.

E. NFPA 80 - Standard for Fire Doors and Windows; National Fire Protection Association.

F. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

### 1.4 SUBMITTALS

A. LEED REQUIREMENTS

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.

D. Details of electrical raceway and preparation for electrified hardware, access control systems and security systems.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

F. Product Schedule: For doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Indicate access control for both rough-in and complete installation. Coordinate with final door hardware schedule.

G. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

F. Warranty: Sample of standard warranty

## 1.5 QUALITY ASSURANCE

A. Perform work in accordance with AWI, Section 1300, Custom Grade.

B. Finish doors in accordance with AWI, Section 1300, Custom Grade.

C. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

## 1.6 REGULATORY REQUIREMENTS

A. Fire Door and Panel Construction: Conform to NFPA 252, 2018 ED.

1. Listed and classified by UL as suitable to for the purpose specified and indicated.

B. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 2016 ED. for fire rated class as indicated.

## 1.7 DELIVERY, STORAGE, AND PROTECTION

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

E. Accept doors on site in manufacturer's packaging. Inspect for damage.

F. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.8 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.9 WARRANTY

A. Provide warranty for the following term:

1. Interior Doors: Two (2) years.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MANUFACTURERS

A. Veneer Doors:

1. Eggers Industries.
2. Algoma.
3. Marshfield Door Systems, Inc.
4. VT Industries, Inc.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.3 DOOR TYPES

A. Flush Interior Doors: 1-3/4 inches thick; solid core construction; fire rated and acoustic rated as indicated, 5-ply door system. Faces are bonded to core using a hot press.

## 2.4 DOOR CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: AWI, Section 1300, Type PC-Particleboard.

B. Fire Rated Doors: AWI, Section 1300, Type FD, hourly ratings as indicated.

C. Sound Retardant Doors: AWI, Section 1300, Type SR - Sound Retardant (Acoustical).

## 2.5 DOOR FACINGS

A. Interior Doors - Veneer: Custom grade wood veneer, plain sliced, with slip matched grain, for transparent finish. Book matched veneer will not be acceptable.

B. Species: To be selected by architect from manufacturers standard veneer including – Red Oak, White Oak, Select White Maple, Select White Birch

B. Cross Banding Behind Laminate Finish: 1 ply; of hardwood material.

C. Facing Adhesive: Type I - waterproof.

## 2.6 ACCESSORIES

A. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws - See Section 08 8000 for Glazing.

## 2.7 FABRICATION

A. Fabricate doors in accordance with AWI Quality Standards requirements.

B. Fabricate fire rated doors in accordance with UL requirements. Attach fire rating label to door.

C. Sound Rating For Single Door Leaf and Frame Assembly: ASTM E 413, minimum STC 35.

D. Provide solid blocks at lock edge for hardware reinforcement.

1. Provide solid blocking for other through bolted hardware.

E. Vertical Exposed Edge of Stiles - Veneer Faces: Of same species as veneer facing.

F. Fit door edge trim to edge of stiles after applying veneer facing.

G. Bond edge banding to cores.

H. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

I. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

1. Comply with NFPA 80 for fire-rated doors.

## 2.8 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

D. Finish doors at factory where indicated in schedules or on Drawings as factory finished.

E. Transparent Finish:

1. Grade: Custom.
2. Finish: AWI conversion varnish or catalyzed polyurethane system.
3. Staining: None required.
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores
5. Sheen: Semigloss.

# PART 3 – EXECUTION

## 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

## 3.3 INSTALLATION

A. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

B Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

1. Comply with NFPA 80, 2016 ED. for fire-rated doors.

C. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
D 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. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).

1. Trim fire door height at bottom edge only, in accordance with fire rating requirements.

F. Machine cut for hardware.

G. Coordinate installation of doors with installation of frames and hardware.

H. Coordinate installation of glazing.

## 3.4 INSTALLATION TOLERANCES

A. Conform to AWI P-200 requirements for fit and clearance tolerances.

B. Conform to AWI P-200, Section 1300 for maximum diagonal distortion.

C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 x 84 inches surface area.

D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inches surface area.

## 3.5 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

C. 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.

3.6 SCHEDULE - SEE DRAWINGS

END OF SECTION 08 1416

# SECTION 08 3113 – ACCESS DOORS AND FRAMES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Access door and frame units, fire-rated, in wall and ceiling locations.

### 1.2 RELATED SECTIONS

A. Section 09 2900 – Gypsum Board

### 1.3 SUBMITTALS

A. LEED REQUIREMENTS
i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Manufacturer's Installation Instructions: Indicate installation requirements.

D. Project Record Documents: Record actual locations of all access units.

### 1.4 REGULATORY REQUIREMENTS

A. Conform to 2009 IBC code for fire rated access doors.

1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.
2. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

### 1.5 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

## PART 2 – PRODUCTS

### 2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

### 2.2 MANUFACTURERS

A. Access Doors:

1. Access Panel Solutions
2. Acudor Products, Inc.
3. Alfab, Inc.
4. Babcock-David
5. Cendrex Inc.
6. Elmdor/Stoneman Manufacturing Co; Div of Acorn Engineering Co
7. Jensen Industries; Div of Broan-Nuton, LLC
8. J.L. Industries, Inc; Div of Activar Construction Products Group
9. Karp Associates, Inc
10. Larsen's Manufacturing Company
11. Maxam Metal Products Limited
12. Metropolitan Door Industries Corp
13. MIFAB, Inc.
14. Milcor, Inc.
15. Nystrom, Inc.
16. Williams Bros Corporation of America.
17. Substitutions: See Section 016000 - Product Requirements.

2.3 ACCESS DOOR UNITS – WALLS AND CEILINGS

A. Ceiling Door and Frame Units: Formed Steel

1. Frames and flanges: 0.058 inch steel
2. Door panels: 0.070 inch single thickness steel sheet
3. Minimum Sizes: 24 x 24 inches or as indicated on drawings
4. Hardware
    a. Hinge: Concealed constant force closure spring type
    b. Lock: Screw driver slot for quarter turn cam lock
5. Finish: Prime coat with alkyd primer, paint to match adjacent surface

B. Wall Door and Frame Units: Stainless-Steel.

1. Frames and flanges: 16 gage
2. Door panels: 16 gage.
3. Sizes: 16 x 16 inches or as indicated on the drawings.
4. Hardware:
    a. Hinge: Concealed constant force closure spring type.
    b. Lock: Screw driver slot for quarter turn cam lock.
5. No. 4 Finish

2.4 FABRICATION

A. Weld, fill, and grind joints to ensure flush and square unit.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.5 FINISHES

A. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.
b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
c. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Verify that rough openings for door and frame are correctly sized and located.

3.3 INSTALLATION

A. Review proposed locations with architect prior to installation.

B. Install units in accordance with manufacturer's instructions.

C. Center access hatches on other systems and equipment. Equally space with other installations.

D. Install frames plumb and level in openings. Secure rigidly in place.

E. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION 08 3113

SECTION 08 3313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Coiling Counter doors.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 09 Section "Exterior Painting" and "Interior Painting" for finish painting of factory-primed doors.
3. Division 26 Sections for special system connections.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design coiling counter doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified.
2. Seismic Component Importance Factor: 1.0

C. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than 10 cycles per day. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type and size of coiling door and accessory, include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats in curtain, bottom bars, guides, brackets, hoods, operating mechanisms and special features.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

D. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.
2. 18" square door curtain material

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For coiling counter doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

C. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MATERIALS

A. Door Curtain

1. Solid Door Curtain (locations shown on drawings): Constructed of interconnected strip stainless steel slats. The curtain shall be constructed of 22 gauge No. 10 (1-1/4" high by 3/8" deep) slats. The finish on the door curtain shall be #4.
2. Coiling Grill Curtain (locations shown on drawings): Aluminum grill curtain constructed as an open network of horizontal rods, spaced at regular intervals, which are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods. Space rods 2" OC and Links 3" OC in a straight in-line pattern. Aluminum finish: Clear anodized.

B. The bottom bar shall be constructed of tubular stainless steel, 2" high by 1-1/4" deep, and including a safety edge system. The bottom bar shall receive a #4 finish.

C. The guides shall be constructed of a stainless steel angle and channel, 1-7/8" square. The guides shall receive a #4 finish.

D. The brackets shall be constructed of 1/8" thick steel plate and shall have stainless steel end covers.

E. The barrel shall be steel tubing of not less than 4" in diameter. Oil tempered torsion springs shall be capable of correctly counter balancing the weight of the curtain. The barrel shall be designed to limit the maximum deflection to .03" per foot of opening width. The finish on the barrel shall be one (1) coat of bronze rust-inhibiting prime paint.

F. Endlocks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

G. Integral Frame, Hood and Fascia shall be fabricated from 24 gauge stainless steel and shall be formed to fit the square brackets. The finish on the hood shall be #4.

H. Integral Metal Sill for Counter door: Fabricate sills as integral part of frame assembly of type 304 stainless steel in manufacturer's standard thickness with No. 4 finish.

1. Locate at all counter doors unless noted otherwise.

2.3 OPERATION

A. The rolling counter door shall be operated at a speed of 1/2 foot per second by a model 11 motor operator. The motor operator shall include an electric motor with gear reducer in oil bath, geared limit switch and emergency release for push up operation. The motor operator shall be 115 volt single phase. The motor starter shall be housed in a NEMA 1 housing and include a 24 volt control transformer and complete terminal strip to facilitate field wiring. The motor operator shall be activated by a 3 button push-button station in NEMA 1 enclosure. The motor operator shall be mounted to the door bracket or as shown on the drawings. All motor operators shall be U. L. Listed.

B. Motor operated counter doors shall be secured by means of a concealed sliding bolt deadlock in the bottom bar operated by a cylinder lock, electrically interlocked to prevent the motor from operating when the door is locked.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware." and keyed to building keying system.
2. Keys: Provide four for each cylinder.

2.5 CURTAIN ACCESSORIES

A. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

1. Provide pull-down straps or pole hooks for doors more than 84 inches (2130 mm) high.

B. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

1. At door head, use 1/8-inch thick, replaceable, continuous sheet secured to inside of hood.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch thick seals of flexible vinyl, rubber, or neoprene.

2.6 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

a. Cookson Company.
b. Overhead Door Corporation.
c. Raynor.

B. Substitution requests must be submitted per Section 01 6300.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

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

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

3.3 INSTALLATION

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install coiling counter doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.5 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 08 3313

SECTION 08 3326 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Open-curtain overhead coiling grilles.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling grilles, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Seismic Performance: Overhead coiling grilles shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
2. Seismic Component Importance Factor: 1.0.

C. Operation Cycles: Provide overhead coiling grille components and operators capable of operating for not less than number of cycles indicated for each grille. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

1.3 SUBMITTALS

A. LEED REQUIREMENTS.

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

D. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

   1. Include similar Samples of accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

   1. Open-Curtain Grille: 18-inch- (457-mm-) square assembly with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
   2. Bottom Bar: 6 inches (150 mm) long.
   3. Guides: 6 inches (150 mm) long.
   4. Brackets: 6 inches (150 mm) square.

F. Qualification Data: For qualified Installer.

G. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.

C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 2.2 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.

1. Aluminum Grille Curtain: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.

C. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.

1. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

D. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

## 2.3 HOODS AND ACCESSORIES

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Aluminum: 0.040-inch- (1.02-mm-) thick aluminum sheet complying with ASTM B 209 (ASTM B 209M), of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

B. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel tubes or shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

## 2.4 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power supply when grille is locked.

2.5 COUNTERBALANCING MECHANISM

A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.

C. Spring balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 ELECTRIC GRILLE OPERATIONS

A. General: Provide electric grille operator assembly of size and capacity recommended and provided by manufacturer for operation-cycle requirements specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

B. Comply with NFPA 70.

C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging chain and sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.

F. Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft-type operator unit consisting of electric motor, worm-gear running-in-oil drive, and chain and sprocket secondary drive.

1. Through-wall-mounted motor operator.

G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1; with overload protection; sized to start, accelerate, and operate door in either direction from any position, at not less than 3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.

1. Type: Single phase type.
2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
3. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

H. Remote-Control Station: Provide momentary-contact, key control station with key control labeled "Open," "Close," and "Stop."

I. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor capable of protecting full width of opening. Activation of sensor immediately stops and reverses downward grille travel.

1. Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

a. Provide pneumatically actuated automatic bottom bar.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

## 2.7 OPEN-CURTAIN GRILLE ASSEMBLY

A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ACME Rolling Doors.
b. AlumaTek, Inc.
c. Cookson Company.
d. Cornell Iron Works, Inc.
e. Lawrence Roll-Up Doors, Inc.
f. McKeon Rolling Steel Door Company, Inc.
g. Overhead Door Corporation.
h. Raynor.
i. Windsor Door.

B. Operation Cycles: Not less than 20,000.

C. Grille Curtain Material: Aluminum

1. Space rods at approximately 2 inches (51 mm) o.c.
2. Space links approximately 3 inches (76 mm) apart in a straight in-line pattern.
3. Spacers: Metal tubes matching curtain material.

D. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

E. Hood: Aluminum.

1. Shape: Round.
2. Mounting: Face of wall.

F. Locking Devices: Equip grille with locking device assembly.

1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside and outside with cylinders.

G. Electric Grille Operator:

1. Usage Classification: Standard duty, up to 60 cycles per
2. Operator Location: Wall.
3. Motor Exposure: Interior
4. Emergency Manual Operation: Push-up
5. Obstruction-Detection Device: Automatic pneumatic sensor edge on bottom bar.

a. Sensor Edge Bulb Color: Black

6. Remote-Control Station: Where shown on Drawings.

H. Grille Finish:

1. Aluminum Finish: Mill

2.8 GENERAL FINISH REQUIRMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

A. Mill Finish: Mill

PART 3 - EXECUTION

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

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.

C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test & adjust controls/safeties. Replace damaged/malfunctioning controls & equipment.

3. Test grille opening when activated by detector, fire-alarm system, emergency-egress release, or self-opening mechanism as required. Reset grille-opening mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 08 3326

# SECTION 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for window walls.
3. Storefront framing for ribbon walls.
4. Storefront framing for punched openings.
5. Exterior and interior manual-swing entrance doors and door-frame units.

B. Related Requirements:
1. Section 07 9200 – Joint Sealants
2. Section 08 5113 – Aluminum Windows
3. Section 08 7100 – Finish Hardware
4. Section 08 8000 - Glazing

### 1.3 ACTION SUBMITTALS

A. LEED REQUIREMENTS.
i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware. Details of electrical raceway and preparation for electrified hardware, access control systems and security systems

## 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data for Installer

B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.

D. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.

E. Source quality-control reports.

F. Field quality-control reports.

G. Sample Warranties.

## 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

## 1.6 QUALITY ASSURANCE

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

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. 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.

D. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of storefront systems.

## 1.7 MOCKUPS

A. Mock-Up: See section 03-3100 Project Management and Coordination for Building Assemblies Mock-up requirements.

## 1.8 WARRANTY

A. General 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. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

## 2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 2.2 PERFORMANCE REQUIREMENTS

A. 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.

B. Structural Loads:

   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.

C. Deflection of Framing Members: At design wind pressure, as follows:

   1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

      a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

   3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

      a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.

D. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

    a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. 6.24 lbf/sq. ft.

2. Entrance Doors:

    a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
    b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

F. 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.

G. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement.
2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement.

I. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.

2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 62 as determined according to NFRC 500.

J. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows.

1. Outdoor-Indoor Transmission Class: Minimum 30.

K. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone 3.

1. Large-Missile Test: For glazed openings located within 30 feet of grade.

L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
b. Low Exterior Ambient-Air Temperature: 0 deg F.
c. Interior Ambient-Air Temperature: 75 deg FRetain "Structural-Sealant Joints" Paragraph below if Project includes two-sided structural glazing.

## 2.2 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis of Design: Tubelite T14000 Series. (Thermally Broken)

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arcadia, Inc.
2. EFCO Windows/Storefront/Curtainwalls/Sunshades
3. Kawneer Company, Inc.
4. Tubelite Architectural Systems
5. Vistawall Architectural Products
6. Manko Window Systems, Inc.

D. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing, spandrel panels, venting windows and accessories, from single manufacturer.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction:
   a. Exterior: Thermally Broken
   b. Interior: Nonthermal
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front
4. Finish: Clear anodic finish
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

   a. Sheet and Plate: ASTM B 209
   b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221
   c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
   d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

   a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
   c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 INSULATED SPANDREL PANELS

A. Insulated Spandrel Panels: Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

1. Overall Panel Thickness: 1 inch.
2. Exterior Skin: Aluminum.

a. Thickness: Manufacturer's standard for finish and texture indicated
b. Finish: Match framing system
c. Texture: Smooth.
d. Backing Sheet: 0.125-inch-thick, corrugated, high-density polyethylene

3. Interior Skin: Aluminum.

a. Thickness: Manufacturer's standard for finish and texture indicated
b. Finish: Match framing system
c. Texture: Smooth.
d. Backing Sheet: 0.125-inch-thick, corrugated, high-density polyethylene

4. Thermal Insulation Core: Manufacturer's standard extruded-polystyrene board.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 2.5 VENTING WINDOWS

A. Aluminum Windows: Manufacturer's standard units, complying with AAMA/WDMA/CSA 101/I.S.2/A440, with self-flashing mounting fins, and as follows:

1. Window Type: As indicated on Drawings.
2. Minimum Performance Class: Heavy Commercial (HC)
3. Minimum Performance Grade: 50
4. Aluminum Extrusions: ASTM B 221 alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 0.064-inch thickness at any location for main frame and sash members.

a. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

5. Mullions: Between adjacent windows, fabricated of extruded aluminum matching finish of window units.
6. Fasteners, Anchors, and Clips: Nonmagnetic stainless steel, aluminum, or other noncorrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners shall not be exposed, except for attaching hardware.

a. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.128 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, spline grommet nuts.

7. Hardware: Manufacturer's standard; of aluminum, stainless steel, die-cast steel, malleable iron, or bronze; including the following:

a. Cam-action sweep sash lock and keeper at meeting rails.
b. Spring-loaded, snap-type lock at jambs.

c. Pole-operated, cam-action locking device on meeting rail where rail is more than 72 inches above floor.
d. Lift handles for single-hung units.
e. Nylon sash rollers for horizontal-sliding units.
f. Steel or bronze operating arms.

8. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric; complying with AAMA 701/702.
9. Insect Screens: Provide removable insect screen on each operable exterior sash, with screen frame finished to match window unit, complying with SMA 1004 or SMA 1201, and as follows:

a. Aluminum Wire Fabric: 18-by-18 mesh of 0.013-inch-diameter, coated aluminum wire.

B. Glazing: Same as adjacent aluminum-framed entrances and storefront glazing.

C. Finish: Match adjacent aluminum-framed entrances and storefront finish.

## 2.6 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's glazed entrance doors for manual-swing operation.
1. Basis of Design: Tubelite Monumental Series Doors

2. Door Construction: 2-inch overall thickness, with minimum 0.188-inch- thick, extruded-aluminum tubular rail and stile members. Dual moment welded corner construction that are deep penetration and fillet welded or that incorporate concealed tie-rods

a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

3. Door Design: Top Rail: Minimum 5-inch. Vertical Rail: Minimum 5-inch Bottom Rail: 10-inch
4. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

## 2.7 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 7100 "Door Hardware."

B. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

C. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

D. Silencers: BHMA A156.16, Grade 1.

E. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

F. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

## 2.8 GLAZING

A. Glazing: Comply with Section 08 8000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

1. Color: Match structural sealant.

## 2.9 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.10 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. 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. Storefront Framing: Fabricate components for assembly using screw-spline system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. 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.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.11 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.12 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2. EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 9200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 08 8000 "Glazing."

G. Install weatherseal sealant according to Section 07 9200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

## 3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

## 3.5 FIELD QUALITY CONTROL

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

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

a. Perform a minimum of three tests in areas as directed by Architect.
b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

## 3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

END OF SECTION 08 4113

**↯ = Door Requiring Electrical Coordination**

| Door Numbers | HwSet# | ↯ |
|---|---|---|
| 001 | 42 | ↯ |
| 002 | 07 | |
| 003 | 03 | ↯ |
| 004 | 42 | ↯ |
| 005 | 03 | ↯ |
| 006 | 05 | |
| 007 | 11 | |
| 100 | 43 | |
| 101A | 44 | ↯ |
| 101B | 44 | ↯ |
| 103 | 22 | |
| 105 | 45 | |
| 107 | 45 | |
| 108 | 46 | |
| 109.1 | 23.01 | |
| 110 | 14 | |
| 111 | 15 | |
| 112 | 15 | |
| 113 | 46.01 | |
| 114.1 | 18.01 | |
| 120 | 16 | |
| 121 | 16 | |
| 200 | 43 | ↯ |
| 201 | 23 | |
| 202 | 47 | ↯ |
| 203 | 15 | |
| 204 | 31 | |
| 205 | 15 | |
| 206 | 15 | |
| 207 | 46 | |
| 207A | 17 | |
| 208 | 46 | |
| 208A | 17 | |
| 209 | 46 | |
| 210 | 46 | |
| 211 | 46 | |
| 212 | 46 | |
| 213 | 46 | |
| 216 | 47 | ↯ |
| 217 | 15 | |
| 218 | 31 | |
| 219 | 15 | |
| 220 | 46 | |
| 221 | 17 | |
| 222 | 46 | |
| 223 | 46 | |
| 223A | 17 | |
| 224 | 46 | |
| 225 | 46 | |

| Door Numbers | HwSet# | ↯ |
|---|---|---|
| 226 | 46 | |
| 227 | 46 | |

**↯ = Door Requiring Electrical Coordination**

| Door Numbers | HwSet# | ↯ |
|---|---|---|
| 001 | 01 | |
| 002 | 01 | |
| 003 | 02 | ↯ |
| 004 | 03 | ↯ |
| 005 | 04 | ↯ |
| 006 | 05 | |
| 007 | 06 | ↯ |
| 008 | 07 | |
| 009 | 06 | ↯ |
| 010 | 08 | ↯ |
| 011 | 09 | ↯ |
| 012 | 04 | ↯ |
| 013 | 04 | ↯ |
| 014 | 04 | ↯ |
| 015 | 10 | |
| 016 | 10 | |
| 017 | 10 | |
| 018 | 11 | |
| 101A | 12 | ↯ |
| 101B | 13 | |
| 101C | 13 | |
| 102.1 | 14 | |
| 102.2 | 14 | |
| 102.3 | 14 | |
| 102.4 | 14 | |
| 105 | 15 | |
| 106 | 16 | |
| 107 | 16 | |
| 108 | 14 | |
| 108A | 17 | |
| 109 | 14 | |
| 109A | 24.01 | |
| 110 | 14 | |
| 111 | 14 | |
| 112 | 18 | |
| 113 | 15 | |
| 114 | 19 | |
| 115A | 20 | ↯ |
| 115B | 21 | ↯ |
| 116 | 19 | |
| 117 | 22 | |
| 118 | 19 | |
| 200.1 | 14 | |
| 201.3 | 23 | |
| 202 | 14 | |
| 202.1 | 24 | |
| 202A | 25 | |
| 203 | 15 | |
| 203.1 | 33 | |

| Door Numbers | HwSet# | ↯ |
|---|---|---|
| 204 | 26 | |
| 204.1 | 27 | |
| 205 | 26 | |
| 205.1 | 28 | |
| 205.2 | 29 | |
| 206 | 30 | |
| 206.2 | 29 | |
| 207 | 26 | |
| 207.1 | 29 | |
| 207.2 | 28 | |
| 207.3 | 28 | |
| 208 | 30 | |
| 208.1 | 16 | |
| 208.2 | 28 | |
| 208.3 | 28 | |
| 208.4 | 29 | |
| 209 | 26 | |
| 209.1 | 29 | |
| 209.2 | 28 | |
| 209.3 | 28 | |
| 210 | 30 | |
| 210.1 | 16 | |
| 210.2 | 28 | |
| 210.3 | 28 | |
| 210.4 | 29 | |
| 215 | 34 | |
| 215.1 | 14 | |
| 301.2 | 15 | |
| 302 | 31 | |
| 302.1 | 15 | |
| 303 | 26 | |
| 303.1 | 29 | |
| 305 | 14 | |
| 306 | 26 | |
| 306.1 | 29 | |
| 307 | 26 | |
| 307.1 | 16 | |
| 308 | 26 | |
| 308.1 | 29 | |
| 309 | 26 | |
| 309.1 | 29 | |
| 310 | 26 | |
| 310.1 | 29 | |
| 402 | 26 | |
| 402.1 | 29 | |
| 403 | 26 | |
| 403.1 | 29 | |
| 404 | 26 | |
| 404.1 | 29 | |

| Door Numbers | HwSet# | ↯ |
|---|---|---|
| 404A | 32 | |
| 405 | 26 | |
| 405.1 | 29 | |
| 406 | 26 | |
| 406.1 | 29 | |
| 407 | 26 | |
| 407.1 | 29 | |
| 408.1 | 29 | |
| 408A | 30 | |
| 408B | 30 | |
| 409 | 26 | |
| 409.1 | 29 | |
| 410.1 | 45 | |
| 410A | 30 | |
| 410B | 30 | |
| 411.1 | 45 | |
| 411A | 30 | |
| 411B | 30 | |
| 412 | 33 | |
| 600A | 35 | |
| 600C | 36 | |
| 601 | 35 | |
| 601.1 | 16 | |
| 601.2 | 37 | |
| 601.3 | 15 | |
| 602 | 38 | |
| 603 | 17 | |
| 604 | 17 | |
| 604A | 14 | |
| 605 | 39 | |
| 606 | 39 | |
| 607A | 14 | |
| 610A | 40 | ↯ |
| 610B | 40 | ↯ |
| 611.1 | 15 | |
| 613 | 41 | ↯ |
| 700 | 11 | |

# SECTION 08 7100 – DOOR HARDWARE

## PART 1 - GENERAL

COMPLY WITH ADA ABA AG, 2004 ED.

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware for:

   a. Swinging doors.
   b. Gates.

2. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
3. Division 26 sections for connections to electrical power system and for low-voltage wiring.
4. Division 28 sections for coordination with other components of electronic access control system.

## 1.03 REFERENCES

A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Key Systems and Nomenclature

C. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

## 1.04 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:

1. Product Data: Technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:

    a. Wiring Diagrams: For power, signal, and control wiring and including:
        1) Details of interface of electrified door hardware and building safety and security systems.
        2) Schematic diagram of systems that interface with electrified door hardware.
        3) Point-to-point wiring.
        4) Risers.

3. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the **Door and Hardware Institute**. Indicate complete designations of each item required for each door or opening, include:

a. Door Index; include door number, heading number, and Architects hardware set number.
b. Quantity, type, style, function, size, and finish of each hardware item.
c. Name and manufacturer of each item.
d. Fastenings and other pertinent information.
e. Location of each hardware set cross-referenced to indications on Drawings.
f. Explanation of all abbreviations, symbols, and codes contained in schedule.
g. Mounting locations for hardware.
h. Door and frame sizes and materials.
i. Name and phone number for local manufacturer's representative for each product.
j. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include operational descriptions for: egress, ingress (access), and fire/smoke alarm connections.
    1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.

4. Key Schedule:

    a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
    b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
        1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.

    f. Prepare key schedule by or under supervision of supplier, detailing Owner’s final keying instructions for locks.

5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.

C. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

    a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.

c. Factory order acknowledgement numbers (for warranty and service)
d. Name, address, and phone number of local representative for each manufacturer.
e. Parts list for each product.
f. Final approved hardware schedule, edited to reflect conditions as-installed.
g. Final keying schedule
h. Copies of floor plans with keying nomenclature
i. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
j. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

## 1.05 QUALITY ASSURANCE

A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. 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.
4. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.

    a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.

B. Architectural Hardware Consultant Qualifications: 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 meets these requirements:

1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC).
2. Can provide installation and technical data to Architect and other related subcontractors.
3. Can inspect and verify components are in working order upon completion of installation.
4. Capable of producing wiring diagrams.
5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

C. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

D. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure

and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70 2017 ED., Article 100, by testing agency acceptable to authorities having jurisdiction.

F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.

G. Keying Conference

1. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

    a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
    b. Preliminary key system schematic diagram.
    c. Requirements for key control system.
    d. Requirements for access control.
    e. Address for delivery of keys.

H. Pre-installation Conference

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

I. Coordination Conferences:

1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1. Deliver each article of hardware in manufacturer's original packaging.

C. Project Conditions:

1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
2. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:

1. Promptly replace products damaged during shipping.
2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to Owner as directed by Owner.

## 1.07 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

## 1.08 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated.

a. Closers:
1) Mechanical: 30 years.

b. Automatic Operators: 2 years.

c. Exit Devices:
1) Mechanical: 3 years.
2) Electrified: 1 year.

d. Locksets:
1) Mechanical: 10 years

2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

### 1.09 MAINTENANCE

A. Maintenance Tools: Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

### 2.02 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80, 2016 ED. as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

## 2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series **(IVE)**.
2. Acceptable Manufacturers and Products: Hager BB series, McKinney TB/T4B series, Stanley FBB Series.

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:

    a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
    b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:

    a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
    b. Interior: Heavy weight, steel, 5 inches (127 mm) high

4. 2 inches or thicker doors:

    a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
    b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

    a. Steel Hinges: Steel pins
    b. Non-Ferrous Hinges: Stainless steel pins
    c. Out-Swinging Exterior Doors: Non-removable pins
    d. Out-Swinging Interior Lockable Doors: Non-removable pins
    e. Interior Non-lockable Doors: Non-rising pins

8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.

## 2.04 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:

   a. Scheduled Manufacturer: Ives **(IVE)**.
   b. Acceptable Manufacturers: Select, Stanley.

2. Requirements:

   a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
   b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
   c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
   d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
   e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
   f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
   g. Install hinges with fasteners supplied by manufacturer.
   h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

   a. Scheduled Manufacturer: Von Duprin EPT-10 **(VON)**.
   b. Acceptable Manufacturers: ABH PT1000, Securitron CEPT-10.

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer’s template and UL requirements, unless interference with operation of door or other hardware items.

## 2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer: Ives **(IVE)**.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

## 2.07 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage ND series **(SCH)**.
2. Acceptable Manufacturers and Products: Sargent 11-Line.

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

    a. Lever Design: Schlage Rhodes

## 2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 99 series **(VON)**.
2. Acceptable Manufacturers and Products: Sargent 80 series.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.

3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer's approved strikes.
8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Provide dogging indicators (CDSI/HDSI) for visible indication of dogging status.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

## 2.09 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 4000 Series **(VON)**.
2. Acceptable Manufacturers and Products: Folger Adam 300 Series, HES 1006 Series.

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary-resistant.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

## 2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 series **(SCE)**.
2. Acceptable Manufacturers and Products: Precision ELR series, Sargent 3500 series, Dynalock 5000 series, Securitron BPS series, Security Door Controls 600 series.

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:

    a. 12/24 VDC Output, field selectable.
    b. Class 2 Rated power limited output.
    c. Universal 120-240 VAC input.
    d. Low voltage DC, regulated and filtered.
    e. Polarized connector for distribution boards.
    f. Fused primary input.
    g. AC input and DC output monitoring circuit w/LED indicators.
    h. Cover mounted AC Input indication.
    i. Tested and certified to meet UL294.
    j. NEMA 1 enclosure.
    k. Hinged cover w/lock down screws.
    l. High voltage protective cover.

## 2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: Schlage

B. Requirements:

1. Provide interchangeable (FSIC) cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide the following keyway: **As selected by owner**.

C. Construction Keying:

1. Replaceable Construction Cores

    a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
        1) 3 construction control keys
        2) 12 construction change (day) keys.

    b. Material Supplier and Owner's Representative will replace temporary construction cores with permanent cores.

## 2.12 KEYING

A. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

    a. Master Keying system as directed by the Owner.

2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:

    a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)

4. Identification:

    a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication “Keying Systems and Nomenclature” for identification. Do not provide blind code marks with actual key cuts.
    b. Identification stamping provisions must be approved by the Architect and Owner.
    c. Stamp cylinders/cores and keys with Owner’s unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with “DO NOT DUPLICATE” along with the “PATENTED” or patent number to enforce the patent protection.
    d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

5. Quantity: Furnish in the following quantities.

    a. Change (Day) Keys: 3 per cylinder/core.
    b. Permanent Control Keys: 3.
    c. Master Keys: 6.

## 2.13 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee.
2. Acceptable Manufacturers: HPC, Lund.

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and

standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.

a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
b. Provide hinged-panel type cabinet for wall mounting.

## 2.14 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4010/4110/4020 series **(LCN)**.
2. Acceptable Manufacturers and Products: Sargent 281 series.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.15 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN Senior Swing **(LCN)**.
2. Acceptable Manufacturers and Products: Horton 4000LE series.

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.

    a. Opening: Powered by DC motor working through reduction gears.
    b. Closing: Spring force.
    c. Manual, hydraulic, or chain drive closers: Not permitted.
    d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
    e. Cover: Aluminum.

2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, or adapters for arms as required to suit details.
4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

## 2.16 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives **(IVE)**.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.

4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

## 2.17 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives **(IVE)**.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:

    a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
    b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
    c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

## 2.18 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson **(GLY)**.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

## 2.19 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives **(IVE)**.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

## 2.20 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International **(ZER)**.
2. Acceptable Manufacturers: National Guard, Reese.

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105, 2016 ED.
3. Size of thresholds:

    a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
    b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width

4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

## 2.21 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives **(IVE)**.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.

2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

### 2.22 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer: Schlage **(SCE)**.
2. Acceptable Manufacturers: GE-Interlogix, Sargent.

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

### 2.23 LATCH PROTECTORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives **(IVE)**.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Provide stainless steel latch protectors of type required to function with specified lock.

### 2.24 FINISHES

A. Finish: As listed in hardware sets.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

## 3.02 INSTALLATION

A. 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. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

H. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying section.

I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Testing and labeling wires with Architect's opening number.

J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

L. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

N. 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 may impede traffic or present tripping hazard.

O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

Q. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

## 3.03 FIELD QUALITY CONTROL

A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.

1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

## 3.04 ADJUSTING

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

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

## 3.05 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

## 3.06 DOOR HARDWARE SCHEDULE

A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:

**⚡= Hardware Item Requiring Electrical Coordination**

SCHOOL

**HARDWARE SET: 01**

DOOR NUMBER:
001 002

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | 689 | VON |
| 2 | EA | PANIC HARDWARE | 99-EO | | 626 | VON |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 2 | EA | OH STOP | 100S | | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | BK | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |

EXIT ONLY

**HARDWARE SET: 02**

DOOR NUMBER:
003

EACH TO HAVE:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | | 628 | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | | ✓ | 689 | VON |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | LX-QEL-99-NL-OP-110MD 24 VDC | | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | | 626 | SCH |
| 2 | EA | OFFSET PULL | 8190EZH10" | | | 630 | IVE |
| 2 | EA | OH STOP | 100S | | | 630 | GLY |
| 1 | EA | SURF. AUTO OPERATOR | 9542 MS AS REQ (120/240 VAC) | | ✓ | ANCLR | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | | 689 | LCN |
| 1 | EA | KEYSWITCH | 8310-806K | | ✓ | | LCN |
| 2 | EA | ACTUATOR | 8310-818 OR 8310-856 AS REQ'D | | ✓ | 630 | LCN |
| 1 | EA | MOUNTING PLATE | 9540-18 | | | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | | BK | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 2 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | ✓ | LGR | SCE |
| 1 | EA | REMOTE RELEASE | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER, REMOTE RELEASE AT RECEPTION OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

NOTE: THE EXTERIOR WALL ACTUATOR SHALL BE WIRED IN SERIES WITH THE "LX" SWITCH IN THE PANIC DEVICE - SUCH THAT WHEN THE PANIC DEVICE IS UNLOCKED BY THE CARD READER ON THE EXTERIOR, THE EXTERIOR WALL ACTUATOR IS ACTIVE, AND THE OPERATOR WILL OPEN THE DOOR WHEN THE WALL ACTUATOR IS PUSHED. THE INTERIOR WALL ACTUATOR SHALL BE WIRED TO WHERE WHEN PUSHED THE “QEL” ON THE PANIC DEVICE WILL RETRACT AND THE OPERATOR WILL OPEN THE DOOR.

**HARDWARE SET: 03**

DOOR NUMBER:
004

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY EPT | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-OP-110MD 24 VDC | | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | OFFSET PULL | 8190EZH10" | | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | LGR | SCE |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 04**

DOOR NUMBER:
005 012 013 014

EACH TO HAVE:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | | 628 | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | | ✓ | 689 | VON |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-OP-110MD 24 VDC | | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | | 626 | SCH |
| 2 | EA | OFFSET PULL | 8190EZH10" | | | 630 | IVE |
| 2 | EA | SURFACE CLOSER | 4021 | | | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | | | 689 | LCN |
| 2 | EA | WALL STOP | WS406/407CVX | | | 630 | IVE |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | | BK | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 2 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | ✓ | LGR | SCE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 05**

DOOR NUMBER:
006

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | PANIC HARDWARE | 99-NL | | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |

**HARDWARE SET: 06**

DOOR NUMBER:
007 009

EACH TO HAVE:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | | 628 | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | | ✓ | 689 | VON |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-OP-110MD 24 VDC | | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | | 626 | SCH |
| 2 | EA | OFFSET PULL | 8190EZH10" | | | 630 | IVE |
| 1 | EA | OH STOP | 100S | | | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4021 | | | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | | | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | | | 630 | IVE |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | | BK | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 2 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | ✓ | LGR | SCE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 07**

DOOR NUMBER:
008

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | LOCK GUARD | LG13 | | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |

**HARDWARE SET: 08**

DOOR NUMBER:
010

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | ✓ | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL 24 VDC | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 SHCUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | ✓ | LGR | SCE |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

HOLD OPEN CLOSER

**HARDWARE SET: 09**

DOOR NUMBER:
011

EACH TO HAVE:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | | 628 | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | | ✓ | 689 | VON |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-OP-110MD 24 VDC | | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | | 626 | SCH |
| 2 | EA | OFFSET PULL | 8190EZH10" | | | 630 | IVE |
| 2 | EA | OH STOP | 100S | | | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4021 | | | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | | | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | | BK | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 2 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | ✓ | LGR | SCE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 10**

DOOR NUMBER:
015 016 017

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | PANIC HARDWARE | 99-L-2SI-06 | | 626 | VON |
| 2 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |

**HARDWARE SET: 11**

DOOR NUMBER:
018 700

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 2 | EA | MANUAL FLUSH BOLT | FB458 | | 626 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | | 626 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO 14-042 | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | LOCK GUARD | LG13 | | 630 | IVE |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | ASTRAGAL | 44SP X 188S X D.H. - MOUNT PUSH SIDE INACTIVE LEAF | | 600 | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |

**HARDWARE SET: 12**

DOOR NUMBER:
101A

EACH TO HAVE:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | ✓ | 689 | VON |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | LX-QEL-99-NL-OP-110MD 24 VDC | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 2 | EA | OFFSET PULL | 8190EZH10" | | 630 | IVE |
| 2 | EA | OH STOP | 100S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 MS AS REQ (120/240 VAC) | ✓ | ANCLR | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | KEYSWITCH | 8310-806K | ✓ | | LCN |
| 2 | EA | ACTUATOR | 8310-818 OR 8310-856 AS REQ'D | ✓ | 630 | LCN |
| 1 | EA | MOUNTING PLATE | 9540-18 | | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | BK | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 2 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | ✓ | LGR | SCE |
| 1 | EA | REMOTE RELEASE | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER, REMOTE RELEASE AT RECEPTION OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

NOTE: THE EXTERIOR WALL ACTUATOR SHALL BE WIRED IN SERIES WITH THE "LX" SWITCH IN THE PANIC DEVICE - SUCH THAT WHEN THE PANIC DEVICE IS UNLOCKED BY THE CARD READER ON THE EXTERIOR, THE EXTERIOR WALL ACTUATOR IS ACTIVE, AND THE OPERATOR WILL OPEN THE DOOR WHEN THE WALL ACTUATOR IS PUSHED. THE INTERIOR WALL ACTUATOR SHALL BE WIRED TO WHERE WHEN PUSHED THE “QEL” ON THE PANIC DEVICE WILL RETRACT AND THE OPERATOR WILL OPEN THE DOOR.

**HARDWARE SET: 13**

DOOR NUMBER:
101B 101C

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 112XY | 628 | IVE |
| 2 | EA | PUSH/PULL BAR | 9190EZH10" | 630 | IVE |
| 2 | EA | OH STOP | 100S | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4021 | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | 689 | LCN |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | |

**HARDWARE SET: 14**

DOOR NUMBER:
102.1 102.2 102.3 102.4 108 109
110 111 200.1 202 215.1 305
604A 607A

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |
| 1 | EA | DOOR BOTTOM | 321AA X D.W.<br>@ STC 30 DOORS ONLY | AA | ZER |

**HARDWARE SET: 15**

DOOR NUMBER:
105 113 203 301.2 302.1 601.3
611.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |

**HARDWARE SET: 16**

DOOR NUMBER:
106 107 208.1 210.1 307.1 601.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PRIVACY W/COIN TURN | L9044 06A L583-363 L283-722 OCC/VAC | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |

**HARDWARE SET: 17**

DOOR NUMBER:
108A 603 604

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PRIVACY LOCK | ND40S RHO | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

**HARDWARE SET: 18**

DOOR NUMBER:
112

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PASSAGE SET | ND10S RHO | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |

**HARDWARE SET: 19**

DOOR NUMBER:
114 116 118

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |

**HARDWARE SET: 20**

DOOR NUMBER:
115A

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | ELECTRIC STRIKE | 4211 FSAFSE 12/24 VDC | | 630 | VON |
| 1 | EA | OH STOP | 100S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | LGR | SCE |
| 1 | EA | REMOTE RELEASE | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER, REMOTE RELEASE AT RECEPTION OR BY KEY AT LOCK.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 21**

DOOR NUMBER:
115B

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | CLASSROOM X STORERM | ND70X80TD RHO XN12-006 | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | ELECTRIC STRIKE | 4211 FSAFSE 12/24 VDC | | 630 | VON |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | LGR | SCE |
| 1 | EA | REMOTE RELEASE | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER, REMOTE RELEASE AT RECEPTION OR BY KEY AT LOCK.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

STOREROOM FUNCTION ON CARD READER SIDE OF OPENING.

**HARDWARE SET: 22**

DOOR NUMBER:
117

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 23**

DOOR NUMBER:
201.3

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 CUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 24**

DOOR NUMBER:
202.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 24.01**

DOOR NUMBER:
109A

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 25**

DOOR NUMBER:
202A

EACH TO HAVE:

ALL HARDWARE BY DOOR MANUFACTURER

**HARDWARE SET: 26**

DOOR NUMBER:

| | | | | | |
|---|---|---|---|---|---|
| 204 | 205 | 207 | 209 | 303 | 306 |
| 307 | 308 | 309 | 310 | 402 | 403 |
| 404 | 405 | 406 | 407 | 409 | |

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |
| 1 | EA | DOOR BOTTOM | 321AA X D.W.<br>@ STC 30 DOORS ONLY | AA | ZER |

**HARDWARE SET: 27**

DOOR NUMBER:

204.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND94TD RHO | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

**HARDWARE SET: 28**

DOOR NUMBER:

| | | | | | |
|---|---|---|---|---|---|
| 205.1 | 207.2 | 207.3 | 208.2 | 208.3 | 209.2 |
| 209.3 | 210.2 | 210.3 | | | |

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | HOSPITAL PRIVACY | ND44S RHO | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

**HARDWARE SET: 29**

DOOR NUMBER:

| | | | | | |
|---|---|---|---|---|---|
| 205.2 | 206.2 | 207.1 | 208.4 | 209.1 | 210.4 |
| 303.1 | 306.1 | 308.1 | 309.1 | 310.1 | 402.1 |
| 403.1 | 404.1 | 405.1 | 406.1 | 407.1 | 408.1 |
| 409.1 | | | | | |

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND94TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 30**

DOOR NUMBER:

| | | | | | |
|---|---|---|---|---|---|
| 206 | 208 | 210 | 408A | 408B | 410A |
| 410B | 411A | 411B | | | |

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | PANIC HARDWARE | 99-L-2SI-06 | | 626 | VON |
| 2 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |
| 1 | EA | DOOR BOTTOM | 321AA X D.W.<br>@ STC 30 DOORS ONLY | | AA | ZER |

**HARDWARE SET: 31**

DOOR NUMBER:

302

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | PUSH/PULL LATCH | HL6 E2 2 3/4" A | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 32**

DOOR NUMBER:
404A

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND94TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 33**

DOOR NUMBER:
203.1 412

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 2 | EA | MANUAL FLUSH BOLT | FB458 | | 626 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | | 626 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO 14-042 | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 CUSH | | 689 | LCN |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |
| 1 | EA | ASTRAGAL | 44SP X 188S X D.H.<br>- MOUNT PUSH SIDE INACTIVE LEAF | | 600 | ZER |

**HARDWARE SET: 34**

DOOR NUMBER:
215

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | 626 | VON |
| 1 | EA | PANIC HARDWARE | 99-L-2SI-06 | | 626 | VON |
| 2 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | 626 | SCH |
| 3 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 2 | EA | OH STOP | 100S | | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | BK | ZER |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |

**HARDWARE SET: 35**

DOOR NUMBER:
600A 601

EACH TO HAVE:

ALL HARDWARE BY DOOR MANUFACTURER

**HARDWARE SET: 36**

DOOR NUMBER:
600C

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | 628 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | |

**HARDWARE SET: 37**

DOOR NUMBER:
601.2

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | ENTRANCE LOCK | ND92TD RHO | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

**HARDWARE SET: 38**

DOOR NUMBER:
602

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 2 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO 14-042 | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | 626 | SCH |
| 2 | EA | OH STOP | 90S | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | BLK | ZER |
| 1 | EA | ASTRAGAL | 44SP X 188S X D.H.<br>- MOUNT PUSH SIDE INACTIVE LEAF | 600 | ZER |

**HARDWARE SET: 39**

DOOR NUMBER:
605 606

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM DEADBOLT | B663T | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | | 630 | IVE |
| 1 | EA | PULL PLATE | 8302 6" 4" X 16" | | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 40**

DOOR NUMBER:
610A 610B

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | | 626 | VON |
| 1 | EA | PANIC HARDWARE | 99-L-2SI-06 | | 626 | VON |
| 2 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | | 626 | SCH |
| 3 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 2 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 2 | EA | FIRE/LIFE WALL MAG | SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT) | | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | | BK | ZER |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |

**HARDWARE SET: 41**

DOOR NUMBER:
613

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 2 | EA | PUSH/PULL BAR | 9190EZH10" | | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 MS AS REQ (120/240 VAC) | | ANCLR | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | KEYSWITCH | 8310-806K | | | LCN |
| 2 | EA | ACTUATOR | 8310-818 OR 8310-856 AS REQ'D | | 630 | LCN |
| 1 | EA | MOUNTING PLATE | 9540-18 | | 689 | LCN |
| 2 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |

**HARDWARE SET: 45**

DOOR NUMBER:
410.1 411.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND94TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

## DORM

**HARDWARE SET: 03**

DOOR NUMBER:
003 005

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY EPT | | 628 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | ✓ | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-OP-110MD 24 VDC | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | OFFSET PULL | 8190EZH10" | | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | ✓ | LGR | SCE |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 05**

DOOR NUMBER:
006

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | PANIC HARDWARE | 99-NL | | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |

**HARDWARE SET: 07**

DOOR NUMBER:
002

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | LOCK GUARD | LG13 | | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |

**HARDWARE SET: 11**

DOOR NUMBER:
007

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 2 | EA | MANUAL FLUSH BOLT | FB458 | | 626 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | | 626 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO 14-042 | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | LOCK GUARD | LG13 | | 630 | IVE |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A X D.W. +4" | | AA | ZER |
| 1 | SET | SEALS | 8303AA X D.S. | | AA | ZER |
| 1 | EA | ASTRAGAL | 44SP X 188S X D.H.<br>- MOUNT PUSH SIDE INACTIVE LEAF | | 600 | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | | A | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | | A | ZER |

**HARDWARE SET: 14**

DOOR NUMBER:
110

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |
| 1 | EA | DOOR BOTTOM | 321AA X D.W.<br>@ STC 30 DOORS ONLY | | AA | ZER |

**HARDWARE SET: 15**

DOOR NUMBER:
111 112 203 205 206 217
219

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 16**

DOOR NUMBER:
120 121

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | PRIVACY W/COIN TURN | L9044 06A L583-363 L283-722 OCC/VAC | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 17**

DOOR NUMBER:
207A 208A 221 223A

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | PRIVACY LOCK | ND40S RHO | | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | | 630 | IVE |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 18.01**

DOOR NUMBER:
114.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | PASSAGE SET | ND10S RHO | | 626 | SCH |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 3 | EA | SILENCER | SR64 | | GRY | IVE |

**HARDWARE SET: 22**

DOOR NUMBER:
103

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM SEC LOCK | ND95TD RHO XN12-035 | | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | OH STOP | 90S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 23**

DOOR NUMBER:
201

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 CUSH | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 23.01**

DOOR NUMBER:
109.1

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 31**

DOOR NUMBER:
204 218

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | PUSH/PULL LATCH | HL6 E2 2 3/4" A | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 42**

DOOR NUMBER:
001 004

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | 628 | | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | 628 | | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | ✓ | 689 | VON |
| 1 | EA | REMOVABLE MULLION | KR4954-STAB-ANGLE PLATE | 689 | | VON |
| 1 | EA | PANIC HARDWARE | 99-EO | 626 | | VON |
| 1 | EA | ELEC PANIC HARDWARE | LX-QEL-99-NL-OP-110MD 24 VDC | ✓ | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | | SCH |
| 2 | EA | FSIC CORE | 23-030 | 626 | | SCH |
| 2 | EA | OFFSET PULL | 8190EZH10" | 630 | | IVE |
| 2 | EA | OH STOP | 100S | 630 | | GLY |
| 1 | EA | SURFACE CLOSER | 4021 | 689 | | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 MS AS REQ (120/240 VAC) | ✓ | ANCLR | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | 689 | | LCN |
| 1 | EA | KEYSWITCH | 8310-806K | ✓ | | LCN |
| 2 | EA | ACTUATOR | 8310-818 OR 8310-856 AS REQ'D | ✓ | 630 | LCN |
| 1 | EA | MOUNTING PLATE | 9540-18 | 689 | | LCN |
| 1 | EA | MULLION SEAL | 8780N X D.H. | BK | | ZER |
| 2 | EA | DOOR SWEEP | 39A X D.W. | A | | ZER |
| 1 | EA | THRESHOLD | 8655A X D.W. | A | | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 2 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | ✓ | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | ✓ | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | ✓ | LGR | SCE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | ✓ | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

NOTE: THE EXTERIOR WALL ACTUATOR SHALL BE WIRED IN SERIES WITH THE "LX" SWITCH IN THE PANIC DEVICE - SUCH THAT WHEN THE PANIC DEVICE IS UNLOCKED BY THE CARD READER ON THE EXTERIOR, THE EXTERIOR WALL ACTUATOR IS ACTIVE, AND THE OPERATOR WILL OPEN THE DOOR WHEN THE WALL ACTUATOR IS PUSHED. THE INTERIOR WALL ACTUATOR SHALL BE WIRED TO WHERE WHEN PUSHED THE “QEL” ON THE PANIC DEVICE WILL RETRACT AND THE OPERATOR WILL OPEN THE DOOR.

**HARDWARE SET: 43**

DOOR NUMBER:
100 200

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 2 | EA | PUSH/PULL BAR | 9190EZH10" | | 630 | IVE |
| 2 | EA | OH STOP | 100S | | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4021 | | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 MS AS REQ (120/240 VAC) | | ANCLR | LCN |
| 1 | EA | MOUNTING PLATE | 4020-18G | | 689 | LCN |
| 1 | EA | KEYSWITCH | 8310-806K | | | LCN |
| 2 | EA | ACTUATOR | 8310-818 OR 8310-856 AS REQ'D | | 630 | LCN |
| 1 | EA | MOUNTING PLATE | 9540-18 | | 689 | LCN |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |

**HARDWARE SET: 44**

DOOR NUMBER:
101A 101B

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL 24 VDC | | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | LGR | SCE |
| 1 | EA | REMOTE RELEASE | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER, REMOTE RELEASE AT HOME LIVING OR BY KEY AT RIM CYLINDER.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN ALARM IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**HARDWARE SET: 45**

DOOR NUMBER:
105 107

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND94TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |

**HARDWARE SET: 46**

DOOR NUMBER:
108 207 208 209 210 211
212 213 220 222 223 224
225 226 227

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | | 652 | IVE |
| 1 | EA | ENTRANCE LOCK | ND92TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |
| 1 | EA | DOOR BOTTOM | 111AA X D.W. | | AA | ZER |
| 1 | EA | THRESHOLD | 546A X D.W. | | A | ZER |
| 1 | EA | DOOR VIEWER | U698 | | 626 | IVE |

**HARDWARE SET: 46.01**

DOOR NUMBER:
113

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | | 652 | IVE |
| 1 | EA | ENTRANCE LOCK | ND92TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | SET | SEALS | 188S X D.S. | | BLK | ZER |
| 1 | EA | DOOR BOTTOM | 111AA X D.W. | | AA | ZER |
| 1 | EA | THRESHOLD | 546A X D.W. | | A | ZER |
| 1 | EA | DOOR VIEWER | U698 | | 626 | IVE |

**HARDWARE SET: 47**

DOOR NUMBER:
202 216

EACH TO HAVE:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | | 628 | IVE |
| 1 | EA | STOREROOM LOCK | ND96TD RHO | | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 | | 626 | SCH |
| 1 | EA | ELECTRIC STRIKE | 4211 FSAFSE 12/24 VDC | | 630 | VON |
| 1 | EA | SURFACE CLOSER | 4011 | | 689 | LCN |
| 1 | EA | WALL STOP | WS406/407CVX | | 630 | IVE |
| 1 | EA | CARD READER | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | DOOR CONTACT | 679-05 WD OR HM AS REQ'D | | BLK | SCE |
| 1 | EA | RX MOTION SENSOR | BY ACCESS CONTROL INTEGRATOR | | | |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS 120/240 VAC | | LGR | SCE |
| 1 | SET | SEALS | BY ALUM DOOR/FRAME MFG | | | |
| 1 | EA | WIRING DIAGRAM | POINT TO POINT / RISER | | | |

DOORS NORMALLY CLOSED AND LOCKED.
ENTRY BY VALID CREDENTIAL AT CARD READER OR BY KEY AT LOCK.
RX MOTION SENSOR SHUNTS DOOR FORCED OPEN IN ACCESS CONTROL SYSTEM.
FREE EGRESS AT ALL TIMES.

**END OF SECTION**

# SECTION 08 8000 – GLAZING

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Glass and plastic glazing.

B. Glazing compounds and accessories.

C. Mirrors

### 1.2 RELATED SECTIONS

A. Section 07 9200 - Joint Sealers: Sealant and Backings.

B. Section 08 1113 – Hollow Metal Doors and Frames.

C. Section 08 1416 - Flush Wood Doors: Glazed doors.

D. Section 08 4113 – Aluminum-Framed Entrances, Storefronts and Canopies

E. Section 08 4423 – Aluminum Curtain Wall

F. Section 08 5113 - Aluminum Windows: Operable and Fixed Glazed Windows.

G. Section 10 2800 - Toilet, Bath, and Laundry Accessories: Mirrors.

### 1.3 REFERENCES

A. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 1993.

B. ASTM C 1036 - Standard Specification for Flat Glass; 1991 (Reapproved 1997).

C. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 1992.

D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 1991 (Reapproved 1995).

E. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1996.

F. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 1997.

G. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 1990.

H. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.

I. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.

## 1.4 PERFORMANCE REQUIREMENTS

A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:

1. In conjunction with materials described in Section 07 2100 and 07 9200.
2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with NFPA 5000, 2018 ED.

1. Test in accordance with ASTM E 330.
2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
3. Thicknesses listed are minimum.

## 1.5 SUBMITTALS

A. LEED REQUIREMENTS.

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements.

D. Samples: Provide sample of each glass material and assembly listed. Identify available colors.

D. Certificates: Certify that products meet or exceed specified requirements.

## 1.6 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

## 1.7 PRE-INSTALLATION MEETING

A. Convene a minimum of one week before starting work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations.

1. Protect materials from moisture, sunlight, excess heat, sparks and flame.

1.10 WARRANTY

A. See Section 01 7700 - Closeout Procedures, for additional warranty requirements.

B. Provide a five (5) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 – PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 GLASS MATERIALS

A. Float Glass: 1/4 inch float glass.

B. Tempered Glass: 1/4 inch thick, tempered, in locations as required by 2009 International Building Code, conforming to ANSI Z97.1, ASTM C 1036, ASTM C 1048, and Consumer Product Safety Commission 16 CFR 1201.

C. Clear Float Glass: Float type, heat strengthened, clear conforming to ASTM E774 and ASTM E773.

D. Low E Glass: Solarban 70 XL Low E #5, Float type, tempered, clear conforming to ASTM E774 and ASTM E773.

1. Coating installed on third surface unless noted otherwise.

E. Laminated glass to comply with ASTM C1172.

F. Sandblasted Glass: Sandblast second surface.

G. Spandrel: Coated Spandrel Float Glass: Float glass complying with the following:

1. Outdoor lite to match adjacent glazing.
2. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.
3. Factory apply manufacturer's standard opacifier of the following material to coated second surface of lites, with resulting products complying with GTA 89-1-6.
   a. Manufacturer's standard opacifier material.
4. Color of spandrel glazing to be selected on site to provide for an equal match in color to adjacent glazing.

H. School Guard Glass (SGG4) - 5 Hoosac Street, Adams, MA 01220 Phone 884.744.5277

1. Product established as performance standard. Substitution must provide certified independent testing of performance data equal to specified product.

2. Insulating Glass Units for Vertical Glazing (Exterior)
   a. Overall thickness: 1" inch thick insulating glass
   b. Outerlite: 1⁄4" tempered glass, low e coating on the No. 2 surface, tinted to match adjacent glazing.
   c. Airspace: 3/8" thick argon gas filled space, and mill finish air spacer.
   d. Innerlite: SGG4 Clear
   e. Ratings Required: 5-aa1 (6 minute), BR2 (available in some configurations), F1233
   f. Visible Light Transmittance 59%
   g. Reflectance Visible Light 13%
   h. U Value (Winter) .24
   i. Shading Coefficient .32
   j. Solar Heat Gain Coefficient .28

3. Single Pane Glass (Interior)
   a. No more than 4.1 lbs. per square foot
   b. 5-aa1 rated for a minimum of 6 minutes
   c. Glass clad on interior and exterior surfaces
   d. F1233 rated
   e. Optical haze of no more than 1.8%

I. All Glass shall be heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.

J. ACM Sandwich Panel (at locations shown on drawings)
   a. Overall thickness: 1" insulated unit

b. Outer & Inner Surface:
    a. 4mm PE core aluminum composite material composed of a thermoplastic core sandwiched between two aluminum sheets formed in a continuous process with no applied glues.
    b. Finish shall be Spray-Applied Fluorocarbon Resin utilizing 70% Kynar 500 resins. Color to match adjacent frame unless noted otherwise.
    c. Panel shall be finished on interior and exterior surfaces.
c. Sandwich material: 3/4" Expanded Polystyrene fully adhered to outer and inner surface.

K. Insulated Spandrel Panels (at locations shown on drawings)
    a. Defined in Section 08 4113 Aluminum Framed Entrances & Storefronts.

## 2.3 SEALED INSULATING GLASS MATERIALS

A. Glass Units – All Facades:

1. Insulating Glass: Double pane units with edge seal, each pane 1/4 inch thick, tinted outer pane (color to be selected by Architect from manufacturer's standard colors), inner pane of Low E glass on clear glass cover plate, total thickness of 1 inch at locations indicated on drawings.

B. Tempered Glass:

1. Insulating Glass: 1/4 inch thick outer and inner pane, tempered, in locations as required by current International Building Code, conforming to ANSI Z97.1, ASTM C 1036, ASTM C 1048, and Consumer Product Safety Commission 16 CFR 1201. All other requirements set forth above for exterior glazing are required for this glazing type as well.

C. Specialty Glass Material:

1. Provide Sandblasted, Spandrel, School Guard Glass, ACM Sandwich Panel or Insulated Spandrel Panels at locations shown on drawings.

## 2.4 GLAZING COMPOUNDS

A. Manufacturers:

1. Dow Corning Corp.
2. GE Silicones.
3. Pecora Corp.
4. J.R. Four LTD
5. Guardian Industries
6. "995" by Dow Corning
7. Substitutions: See Section 01 6000 - Product Requirements.

2.5 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A duometer hardness; coiled on release paper, black color.

D. Glazing Clips: Manufacturer's standard type.

PART 3 – EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.3 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C 1193 and FGMA Sealant Manual.

E. Install sealant in accordance with manufacturer's instructions.

3.4 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Install glazing material in accordance with the manufacture’s printed instructions or the

following information whichever is more stringent.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Fill gap between glazing and stop with butyl type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of butyl type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

## 3.5 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

A. Install glazing material in accordance with the manufacture's printed instructions or the following information whichever is more stringent.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with butyl type sealant to depth equal to bite on glazing, to uniform and level line.

G. Trim protruding tape edge.

## 3.6 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

## 3.7 PROTECTION OF FINISHED WORK

A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

3.8 SCHEDULE

A. Aluminum Windows:

1. Exterior: As scheduled in 2.2 of this Section.
2. Interior: Tempered glass
3. Specialty glass material where indicated on drawings

C. Hollow Steel Frames:

1. Interior non-rated: Tempered glass.
2. Interior rated: FireLite PLUS
3. Specialty glass material where indicated on drawings

D. Steel Doors:

1. Exterior: Insulated glass
2. Interior non-rated: Tempered glass.
3. Specialty glass material where indicated on drawings

E. Wood Doors:

1. Interior non-rated: Tempered glass.
2. Interior rated: FireLite PLUS
3. Specialty glass material where indicated on drawings

F. Aluminum Storefront and Entrances

1. Exterior: As scheduled in 2.2 of this Section.
2. Interior: Tempered glass
3. Specialty glass material where indicated on drawings

G. Aluminum Curtainwall:

1. Exterior: As scheduled in 2.2 of this Section.

2. Specialty glass material where indicated on drawings

END OF SECTION 08 8000

# SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

B. Related Sections include the following:

1. Division 5 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.
2. Division 7 Section "Building Insulation" for insulation installed with Z-shaped furring members.
3. Division 7 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.
4. Division 9 Section "Portland Cement Plaster" for metal lath supported by non-load-bearing steel framing.
5. Section 09 2900 – Gypsum board

### 1.3 ACTION SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product.

### 1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies

B. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General: Comply with ASTM C 645 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M**,** G40 (Z120), hot-dip galvanized unless otherwise indicated.

C. Studs and Runners: ASTM C 645. Use either steel studs and runners or equivalent gauge steel studs and runners.

1. Steel Studs and Runners:

    a. Minimum Base-Metal Thickness: 25 gauge = 0.0179 inch
    b. Depth: 3-5/8 inches (92 mm), 6 inches (152 mm), 4 inches (102 mm), 2-1/2 inches (64 mm), and 1-5/8 inches (41 mm).

2. Equivalent Gauge Steel Studs and Runners:

    a. Minimum Base-Metal Thickness: 25 gauge = 0.015.
    b. Depth: 3-5/8 inches (92 mm), 6 inches (152 mm), 4 inches (102 mm), 2-1/2 inches (64 mm), and 1-5/8 inches (41 mm).

3. See 3.3.B for stud gauge and installation requirements

D. Slip-Type Head Joints: As required, provide one of the following:
1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

    a. Products: Subject to compliance with requirements:

        1) ClarkDietrich Building Systems; MaxTrak Slotted Deflection Track or BlazeFrame at rated partitions.
        2) MBA Building Supplies; FlatSteel Deflection Track or Slotted Deflecto Track.
        3) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
        4) Telling Industries; Vertical Slip Track or Vertical Slip Track II.

E. 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.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
    b. Metal-Lite, Inc.; The System.
    c. Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.

F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal width: 4-inches wide (100 mm).
2. Minimum Base-Metal Thickness: 18 gauge = 0.0428 inch
3. Minimum Attachment: two (2) #12 screws at each stud.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 25 GAGE

2. Depth: 7/8 inch (22.2 mm).

H. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical or hat shaped.
2. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Resilient Channel RC Deluxe (RCSD), or a comparable product.

I. Cold-Rolled Furring Channels: 18 GAGE uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 20 GAGE.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 16 GAGE diameter wire, or double strand of 18 GAGE diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 25 GAGE, and depth required to fit insulation thickness indicated.

## 2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 16 GAGE diameter wire, or double strand of 18 GAGE diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Cast-in-place anchor, designed for attachment to concrete forms.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2-1/2 inches.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.

    a. Minimum Base-Metal Thickness: 0.027 inch.
    b. Depth: 1-5/8 inches.

3. Equivalent Gauge Steel Studs and Runners: ASTM C 645.

    a. Minimum Base-Metal Thickness: 25 GAGE.
    b. Depth: 1-5/8 inches.

4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

    a. Minimum Base-Metal Thickness: 25 GAGE.

5. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

    a. Configuration: Asymmetrical or hat shaped.
    b. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Resilient Channel RC Deluxe (RCSD), or a comparable product.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    b. Chicago Metallic Corporation; Drywall Grid System.
    c. USG Corporation; Drywall Suspension System.

## 2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, 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.
3.

PART 3 - EXECUTION

## 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 .EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

## 3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

## 3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.

3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install studs of the following gages:
1. Partitions less than 15 feet high: 25 gage.
2. Partitions 15 feet or more high: 20 gage.
3. Double jambs at door and other openings: 20 gage.
4. Partition corners: 20 gage.
5. End of freestanding partition: 18 gage.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

## 3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: As required, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Furring Members:

1. Erect insulation, specified in Division 07 Section "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

## 3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (non cumulative) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 2216

# SECTION 09 2240 THREE COAT STUCCO SYSTEM

## Part 1 - General

### 1.1 SUMMARY

A. Section Includes: Installation of the Portland cement stucco as an exterior wall cladding. The extent of stucco base and finish coat assembly is as indicated on the drawings. This system is to be mechanically attached over continuous insulation, sheathing, metal panels, wood or steel studs, CMU and ICF, or concrete.

B. The types of stucco base coat assembly include:

1. Factory blended, fiber-reinforced cement plaster basecoat for jobsite mixing to provide scratch and brown coats to receive secondary fiberglass crack suppression reinforcement and an elastomeric acrylic based colored stucco finish.

C. Related Products:

1. Joint Sealant: Refer to Division 7 Joint Treatment (Sealants) Section. Installation of joint sealant shall be by coating applicator or a separate installer. Joint sealant installer shall be experienced and competent in the installation of elastomeric construction sealants.

### 1.2 DESCRIPTION

A. Scratch and Brown Concentrate fiber reinforced stucco that is a factory blended formulation of Portland cement, lime, fibers and proprietary ingredients. For use with jobsite added ASTM C-897 stucco sand and clean potable water.

B. Scratch and Brown Functional Criteria:

1. Stucco application shall be sloped a minimum of 4”/12” (15˚) for positive drainage.
2. Substrate conditions:
   a. Sheathing substrates shall be sound, dry and free of dust, dirt, and other contaminants.
   b. Substrate Dimensional Tolerances: Flat with ¼ inch (6.4 mm) within any 4 foot (1219 mm) radius to maintain a uniform thickness of basecoat material.
   c. Maximum deflection of substrate assembly under positive or negative design loads shall not exceed L/360 of span.

C. Expansion Joints:
1. Continuous expansion joints shall be installed at all areas of dissimilar materials, multiple story plate lines or existing engineered through wall expansion joints.
2. Per ASTM C 1063, “Expansion and or contraction joints shall be installed in walls not more than 144 ft2 (13.4 m2) in area and not more than areas of 100 ft2 (9.30 m2) for all horizontal applications. The distance between joints shall not exceed 18 ft (5.5m) in either direction or a length-to-width ratio of 2-1/2 to 1.”
3. Location and frequency of control joints to be detailed by the design professional and shown on drawings when applicable.

## 1.3 SUBMITTALS

A. LEED REQUIREMENTS.
   i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. General: Applicator to submit:
   1. Manufacturer's technical information including installation instructions and recommendations.
   2. Samples: Submit samples for approval. Samples shall be of materials specified and of suitable size as required to accurately represent each color and texture to be used on project. Prepare each sample using same tools and techniques for actual project application. Approved samples shall be maintained and available at job site.

## 1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Install stucco basecoat assembly to comply with all applicable codes and standards and with requirements of local agencies having jurisdiction.

B. Manufacturer: Shall have marketed stucco products in United States for at least ten years; shall have completed projects of same building size and type as this project.

C. Applicator Qualifications: Applicators specializing in the installation of exterior stucco assembly with a minimum of 5 years experience in work similar to that required by this section.

D. Single Source Responsibility: All stucco base coat and finish materials shall be from a single manufacturing source, and delivered to jobsite with labels intact.

E. Surface Deviation: Shall not be more then ¼" in 10' when utilizing a straight edge placed anywhere on the wall(s)

F. Mock-Up: See section 03-3100 Project Management and Coordination for Building Assemblies Mock-up requirements.

## 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver manufactured materials in original packages or containers, with manufacturer's labels intact and legible.

B. Keep materials dry, above freezing, stored off ground, under cover and away from damp surfaces. At the time they are mixed, all materials shall be at a minimum temperature of 40˚F (4˚C).

C. Remove wet, frozen, damaged or detrimental materials from site immediately.

## 1.6 PROJECT SITE AND INSTALLATION CONDITIONS

A. Environmental Conditions: Comply with manufacturer's recommendations of environmental conditions affecting product installation requirements.

1. Installation Ambient Air Temperature: Minimum of 40ºF (4ºC) and rising, and remain so for 48 hours thereafter. Maximum Ambient Air Temperature of 120˚F (49˚C). Protect stucco from uneven and excessive evaporation during hot, dry weather.
2. Do not use frozen materials in cement stucco.
3. Do not apply cement stucco to frozen surfaces or surfaces containing frost or ice.
4. Inclement Weather: Do not apply basecoat during inclement weather, unless appropriate protection is employed.
5. Wall and Substrate Temperatures: Avoid, when possible, installation of the basecoat and the finish coats over substrates that are over 120˚F (49˚C).

B. Protection:
1. Protect adjacent finished surfaces prior to stuccoing.
2. Maintain protection in place until completion of work.
3. Protect finished work when stopping for the day or when completing an area.

## Part 2 - PRODUCTS

### 2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

### 2.2 MANUFACTURERS

A. Specification Base and Basis of Design: Parex: 1870 Stone Mountain Road, Lithonia Rd, Georgia, 30058 (770) 482-7872. Contact andy.townes@parexusa.com or 505-338-4433 direct

B. El Rey Stucco, 4100 Broadway SE, Albuquerque New Mexico, 87105 (505) 873-1180

C. TEIFS: 220 Burleson, San Antonio Texas, 78202, 800-358-4785.

D. Sto Corp: 3800 Camp Creek Parkway, Atlanta GA, 30331, 800-221-2397

E. Dryvit Systems, Inc: One Energy Way, West Warwick, RI, 02893 (800) 556-7752.

F. Substitutions: See Specification Section 01 6300 – Product Substitution Procedures.

### 2.3 MATERIALS

A. Fluid Applied Water & Air Barrier: Over all sheathing substrates as specified in section 07 2726

B. Continuous Insulation: Expanded, Extruded or Polyisocyanurate, as specified in Section 07 4265 and in thickness as indicated on drawings.

C. Lath and Trim Accessories: Conform to ASTM C1063 lathing and furring.
1. Exterior components field walls: Minimum 3.4lb expanded metal self-furred to lath to be used in accordance with ASTM C897.

2. Terminations: J-Metal or Stucco stop, Soffit Vent or Thin Stucco Drip Screed, general purpose type with expanded or perforated flanges. Plaster stops to be utilized around all through wall penetrations with gaps between the back of the plaster stops and the window or door frames wide enough to installed backer rod and sealant. See manufactures publish details.
3. Corner Reinforcement: (galvanized welded wire, minimum 18 gage): Manufacturer's standard pre-formed corner reinforcement made from 1.7 lbs. (0.059 kg/m2) per square yard of diamond mesh lath.
4. Square Edge Corner Beads: expanded or flanged to suit application. (For square corners).
5. Round-Edged Corner Beads: expanded or flanged to suit application. (For rounded corners).
6. Control Joints: Single component control joints with ¼ inch slots and ¾ inch grounds, or equal.
7. Expansion Joints: two piece adjustable expansion joints, free floating adjustments from ¼ inch to 5/8 inch.
8. Weep Screeds: foundation weep screed, with perforations and minimum 3-1/2 inch vertical attachment flange.
9. Fasteners: steel nail or screw of furring type with 1 inch cap of sufficient length for minimum ½ inch penetration into brick, block, concrete or stud system.
10. 3.4lb. per square yard expanded metal strip-lath 4 inches wide to be used at around all windows, doorways, openings and through wall penetrations.
11. 3.4lb density expanded metal lath for use on all soffits and overhangs as shown on drawings.

D. Fiber-reinforced Portland cement stucco basecoat: The following stucco specification is basis of design Parex Amourwall 300 Water Master Crack Shield HE. Therefore, all substitution requests must be proven to be of equal quality no less than ten (10) days prior to project bid date.

1. Fiber-47® Concentrate: Manufacturer's standard factory formulated, concentrate scratch and brown stucco basecoats consisting of Portland cement, lime, fibers, and proprietary ingredients.

E. Acrylic Modified skim coat: Parex Level Coat. For use with Crack Suppression assembly.

F. Fiberglass mesh for increased crack suppression:
1. Krak-Master mesh as manufactured by Parex USA for embedment into the surface of the Level Coat while it is still wet. A 4.5oz fiberglass woven fiberglass that has been treated for Alkali resistance.

G. Water: Potable.

H. Sand: Comply with all requirements of ASTM C 897.

I. Primer and Surface Conditioner:
1. Parex USA Tintable primer: Consisting of acrylic polymers and design for use over fully cured brown coats prior to the application of acrylic finish coats. To be tinted to the finish coat color, prior to the application of the finish coat.

J. Finish coat, Elastomeric Acrylic Based Tinted Stucco Finish:
1. e-Lastic finish by Parex USA Acrylic based stucco finish coat, consisting of Elastomeric Acrylic Polymers, properly graded aggregate, colorant and proprietary ingredients.
2. Texture and color to be selected by Architect.

2.4 ELASTOMERIC SEALANTS

A. Sealant Type A:
1. For exterior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:
a. Control and expansion joints in cast-in-place concrete.
b. Joints between architectural pre-cast concrete units.
c. Control and expansion joints in stucco
d. Butt joints between metal panels.
e. Joints between marble and/or granite or tile
f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
h. Control and expansion joints in EIFS, Exterior Insulation and Finish System
I Control and expansion joints in ceiling and overhead surfaces.
2. Provide single-component, low-modulus, non-sag sealant; comply with ASTM C920, Type S or M, Grade NS, Class 25, Class 35, Class +50/-50, Class +100/-50
3. Acceptable sealants:
a. Silicones
1. Single Component, Sikasil - WS 290, Sikasil – WS 295, Sika Silbridge 300, or Sikasil 728 NS

Part 3 - Execution

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials Provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 INSTRUCTIONS

A. Compliance: Comply with manufacturer’s instructions for installation of base and finish coats.

3.3 INSPECTION

A. Substrate Examination: Examine prior to stucco installation as follows:

1. Substrate shall be of a type listed in IBC current addition or as required by local codes and agency's having jurisdiction. Wood based sheathings substrates must be gapped 1/8 inch (3 mm) between panels.
2. Substrate shall be examined for soundness, and/or other harmful conditions.
3. Substrate shall be free of dust, dirt, efflorescence, and other harmful contaminants.
4. Notify contractor of discrepancies preventing installation of the stucco assembly.

B. Install lath tight utilizing approved fasteners, properly secured, and that all accessories are properly set and secured.

C. Isolation: Where lath and metal support assembly abuts building structure horizontally, and where partition wall work abuts the overhead structure, isolate work from structure movements. Install expansion or control joints to absorb deflections but maintain lateral support. Frame both sides of expansion and control joints separately and do not bridge joints with furring or lath.

D. Examine substrates, grounds and accessories to insure that finished stucco work will be true to line, plane, level and plumb.

## 3.4 PREPARATION OVER MASONRY SUBSTRATES: DIRECT BOND APPLICATIONS

A. Conform to preparation requirements of ASTM C926.

B. Verify that masonry and concrete surfaces to receive direct bond applications of stucco basecoats are rough, free from form release agents or otherwise properly prepared to provide for adequate bond.

C. Apply a uniform coating of the acrylic bonding agent in accordance with manufacturer's recommendations and instructions.

## 3.5 INSTALLATION

A. General:
1. Apply fluid applied Weather Barriers over all substrates with sheathing tape at all seams and through wall penetrations
2. Install continuous insulation utilizing fasteners that are long enough to penetrate the stud assembly a minimum of ¾ inch.
3. Install lathing and accessories followed by stucco basecoat assembly in accordance with manufacturer's instructions and recommendations as written in manufacturer's data sheets, and in compliance with requirements of applicable codes, regulations and agencies having jurisdiction.

B. Lathing: Install according to ASTM 1063 and install through polyisocyanurate and into block, brick or concrete and or stud assemblies with a minimum of 1 inch penetration into framing or block substrates. Install at a rate of one fastener per square foot.

C. Interrupt stucco application only at junctions of stucco planes, at openings, at control joints or at expansion joints.

D. Basecoat:
1. Apply scratch coat to a thickness of 3/8 inch using sufficient trowel pressure or spray

velocity to key stucco into lath or onto direct bond substrate.
2. Scratch horizontally and in order to provide for a key with the brown coat.
3. Apply Brown coat directly over scratch coat to a thickness of 3/8 inch (9.5mm), using sufficient trowel pressure or spray velocity to key brown coat into scratch coat.
4. Darby, then rod surface to true plane.
5. Once brown coat has cured, apply the skim coat of the acrylic modified leveling material and while wet, embed fiberglass reinforcement utilizing a wood float, and smooth to flush. Take care to completely embed mesh not more than 1/32 inch into surface of wet brown coat. Overlap all seams 2 inches and remove all wrinkles, rough edges etc.
6. Float or lightly broom surface to provide bond with cement stucco finish coat, or trowel smooth in preparation for acrylic finish coat.
7. Tool brown coat to provide a V-joint at intersection of stucco with frames or other items of metal, wood, or plastic which act as stucco grounds.

D. Finish Coat: Acrylic Based Elastomeric Stucco Finish
1. Apply primer coats to fully cured basecoats, allow to dry until tacky.
2. Apply exterior wall finish coat to thickness recommended by manufacturer to achieve texture indicated, using sufficient trowel pressure or spray velocity to bond finish coat to basecoat.
3. Apply exterior wall finish in number of coats and consistency required to achieve texture to match approved sample.

3.6 CURING

A. Moist cure cement base coats with a fog spray of clear water with sufficiently frequent applications to maintain stucco uniformly moist for a minimum of 48 hours following applications. Allow an additional 5 days of air curing before the application of any primers or finish coats.

B. Air Cure acrylic finish coats only, do not wet cure.

3.7 CLEANING

A. Patching:
1. Repair damaged exterior wall finish coat to match surrounding finish.

B. Cleanup:
1. Remove excess finish and protective materials from adjacent surfaces.
2. Remove all excess materials from the project site.

END OF SECTION 09 2240 THREE COAT STUCCO SYSTEM

# SECTION 09 2900 - GYPSUM BOARD

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Texture finishes.

B. Related Requirements:

1. Division 06 Section "Sheathing" for gypsum sheathing for exterior walls.
2. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
3. Division 09 Section "Tiling" for cementitious backer units installed as substrates for ceramic tile.

### 1.3 ACTION SUBMITTALS

A. LEED REQUIREMENTS.

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.
3. Mock-Up: See section 03-3100 Project Management and Coordination for Building Assemblies Mock-up requirements.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written 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 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2. PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying 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."

2.3 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.

2.4 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. Lafarge North America Inc.
5. National Gypsum Company.
6. PABCO Gypsum.
7. Temple-Inland.
8. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

3. Core: 5/8 inch, Type X.
4. Long Edges: Tapered.
5. Mold Resistance: ASTM D 3273, score of 10.

D. Impact-Resistant Gypsum Board (VHI): ASTM C 1629/C 1629M, Level 2.

6. Core: 5/8 inch, Type X.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.If required, insert other types of gypsum board here.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

9. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; GlasRoc Sheathing.
b. Georgia-Pacific Gypsum LLC; Dens-Glass Gold.
c. National Gypsum Company; Gold Bond, e(2)XP.
d. USG Corporation; Securock Glass Mat Sheathing.

10. Core: 5/8 inch, Type X.

## 2.6 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:
    a. CertainTeed Corp.; GlasRoc Tile Backer.
    b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10.

## 2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
    a. Cornerbead.
    b. Bullnose bead.
    c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    d. L-Bead: L-shaped; exposed long flange receives joint compound.
    e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    f. Expansion (control) joint.
    g. Curved-Edge Cornerbead: With notched or flexible flanges.
    h. Expansion (control) joint.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
2. Shapes:
    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Fry Reglet Corp.
    b. Gordon, Inc.
    c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

## 2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

## 2.9 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. Grabber Construction Products; Acoustical Sealant GSC.
c. Pecora Corporation; AC-20 FTR.
d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Acoustical joint sealant 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."

F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

## 2.10 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
b. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

2. Texture: Light spatter

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet materials provide submittals as required by section 01 8113 supplemental table.

i. Submittal requirements for LEED v4 Environmental Quality Credits.

3.2 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.

3.3 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 (including but not limited to load bearing walls, columns, roof deck, etc.), 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 following locations:
   1. Type ‘X’: In all areas – except as noted below.
   2. Flexible Type: Apply in double layer at curved assemblies.
   3. Impact-Resistant Type: As indicated on Drawings.
   4. Moisture- and Mold-Resistant Type: At all wet areas.

B. Single-Layer Application:

   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum,

from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

## 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 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated and locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

## 3.7 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect. At minimum provide control joints in the following conditions:

1. At all construction joints (expansion, seismic or building control elements)
2. At a wall or partition runs an uninterrupted straight plane exceeding 30 linear feet.
3. At an interior ceiling with perimeter relief so that dimensions between control joints does not exceed 50 linear feet or the area of the ceiling between joints exceeds 2,500sf
4. At an interior ceiling without perimeter relief so that dimensions between control joints does not exceed 30 linear feet or the area of the ceiling between joints exceeds 900sf
5. At an exterior ceiling or soffit so that dimensions between control joints does not exceed 30 linear feet or the area of the ceiling or soffit between joints exceeds 900sf

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. Bullnose bead.
3. LC-Bead: J-shaped; exposed long flange receives joint compound.
4. L-Bead: L-shaped; exposed long flange receives joint compound.
5. U-Bead: J-shaped; exposed short flange does not receive joint compound.
6. Curved-Edge Cornerbead: With notched or flexible flanges.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings.

## 3.8 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints**,** rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile and that are substrate for acoustical tile.

3. Level 3: Storage rooms, mechanical, electrical and other service type rooms, at other locations noted on drawings.
4. Level 4: At all other locations

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

5. Level 5: Where wall heights exceed 16'-0" or surface area exceeds 500sf uninterrupted by wall mounted equipment. This surfaces will be approved by the architect in writing prior to primer and paint applications.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

H. Tolerances: Maximum Variation of Finished Gypsum Board Surface from True Flatness - 1/32 inch in 1 foot, 1/16 inch in 2 feet, 1/8 inch in 10 feet in any direction (non-cumulative).

## 3.9 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

## 3.10 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 2900

# SECTION 09 3013 – FLOOR AND WALL TILING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Porcelain, Ceramic & Glass wall and floor tile.
   2. Thresholds installed as part of tile installations.
   3. Waterproof membrane for tile installations.
   4. Crack-suppression membrane for thin-set tile installations.

B. Related Sections include the following:
   1. Joint sealants: Section 07 9200
   2. Tile backer units: Section 09 2900.

### 1.2 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

C. Wet Area: Tile surfaces that are either soaked, saturated, or regularly and frequently subjected to moisture or liquids (including water).

### 1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
   1. Level Surfaces: Minimum 0.6.

### 1.4 SUBMITTALS

A. LEED REQUIREMENTS

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of tile, mortar, grout, and other products specified.

### 1.5 INFORMATIONAL SUBMITTALS

A. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

B. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.

### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Source Limitations for Other Products: Obtain each of the products specified in this Section from one source and by a single manufacturer for each product.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 01 Section "Project Meetings."

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

## 1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

## 1.9 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

# PART 2 - PRODUCTS

## 2.1 LEED REQUIREMENTS

A. Provide submittals as requirement by section 01 8113 supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.

ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products indicated in the porcelain tile installation schedules at the end of this Section.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Tile Products:
      a. As noted on drawings.
      b. Approved equivalent.

   2. Tile-Setting and -Grouting Materials:
      a. American Olean Tile Company.
      b. Dal-Tile Corporation.
      c. Custom Building Products.
      d. Laticrete International, Inc.
      e. Mapei Corporation.

2.3 PRODUCTS, GENERAL

A. ANSI Porcelain Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Porcelain Tile," for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
   2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
   1. Provide tile color, texture and patterns indicated on Finish Schedule on the ID Drawings.
   2. Provide tile trim and accessories that match color and finish of adjoining flat tile.

D. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.

E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.
   1. Where tile is indicated for installation in swimming pools, on exteriors, or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for these kinds of installations and has a record of successful in-service performance.

F. Waterproofing/Crack Suppression Membrane for thin set applications: Acceptable Product; Laticrete Hydro Ban Waterproofing/Anti-Fracture Membrane.

2.4 TILE PRODUCTS

A. Refer to Interior Finish Legend on Drawings.

B. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
   1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
   2. Shapes: As follows, selected from manufacturer's standard shapes:
      a. Base for Thin-Set Mortar Installations: Straight.
      b. Wainscot cap or exposed edge for Thin-Set Mortar Installations: Straight with edge protection.
      c. External Corners for Thin-Set Mortar Installations: Straight with edge protection.
      d. Internal Corners: Field-butted square corners, except with coved base and cap angle pieces designed to member with stretcher shapes.

2.5 THRESHOLDS AND EDGE PROTECTION

A. Thresholds:
   1. Acceptable Products (unless noted otherwise on drawings):
      a. Tile-to-Hard Surface Flooring: "RENO-U," Material and Finish – Brushed Stainless Steel as manufactured by Schluter Systems, in height as required to accommodate scheduled tile and setting bed thickness.

      b. Tile-to Carpet: "RENO-TK," Material and Finish – Brushed Stainless Steel as manufactured by

B. Edge Protection:
   1. Acceptable Products (unless noted otherwise on drawings):
      a. "RONDEC," Material & Finish – Satin Anodized Aluminum as manufactured by Schluter Systems, in height as required to accommodate scheduled tile and setting bed thickness. Accessories include Endcaps, Outside and Inside 90 degree corners.

2.6 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, composed as follows:
   1. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of prepackaged dry-mortar mix and liquid-latex additive complying with the following requirements:
      a. Latex Additive: Styrene butadiene rubber.
      b. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.

B. Chemical-Resistant, Water-Cleanable, Porcelain Tile-Setting and -Grouting Epoxy: ANSI A118.3 with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   1. Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F(60 deg C) and 212 deg F(100 deg C), respectively, as certified by mortar manufacturer for intended use.

C. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3.

2.7 GROUTING MATERIALS

A. Chemical-Resistant Epoxy Grout: ANSI A118.3, color as indicated.
   1. Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F(60 deg C) and 212 deg F(100 deg C), respectively, as certified by mortar manufacturer for intended use.

B. Standard Unsanded Cement Grout: ANSI A118.6, color as indicated.

C. Grout Sealer:
   1. Water-based acrylic sealant, 15 percent resin solids, designed to effectively seal grout from common staining materials and prevent the absorption of liquids leaving a smoother finish with a clear film on top of the grout.
   2. Does not turn white when exposed to standing water.
   3. Not easily removed by common household cleaners.
   4. Acceptable Product: CeramaSeal Grout Sealer by Bostik, Middleton, MA.

2.8 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

   1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. Chemical-Resistant Sealants: For chemical-resistant floors, provide sealants compatible with chemical-resistant mortars and grouts, approved for use indicated by manufacturers of both mortar/grout and sealant and with chemical-resistance properties equivalent to mortar/grout.

D. Products: Subject to compliance with requirements, provide one of the following:
   1. One-Part, Mildew-Resistant Silicone Sealants:
      a. Dow Corning 786; Dow Corning Corporation.
      b. Sanitary 1700; GE Silicones.
      c. Pecora 898 Sanitary Silicone Sealant; Pecora Corp.
      d. Rhodorsil 6B White; Rhone-Poulenc, Inc.
      e. Tremsil 600 White; Tremco, Inc.

2.9 TILE BACKER UNITS

A. Refer to Section 09 2900.

2.10 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. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; is compatible with tile, mortar, and grout products; and is easily removable after grouting is completed without damaging grout or tile.
   1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.11 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials provide submittals as required by section 018113 supplemental table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 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 installed tile.
   1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
   2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
   3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in 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.

B. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
   1. Grout release.

3.4 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Porcelain Tile" that apply to types of setting and grouting materials and to methods indicated in porcelain tile installation schedules.

B. TCNA Installation Guidelines: TCNA's "Handbook for Porcelain Tile Installation." Comply with TCNA installation methods indicated in porcelain tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. 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.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
   1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Movement Joints: Locate movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   1. Locate joints in tile surfaces directly above joints in concrete substrates.
   2. Locate joints where tilework abuts restraining surfaces, such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials.
   3. Prepare joints and apply sealants to comply with requirements of Division 07 Section "Joint Sealants."

H. Grout tile to comply with the requirements of the following tile installation standards:
   1. For chemical-resistant epoxy grouts, comply with ANSI A108.6.

I. At wet walls and elsewhere indicated on the Drawings, install tile backer units and treat joints to comply with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

J. At restroom locations adjacent to Classrooms, install tile per TCA W-816 recommendations at wall tile.

## 3.5 WATERPROOFING INSTALLATION

A. Install waterproofing per sheathing manufacturer's written recommendations and to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate where required.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

## 3.6 SHEET MEMBRANE INSTALLATION

A. Thoroughly clean existing surfaces scheduled to receive tile finish to ensure the removal of all grease, oil or dust film.

B. Apply a latex modified cementitious levelling coat wherever a slight substrate irregularity exists.

C. Crack Suppression Membrane: Install uncoupling membrane over structural concrete slab. Apply uncoupling membrane to substrate with recommended bonding mortar for substrate, applied using a notched trowel. Solidly embed scrim membrane into mortar.

D. Cover tile-backer board joints with fibre mesh tape set in latex-Portland cement mortar

## 3.7 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Porcelain Tile Floor Installation Schedule, including those referencing TCNA installation methods and ANSI A108 series of tile installation standards.

B. Joint Widths: Install tile on floors with the following joint widths:
   1. Porcelain Mosaic Tile: 1/16 inch (1.6 mm).
   2. Paver Tile: 1/8 inch (3.2 mm).

C. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
   1. Exterior tile floors.
   2. Tile floors in wet area.
   3. Tile floors installed with chemical-resistant mortars and grouts.
   4. Tile floors composed of tiles 8 by 8 inches (203 by 203 mm) or larger.
   5. Tile floors composed of rib-backed tiles.

D. Thresholds: Install thresholds at all transition locations between dissimilar materials.

E. Edge Protection: Install at locations indicated, at locations of exposed tile edge at location where of tile forms an outside corner.

## 3.8 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Porcelain Tile Wall Installation Schedule, including those referencing TCNA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:
   1. Porcelain Mosaic Tile: 1/16 inch (1.6 mm).
   2. Glass Mosaic Tile: 1/16 inch (1.6 mm).

3. Wall Tile: 1/16 inch(1.6 mm).

C. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
1. Tile installed with chemical-resistant mortars and grouts.

## 3.9 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all porcelain tile surfaces so they are free of foreign matter.
1. Remove grout residue from tile as soon as possible.
2. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure tile is without damage or deterioration at the time of Substantial Completion.
1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

## 3.10 FLOOR TILE INSTALLATION SCHEDULE

A. On or Above-Ground Concrete, Unbonded Mortar Bed, Floor Tile & Epoxy Grout
   1. Installation Method: TCNA F114-12
   2. Tile Type/Products: Refer to Finish Legend on Drawings.
   3. Bond Coat for Cured-Bed Method and Grout: ANSI A118.4 with the following mortar and grout:
      a. Chemical-resistant epoxy grout
   4. Seal grout

B. Porcelain Tile Floor Installation – (thin-set mortar bonded to concrete sub-floor, with epoxy grout): For interior floor installations of this designation, comply with the following:
   1. Tile Type/Products: Refer to Finish Legend on Drawings.
   2. Installation Method: TCNA F115.
   3. Setting Bed and Grout: ANSI A108.5 with the following mortar and grout:
      a. Chemical-resistant epoxy grout.
   4. Seal grout.

## 3.11 WALL TILE INSTALLATION SCHEDULE

A. Porcelain Tile Wall Installations - (thin-set bonded to gypsum Tile Backer on metal studs): For interior wall installations of this designation, comply with the following:
   1. Tile Type/Products: Refer to Finish Legend on Drawings.
   2. Installation Method: TCNA W243.
   3. Setting Bed and Grout: ANSI A118.3 with the following mortar and grout:
      a. Sanded Grout
   4. Seal grout.

B. Porcelain Tile Wall Installations - (thin-set bonded to gypsum Tile Backer on CMU): For interior wall installations of this designation, comply with the following:
   1. Tile Type/Products: Refer to Finish Legend on Drawings.
   2. Installation Method: TCNA W2021.
   3. Setting Bed and Grout: ANSI A118.3 with the following mortar and grout:
      a. Sanded Grout
   4. Seal grout.

END OF SECTION 09 3013

# SECTION 09 5113 - ACOUSTICAL PANEL CEILINGS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Acoustic ceiling panels

B. Exposed grid suspensions system

C. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings

### 1.2 RELATED SECTIONS

A. Section 08 3113 - Access Doors and Frames: Access panels.

### 1.3 REFERENCES

The references listed below are declared to be a part of these specifications, the same as if fully set forth, except as modified herein. Unless specifically stated otherwise, the edition or revision of each document in effect at the beginning of work on this project shall be used.

A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; current edition.

B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; current edition.

C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; current edition.

D. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint; current edition.

E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

F. CISCA (Ceiling and Interiors Systems Construction Association) Guidelines for seismic restraint for direct -hung suspended ceiling assemblies, current edition, for Seismic Design Categories D, E and F.

G. ASCE 7 Section 13.5.6.2.2 for Seismic Design Categories D, E and F.

### 1.4 SUBMITTALS

A. LEED REQUIREMENTS

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data:

1. Provide data on each type of acoustical unit used in the project.
2. Provide data on each type of suspension system components and installation details based on Site Seismic Class noted on Structural Drawings.

C. Samples: Submit two samples 12 x 12 inch in size illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, 12 inches long, of suspension system main runner.

## 1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

## 1.6 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

## 1.7 EXTRA MATERIALS

A. Provide 2.0 percent of amount installed of each acoustical unit type for Owner's use in maintenance of project.

B. Provide 1.0 percent of amount installed of each suspension system component for Owner’s use in maintenance of project.

# PART 2 - PRODUCTS

## 2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.

ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 ACOUSTICAL UNITS (All Acoustical Panel types may not be used)

A. Manufacturers:
1. Armstrong World Industries, Inc. (Basis of Design)
2. USG
3. Rockfon
4. Substitutions: See Section 01 6300 Product Substitution Procedures

B. Acoustical Panels square lay-in medium texture tiles.
1. Size: 24 x 48 inches and 24 x 24 inches as shown on Drawings.
2. Thickness: 3/4 inch.
3. Composition: Mineral fiberboard.
4. Light Reflectance: 85 percent.
5. NRC Range: 0.70.
6. CAC range: 35 to 40.
7. Flame spread: Class A.
8. Surface Color: White.
9. Product: School Zone Fine Fissured #1811 & #1810 & by Armstrong

C. Food Service and Wet Areas – locations indicated on drawings:
1. Size: 24 x 48 inches.
2. Thickness: 3/4 inch.
3. Composition: Mineral Fiber
4. Light Reflectance: 86 percent.
5. NRC Range: 0.70
6. CAC range: 35
7. Flame spread: Class A
8. Surface Color: White, DuraBright with acoustically transparent water repellent membrane.
9. Product: Ultima Health Zone #1938 by Armstrong.

E. Acoustical Panels Simulated Second Look – locations indicated on drawings
1. Size: 24 x 48 inches – See plan for second look pattern.
2. Thickness: 3/4 inch.
3. Composition: Mineral fiberboard.
4. Light Reflectance: 85 percent.
5. NRC Range: 0.65
6. CAC range: 35
7. Flame spread: Class A.
8. Surface Color: White.
9. Product: Cirrus Second Look by Armstrong (# varies based on pattern)

2.2 SUSPENSION SYSTEM(S)

A. Manufacturers:

1. Same as for acoustical units. Same manufacturer shall provide both the acoustical units and suspension system.

2. Substitutions: See Section 01 6300 and 01 6301.

B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

1. Standard System: Exposed Steel Suspension System Type Prelude as manufactured by Armstrong World Industries: Formed steel, commercial quality cold rolled, with painted finish and electro galvanized coating.

2. Seismic Design Category: See Seismic Site Class on Structural Drawings. System shall be installed per manufacturers requirements based on Seismic Site Class per ASTM E580.

3. Corrosion Resistant Grid: Cold rolled steel with hot dipped galvanized coating and aluminum face cap and conforming to ASTM C635 for Severe Environmental Performance; Prelude Plus as manufactured by Armstrong World Industries.

4. Finish: Color as selected by Architect from manufacturer's standard colors.

C. Profile: 1 1/2 inch main tees and 1 1/2 inch cross tees; 15/16 inch wide face.

D. Construction: Double web.

## 2.3 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hangar Wire: 12 gage minimum.

C. Perimeter Moldings: Same material and finish as grid.

1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid. Size per Seismic design category.

D. Acoustical Insulation: Acoustical Backloading: 1.5# density polybagged acoustical absorber, matte black finis, class A rated. NRC 0,85.

1. Size: To fit acoustical suspension system.

E. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 92 00.

F. Touch-up Paint: Type and color to match acoustical and grid units.

G. Axiom Classic Trim by Armstrong.

1. Size and location shown on drawings.
2. Color: White

# PART 3 – EXECUTION

## 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

## 3.3 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1/360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions. Attach per Seismic design category requirements.

1. Use longest practical lengths.
2. Overlap and rivet corners.

## 3.4 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:

1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.

G. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions when wall does not extend to bottom of roof deck above.

H. Install hold-down clips on panels within 20 ft of an exterior door.

## 3.5 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 09 5113

# SECTION 09 6500 - RESILIENT LINOLEUM SHEET FLOORING

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes: Resilient Linoleum Sheet Flooring
   1. Marmoleum® Flooring, Adhesive Installation, Heat Welded Seamless Installation, Topshield2™ Finish
   2. Forbo Flooring Systems Resilient Transition Accessories

B. Related Sections: Section(s) related to this section include:
   1. Concrete: Refer to Division 3 Concrete Sections for cast-in-place concrete
   2. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases, reducer strips, metal edge strips and other resilient flooring accessories.
   3. Expansion Joint Covers: Refer to Division 10 Specialties Section for expansion joint covers to be used with resilient flooring.

### 1.02 REFERENCES

A. Forbo Installation Guide

B. Forbo Floor Care Guide

C. American Society for Testing and Materials (ASTM):

   1. ASTM F 2034 Standard Specification for Linoleum Sheet Floor Covering
   2. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
   3. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
   4. ASTM F 1861 Standard Specification for Resilient Wall Base
   5. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
   6. ASTM F 1482 Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
   7. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
   8. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
   9. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
   10. ASTM E 492 Standard Test Method for Laboratory Measurement of lmpact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine
   11. ASTM E 989 Standard Classification for Determination of lmpact lnsulation Class (llC)

D. National Fire Protection Association (NFPA 2018 ED.):
   1. NFPA 253, 2018 ED. Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
   2. NFPA 258, 2018 ED. Test Method for Specific Optical Density of Smoke Generated by Solid Materials

E. Standards Council of Canada

1. CAN/ULC S102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

1.04 SUBMITTALS

A. LEED REQUIREMENT.
i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: Submit product data, including manufacturer's SPEC-DATA product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns and textures.

D. Samples: Submit selection and verification samples for finishes, colors, and textures.

E. Quality Assurance Submittals: Submit the following:
1. Manufacturers Technical Data: Manufacturers document specifying performance characteristics and criteria, and physical requirements.
2. Manufacturer's Instructions: Manufacturer's installation instructions.
3. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

F. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
2. Warranty: Warranty documents specified herein.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
1. Must be a Forbo Certified Installer.
2. Proof of valid certification must be submitted to the GC and verified by Forbo Flooring Systems prior to the start of the project.
3. The Forbo Certified Installer must manage and be on site during installation at all times.

B. Regulatory Requirements:
1. Fire Performance Characteristics: Provide resilient linoleum sheet flooring with the following fire performance characteristics as determined by testing products in accordance with the latest version of ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction:
a. Critical Radiant Flux: Class 1 Rating per NFPA 253, 2018 ED. (ASTM E 648) (0.45 watts/cm$^2$ or greater).
b. Smoke Density: Less than 450 per NFPA 258, 2018, ED.(ASTM E 662).

C. Mock-Ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, texture and pattern, and workmanship standard. Comply with Division 1 Quality Control (Mock-Up Requirements) Section.

1. Mock-Up Size: 10’x10’
2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

D. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

E. Pre-Installation Testing: Conduct pre-installation testing as follows: Bond testing, pH testing, calcium chloride testing, relative humidity testing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
1. Material should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational, controlled and set at a minimum of 68º F (20º C) for at least 48 hours prior to the installation.

1.07 PROJECT CONDITIONS

A. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, areas to receive flooring should be clean, fully enclosed and weathertight. The permanent HVAC must be fully operational, controlled and set at a minimum of 68º F (20º C) for a minimum of seven days prior to, during, and seven days after the installation. The flooring material should be conditioned in the same manner for at least 48 hours prior to the installation. Areas to receive flooring shall be adequately lighted to allow for proper inspection of the substrate, installation and seaming of the flooring, and for final inspection.

B. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.
1. Temperature Conditions: 68º F (20º C) for a minimum of seven days prior to, during, and seven days after the installation.

C. 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.

1.08 SEQUENCING AND SCHEDULING

A. Finishing Operations: Install flooring after finishing operations, including painting and ceiling operations, have been completed.

B. Concrete Curing: Do not install flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond testing, moisture testing, and pH testing.

1. Flooring Contractor assigned to report responsibility back to owner/architect.

1.09 WARRANTY

A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.10 MAINTENANCE

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 PRODUCTS

2.01 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):

i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.02 RESILIENT LINOLEUM SHEET FLOORING [PRODUCT TYPE]

A. Manufacturer: Forbo Flooring, Inc.

B. Proprietary Product(s): Marmoleum® Linoleum Sheet and Adhesive.
1. Description: Homogeneous linoleum sheet made primarily of natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto natural jute backing. Pattern and color shall extend throughout total thickness of material.
2. Width: 2 Meters (79")
3. Length: 32 Meters (105 Linear Feet)
4. Gauge: 2.5mm (1/10”)
5. Backing: Jute
6. Pattern and Color: See drawings
7. Adhesive: Forbo Sustain 1195 Adhesive
8. Net Fit Seams: All Marmoleum sheet products shall be installed utilizing net fit seams.
   a. Welding Rod: Forbo Marmoweld® color-matched welding rod as selected by Architect from manufacturer’s standard patterns and colors.
9. Topshield 2™ Finish: Applied during the manufacturing process.

C. Product Criteria Forms: Refer to Product Criteria Forms as an attachment to this section.
1. Product Forms: Subject to compliance with specified requirements, provide products specified in each Technical Data Sheet.

2.03 PRODUCT SUBSTITUTIONS

A. Substitutions: See Section 01 6300 – Product Substitutions Procedures

2.04 RELATED MATERIALS

A. Related Materials: Refer to other sections for related materials as follows:
   1. Underlayment and Patching Compound: Refer to Division 3 Concrete Sections for Portland cement based underlayments and patching compounds.
   2. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient flooring accessories.
   3. Expansion Joint Covers: Refer to other specification section for expansion joint covers to be used with resilient flooring.

2.05 SOURCE QUALITY

A. Source Quality: Obtain flooring product materials from a single manufacturer.

PART 3 EXECUTION

3.01 LEED REQUIREMENTS

A. If section includes wet applied materials provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.02 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.03 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (bond testing, pH testing, calcium chloride testing, relative humidity testing, etc.).

B. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.

3.04 PREPARATION

A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

B. Surface Preparation:
   1. General: Prepare floor substrate in accordance with manufacturer's instructions.
   2. Floor Substrate: Floors shall be sound, smooth, flat, permanently dry, clean, and free of all foreign materials including, but not limited to, dust, paint, grease, oils, solvents, curing and hardening compounds, sealers, asphalt and old adhesive residue.

3. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3,000 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials and leveling compounds with Portland cement based compounds.
   a. Reference Standard: Comply with the latest version of ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

C. Concrete Moisture Testing: Conduct moisture tests on all concrete floors regardless of the age, grade level or the presence of existing flooring. Conduct calcium chloride tests in accordance with the latest version of ASTM F 1869. Measure the internal relative humidity of the concrete slab in accordance with the latest version of ASTM F 2170. One test of each type should be conducted for every 1,000 square feet of flooring (minimum of 3). The tests should be conducted around the perimeter of the room, at columns, and anywhere moisture may be evident. Concrete moisture vapor emissions must not exceed 10.0 lbs. per 1,000 square feet in 24 hours when using Forbo Sustain 1195. Concrete internal relative humidity must not exceed 95% when using Forbo Sustain 1195. A diagram of the area showing the location and results of each test should be submitted to the Architect, General Contractor or End User. If the test results exceed these limitations, the installation must not proceed until the problem has been corrected.

D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. The surface pH of concrete slabs must not exceed a pH of 11 for Forbo Sustain 1195 adhesive. Concrete substrates with pH readings less than 7.0 or above 10.0 will require remediation prior to installation.

## 3.05 INSTALLATION

A. Material Installation: Measure the area to be installed and determine the direction in which the material will be installed and seam placement. Seams must be a minimum of 6” away from underlayment and concrete joints, saw cuts, etc. Cut the required length for the first sheet, adding 3” - 6” for trimming. Fit the first sheet along the main wall and at the ends using standard fitting methods. The factory edge must be trimmed in order to produce a clean edge suitable for seaming. Immediately after installation, roll the tile with a 100 pound three-section roller in both directions and repeat as necessary to ensure adequate transfer of adhesive to the backing. Repeat the same procedure on the other half of the sheet. DO NOT REVERSE THE SHEETS. INSTALL ALL MARMOLEUM® AND LINOLEUM SHEETS IN THE SAME DIRECTION.

B. Adhesive Flooring Installation: Use trowel recommended by flooring manufacturer for specific adhesive (1/16” x 1/16” x 1/16” Square notch trowel). Spread rate is approximately 125 $ft^2$/gallon.

C. Seaming: After the material has been laid into the adhesive, the material should be trimmed to produce a net fit at the seam. The seam edges should just meet, with no pressure or fullness and should be cut with a slight bevel. This will compensate for any slight expansion that may occur.

D. Heat Welded Seamless Flooring Installation: Groove out seams and heat weld together with complementary colored heat welding rod of complimentary composition in accordance with resilient flooring manufacturer's recommendations.

E. Installation Techniques:
   1. Where demountable partitions and other items are indicated for installation on top of finished flooring, install flooring before these items are installed.
   2. Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built-in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets.
   3. Extend flooring into toe spaces, door reveals, closets, and similar openings.

4. Install flooring on covers for telephone and electrical ducts, and similar items occurring within finish floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.
5. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.
6. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.
   a. Use adhesive applied to substrate in compliance with manufacturer's recommendations, including those for mixing, trowel notch, and adhesive open and working times.
7. Roll resilient flooring as required by resilient flooring manufacturer.

F. Finish Flooring Patterns: As shown in drawings

## 3.06 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
   1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by floor manufacturer.
   2. Sweep and vacuum floor after installation.
   3. Do not wash floor until after time period recommended by flooring manufacturer.
   4. Damp mop flooring to remove black marks and soil.
   5. Marmoleum® with Topshield 2 ™ is pre-sealed and pre-finished. It is occupancy ready- no additional finish is required at the time of installation. See manufacturers' recommendations for further information.

## 3.07 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

## 3.08 INITIAL MAINTENANCE PROCEDURES

A. General: Include in Contract Sum Amount cost for initial maintenance procedures, and execute procedures after flooring installation as recommended by flooring manufacturer.

B. Initial maintenance to be conducted by awarded Flooring Contractor using a Certified Forbo Floor Care Technician.

C. Drying Room Yellowing/Ambering: While Marmoleum® and linoleum products are maturing in the drying stoves, a yellow cast, called "drying room yellowing" or "ambering" may appear on the surface. This yellow cast is caused by the oxidation of linseed oil and is TEMPORARY. It occurs intermittently and with varying intensity. It is most noticeable on blue and grey shades of material. When the material is exposed to light, the drying room yellowing will disappear. The process may take as little as a few hours in bright sunlight or longer with artificial light. Because this is a natural occurrence in the product, there is no set time frame for the yellowing to disappear. This is not a material defect. In regards to floor care, applying finish to the material before the drying room yellowing disappears will make no difference; it will still disappear with exposure to light.

END OF SECTION 09 6500

# SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Resilient wall base.
2. Resilient molding accessories
3. Resilient flooring accessories.

### 1.2 ACTION SUBMITTALS

A. LEED REQUIREMENTS

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product specified.

C. Samples for Verification: In manufacturer's standard sizes, but not less than 12 inches (300 mm) long, of each product color and pattern specified.

### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post-installation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F(35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. For resilient products installed on traffic surfaces, close spaces to traffic during installation and for time period after installation recommended in writing by manufacturer.

D. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than 10 linear feet(3 linear m) for each 500 linear feet(150 linear m) or fraction thereof, of each different type, color, pattern, and size of resilient product installed.
2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
i. Submittal Requirements for LEED v4 Materials and Resources Credits.
ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MANUFACTURERS

A. Acceptable Manufacturers:
1. Johnsonite.
2. Roppe.

B. Products: Refer to Finish Legend.

## 2.3 VINYL WALL BASE

A. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I solid, homogeneous.
2. Style and Location:
   a. Style B, Cove: All areas.

B. Minimum Thickness: 0.125 inch.

C. Height: 4 inches.

D. Lengths: Cut lengths 48 inches.

E. Outside Corners: Preformed.

F. Inside Corners: Job formed or preformed.

G. Colors and Patterns: As indicated on Drawings.

## 2.4 RESILIENT ACCESSORIES

A. Vinyl Accessories:

1. Special radius flexi-track transitions for curved flooring transitions.

## 2.5 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

C. Edge Strips: As manufactured by Schluter Systems.

D. Sealant: Silicone sealant acceptable to resilient base and sheet vinyl flooring manufacturers. Refer to Section 07 92 00.

# PART 3 - EXECUTION

## 3.1 LEED REQUIREMENTS

A. If section includes wet applied materials provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.3 PREPARATION

A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.4 INSTALLATION

A. General: Install resilient products according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
5. Install pre-molded outside and inside corners before installing straight pieces.

C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

D. Sealant (in wet areas): Apply sealant to seal joint between resilient base and sheet vinyl flooring. Comply with base, flooring, and sealant manufacturers' published instructions.

E. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

## 3.5 CLEANING AND PROTECTING

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum horizontal surfaces thoroughly.
3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
4. Damp-mop or sponge resilient products to remove marks and soil.

C. Protect resilient products against mars, marks, indentations, and other 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 resilient product manufacturer.

1. Cover resilient products subject to wear and foot traffic until Substantial Completion.

D. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project.

END OF SECTION 09 6513

# SECTION 09 6519 - RESILIENT TILE FLOORING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Vinyl composition floor tile.

B. Related Sections include the following:

1. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with resilient floor tiles.

### 1.2 SUBMITTALS

A. LEED REQUIREMENT

i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Product Data: For each type of product specified.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.

D. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.

1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches (300 mm) long, of each resilient accessory color and pattern specified.

E. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.

F. Maintenance Data:
1. Manufacturers initial maintenance requirements
2. For resilient floor tile include in the maintenance manuals specified in Division 1

### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

## 1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

## 1.5 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install tiles and accessories after other finishing operations, including painting, have been completed.

E. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

## 1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than one box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.
2. Furnish not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient accessory installed.

3. Deliver extra materials to Owner.

## PART 2 - PRODUCTS

### 2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

### 2.2 MANUFACTURERS

A. As shown on drawings.

### 2.3 RESILIENT TILE

A. Vinyl Composition Tile: Provide vinyl composition floor tile complying with the following:

1. Products: As shown on drawings.

2. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for tile complying with requirements indicated.
3. Class: Class 2 (through-pattern tile).
4. Wearing Surface: Smooth.
5. Thickness: 1/8 inch (3.2 mm).
6. Size: As shown on drawings.

## PART 3 - EXECUTION

### 3.1 LEED REQUIREMENT

A. If section includes wet applied materials provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

## 3.2 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.3 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.4 VINYL COMPOSITION TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. 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 of a tile at perimeter.

1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in basket-weave pattern with grain direction alternating in adjacent tiles.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's 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.

H. Hand roll tiles according to tile manufacturer's written instructions.

## 3.5 CLEANING AND PROTECTING OF VINYL COMPOSITION TILE

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by flooring manufacturer.
4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other 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 flooring manufacturer.

1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.

a. Use commercially available product acceptable to flooring manufacturer.

b. Follow manufacturer’s initial maintenance requirements. Unless specifically noted by the manufacturer, apply a minimum of five (5) coats of finish prior to substantial completion.

2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09 6519

SECTION 09 6813 – TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES:

1. Manufacturers
2. Testing Protocols
3. Performance Requirements
4. Product Specifications
5. Environmental Requirements
6. Warranties
7. Exclusions
8. Installation
9. Maintenance
10. Accessories

1.2 REFERENCE STANDARDS

The references listed below are declared to be a part of these specifications, the same as if fully set forth, except as modified herein. Unless specifically stated otherwise, the edition or revision of each document in effect at the beginning of work on this project shall be used.

A. American Association of Textile Chemists and Colorists (AATCC):

1. AATCC 16 – Test Method for Colorfastness to Light.
2. AATCC 107 – Test Method for Colorfastness to Water.
3. AATCC 129 Test Method for Colorfastness to Ozone in the Atmosphere under High Humidity.
4. AATCC 134 – Test Method for Electrostatic Propensity of Carpets.
5. AATCC 165 –(93) Test Method for Colorfastness to Crocking: Carpets – AATCC Crock Meter Method.
6. AATCC 175-(98) Test Method for stain Resistance: Pile Floor Coverings.

B. American Society for Testing and Materials (ASTM):

1. ASTM D418-(12), Methods for Testing Pile Yarn Floor Covering Construction (Finished Pile Thickness only).
2. ASTM E648 – Test Method for Critical Radiant Flux of Floor Covering Systems using a Radiant Heat Energy Source.
3. ASTM E662 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
4. ASTM D3676 – Test Method for Thickness.
5. ASTM D3676 – Test Method for Compression Resistance.
6. ASTM D3676 – Test Method for Volume Density.
7. ASTM D3676 – Test Method for Compression Set.
8. ASTM E2471-05 Test Method for Antimicrobial.

9. International Standards Organization (ISO):

10. ISO 2551 – Test Method for Dimensional Stability (Aachen Test).

11. Carpet and Rug Institute (CRI):

12. CRI Indoor Air Quality Testing and Labeling Program.

13. U.S. Department of Housing and Urban Development (HUD):

14. HUD UM 44D-(93), HUD Building Product Standards and Certification Program for Carpet.

1.2 PERFORMANCE REQUIREMENTS

A. Comply with the following performance requirements:

| | | |
|---|---|---|
| 1. | Radiant Panel: ASTM E648: | >.45 watts/sq. cm: Class 1 |
| 2. | Smoke Density: ASTM E662: | 450 Flaming Mode - Maximum |
| 3. | Static Generation: AATCC 134: | 3.5 KV - Maximum |
| 4. | Lightfastness: AATCC 16E: | Min 4.0 at 40 hrs. |
| 5. | Crocking: AATCC 165: | 4.0 – Wet/Dry |
| 6. | Cold Water Bleed: AATCC 107: | 3.0 - Minimum |
| 7. | Ozone Fade: AATCC 129: | 3.0 - Minimum |
| 8. | Soil Protection: AATCC 189: | 500 PPM Min. |
| 9. | CRI Green Label Air Quality Certification: | Pass |
| 10. | Aachen Test: ISO 2551 | Less than .15% shrinkage or growth |

11. Stain protection: AATCC 175: Equal to or greater than 8.0 on Red 40 stain test.

B. Comply with the following Construction performance requirements:

| | | |
|---|---|---|
| 1. | Delamination: | Pass 50,000 cycles roll stool test |
| 2. | Cushion Density: | 18 lb. Per Cubic Foot Minimum |
| 3. | Compression Resistance Test: | 7.5 lb/sq. in. minimum |
| 4. | Compression Set: | 10% Maximum |
| 5. | Elongation: | 60% Minimum |
| 6. | Tensile Strength: | 50 lb/ sq. in. minimum |
| 7. | Moisture Barrier-non seam area: | Passes British Spill Test |

C. Warranty Performance Requirements:

1. Warranties must be for 20 years on all items.
2. Lifetime warranties must cover face components and backing components.
3. Warranties must be non-prorated.

D. Special Performance Requirements

1. Must have Soil and Stain resistant treatment.
2. Must have minimum 20 dpf fiber.
3. Must have Trilobal cross-section.
4. Must have permanent anti-stat yarn.
5. Must be Branded Nylon type.

1.4 SUBMITTALS

A. LEED REQUIREMENTS.
i. Refer to specification Section 01 8113 Part 1.5 for LEED product submittal requirements.

B. Manufacturer's Data-
Submit two (2) copies of manufacturer's specifications and installation instructions for modular carpet and related items specified.

C. Fiber Requirements-
Submit certification from the fiber producer verifying the following:

1. Use of the specified fiber in the submitted carpet product.

D. Warranties-
Submit warranties as described in Section 1.13.

D. Maintenance-
1. Maintenance Manual – submit manual of carpet manufacturer's recommendations for the general care, cleaning and maintenance of modular carpet products.

E. Certificate of Compliance-
Submit certified test reports that modular carpet meets all the performance requirements stated above in section 1.3 Performance requirements. Submit certified test reports from a NVLAP Certified Lab that carpet meets all performance criteria.

F. Shop Drawings-
For carpeted areas submit shop drawings showing installation of carpeting, pattern direction, necessary installation accessories, and provisions for work of other trades. Show location of different patterns or styles of modular carpet. Also show locations of any threshold conditions.

1. The contractor will supply reproducible prints on request, to facilitate shop drawing preparation.

G. Samples-
Submit standard-size modular carpet samples of each type of carpet, in each specified pattern, color and construction.

1. Final Sample Submittal
Submit two (2) sets of samples for each carpet type.

2. No carpet shipments are permitted until acceptance of final samples is given by representative of the end user or architect/design firm, certifying that samples are the approved color, pattern and texture.

3. Custom Color only
A representative of the end user or architect/design firm, certifying that the samples are the approved color, pattern and texture, shall sign high quality color samples.

4. Samples submitted are assumed to be the manufacturer's best obtainable match to the color described under Materials Section.

5. Must have federally registered Branded trademark.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data
Include maintenance procedures, recommended cleaning and stain removal materials, and recommended cleaning schedule. Include product data and Material Safety data Sheets (MSDS) for cleaning and stain-removal materials.

B. Installation Instructions
Include detailed installation procedures. Include modular installation procedures, adhesive types, trowel sizes, spread rates, open times, and Material Safety data sheets (MSDS) for all modular adhesives.

C. Warranties and Performance Certifications
Submit written warranties for all products as well as Performance testing results on all items included in Warranty section (including all testing results mandated by EverSet warranty on EverSet products) and Performance section of this specification.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility: Provide products from a single manufacturer.

1. Warranties must be standard and not job specific.

2. All styles must come from the same manufacturer.

3. Must be single source fiber extrusion and yarn manufacturing.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing modular tiles with minimum five (5) years (documented) experience.

B. Installer/Flooring Contractor Qualifications

1. Carpet contractor must provide all the necessary licenses, performance bonds, and insurance certificates that comply with all local, state, and federal laws, ordinances, or codes prior to the start of the installation.

2. Carpet contractor shall be a firm established not less than five (5) years and, if requested, shall submit evidence of having furnished and installed commercial carpet with vinyl backings on commercial carpet projects of similar size and scope for at least give (5) years.

3. Flooring Contractor to provide references at the request of the owner.

4. Carpet Contractors must also be mill certified for installing products.

5. Carpet Contractor will be responsible for the proper product installation, including floor preparation, in those areas indicated in the Drawings.

6. Carpet Contractor to provide owner a written warranty that guarantees the completed installation be free from defects in materials and workmanship for a period of two (2) years after job completion.

1.8 PRE-INSTALLATION MEETINGS

A. Convene one (1) week prior to commencing work of this section.

B. Require attendance of installer, contractor, owner, architect and other parties directly affecting the work of this section.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver modular carpet in sealed protective boxes and accessories in sealed containers. Segregate each modular product (if several product styles are involved), according to style, color, pattern, dye lot, run number, and quantity.

B. Store products in an enclosed and dry area protected from damage and soiling.

1.10 SITE ENVIRONMENTAL REQUIREMENTS

A. Do not install modular carpet until all areas have been fully enclosed and the environmental conditions have reached the levels desired for occupancy of the space.

B. Maintain ambient temperature and humidity conditions during and after installation of modular carpet at occupancy levels.

C. Allow modular carpet to reach room temperature, or minimum temperature recommended by manufacturer prior to the start of the installation.

D. Protect adhesives from freezing. Follow manufacturer’s recommendations for minimum temperatures to which adhesives are exposed.

E. IAQ Requirements: All adhesive products must be CRI Green Label Certified.

1.11 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on drawings.

1.12 SEQUENCING

A. Sequence installation so as to minimize possibility of damage and soiling of carpet.

B. Do not commence installation until painting and finishing work are complete, and ceiling and overhead work have been tested, approved and completed.

C. Remove and replace existing carpet (renovations) in accordance with pre-approved architectural plan.

1.13 WARRANTY

A. Provide manufacturer's lifetime warranties as outlined below.

1. Wear
2. Antimicrobial
3. Antistatic
4. Colorfastness
5. Floor Release
6. Edge Ravel
7. Zippering
8. Dimensional Stability
9. Cushion Resilience
10. Impervious to Liquids

B. Provide warranties on all items above without exception for the life of the Modular tile. All items are to be non-prorated.

1.14 EXTRA MATERIALS

A. Provide 15% minimum of carpet tiles for each type of carpet (include carpet needed for complete installation plus waste and usable scraps in calculated yardage) as specified by architect. Recycle waste, unusable scrap and any modular carpet damaged during installation through a qualified industry recycling or manufacturer environmental program.

B. Deliver specified attic stock requirements to Owner's designated storage space, properly packaged and identified.

1. Must have a choice of at least 15 running line products.

PART 2 PRODUCTS

2.1 LEED REQUIREMENTS

A. Provide submittals as required by Section 01 8113 Supplemental Table(s):
   i. Submittal Requirements for LEED v4 Materials and Resources Credits.
   ii. Submittal Requirements for LEED v4 Environmental Quality Credits.

2.2 MODULAR CARPET TILE CONSTRUCTION

DETAILED PRODUCT CONSTRUCTION SPECIFICATIONS – FIELD CARPET

See Finish Schedule on Drawings

DETAILED PRODUCT CONSTRUCTION SPECIFICATIONS – COLOR ACCENTS

See Finish Schedule on Drawings

DETAILED PRODUCT CONSTRUCTION SPECIFICATIONS – WALK-OFF CARPET TILES

See Finish Schedule on Drawings

2.3 ACCESSORIES

A. Leveling Compound: Latex type as recommended by carpet manufacturer; compatible with carpet adhesive and curling/sealing compound used on concrete.

B. Re-sealable Adhesive: Manufacturers Recommendations.

C. Non-Metallic Carpet edge Guard: Extruded or molded heavy-duty vinyl or rubber carpet edge guard of size and profile indicated; minimum two (2) inch wide anchorage flange; colors selected by (Architect) (Designer) from manufacturer's standard range of colors.

D. Miscellaneous Materials: As recommended by manufacturer of carpet, cushion, and other carpet products; as required to complete installation.

PART 3 EXECUTION

3.1 LEED REQUIREMENTS

A. If section includes wet applied materials provide submittals as required by Section 01 8113 Supplemental Table

i. Submittal Requirements for LEED v4 Environmental Quality Credits.

3.2 EXAMINATION

A. Examine substrates for conditions under which modular carpet tiles are to be installed.

B. Verify that floor surfaces are smooth and flat within tolerances specified in Section 3.2 and are ready to receive work.

C. Beginning of installation is defined as the time when the installer accepts existing substrate conditions.

3.3 PREPARATION

A. Allow new concrete to cure for 90 days before carpet installation starts.

B. Perform moisture content testing as required by manufacturer's instructions to ensure pH readings of no more than nine (9). Moisture transmission of 5.0-lbs/sq. ft per 24 hours is acceptable. If values exceed this level, follow manufacturer's recommendations for moisture transmission mitigation. Do not proceed until unsatisfactory conditions have been corrected.

C. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes and other defects with sub-floor filler.

D. Fill, level and make smooth cracks 1/16 inch or more, holes, unevenness, and roughness with compatible latex floor patching compounds. Feather floor filling or leveling compound a minimum of four (4) ft. Sweep floor of loose granular debris prior to filling. After filling, allow filler to dry. Damp mop floor with warm water and allow to dry. Vacuum after mopping to ensure that loose granular debris is removed and to provide a proper substrate to install modular carpet. Prohibit traffic until filler is cured.

E. Vacuum floor again immediately before installation of carpeting.

F. Confirm compatibility of NuBroadlok™ or NuSprayLok™ premium releasable carpet tile adhesive with curing compounds on concrete floors.

G. Preheat areas to receive modular carpet to a minimum temperature of 68° F for 72 hours prior to installation, with a relative humidity of not more than 65 percent. Maintain minimum temperature of 50° F thereafter. Modular carpet and adhesive must be stored at a minimum temperature of 68° F, for 72 hours prior to installation.

3.4 INSTALLATION

A. Install modular carpet in accordance with the Technical Bulletins provided by the manufacturer. These technical bulletins will offer the proper instructions to install modular carpet including: (1) conducting site testing and conditioning, (2) floor preparation, (3) installation of the modular carpet, including modular carpet layout (if more than one pattern or color) and approved adhesives, systems, etc. As a supplement, the CRI 104, section 8 will supply additional installation support guidance for your installation.

B. Install modular carpet under open-bottom obstructions and under removable flanges and furnishings, and into alcoves and closets in each space.

C. Conceal cut edges with protective edge guards or flanges.

D. Install modular carpet under open-bottom items and cut tiles tight against walls, columns, and cabinets so that the entire floor area is covered with modular carpet. Cover over floor-type door closers.

E. Install edging guards at openings and doors wherever modular carpet terminates, unless indicated otherwise.

F. Perform cutting in accordance with manufacturer's recommendation using tools designed for modular carpet being installed. Verify modular carpet patterns and colors before cutting to insure minimal variation between dye lots.

G. Install modular carpet according to manufacturer's instructions. Depending on the product specification, install either monolithically, quarter turned, Ashlar, or random. Installation requirements will be spelled out in the architectural drawings for the recommended method to be employed.

H. Use leveling compound where necessary. Feather floor leveling compounds minimum of 4 ft.

I. Trim modular carpet neatly at walls, and around interruptions.

J. Complete installation of edge strips, concealing exposed edges.

K. Cut modular carpet at fixtures, architectural elements, and perimeters.

L. Install carpet on stairs using acceptable permanent adhesive. Furnish and use compatible edge strip and nosing products as required.

3.5 FIELD QUALITY CONTROL

A. Inspect completed modular carpet installation on each floor.

B. Verify that installation is complete; work is properly done and acceptable.

C. Remove and replace, at no additional cost to owner, any work found not to be acceptable.

3.6 CLEANING

A. On completion of installation in each area, remove dirt and scraps from surface of finished modular carpet. Clean soiling, spots, or excess adhesive on carpet with cleaning materials recommended by carpet manufacturer.

B. Remove debris; sort pieces from carpet scraps.

C. At completion of work, vacuum carpet using commercial vacuuming equipment as recommended by manufacturer. Remove spots and replace modular carpet where spots cannot be removed. Remove rejected modular carpet pieces and replace with new modules. Remove any protruding yarns with shears or sharp scissors.

3.7 PROTECTION

A. Do not permit traffic over unprotected carpet surface.

B. Protect modular carpet against damage during construction. Cover with 6-mil thick polyethylene during construction period so that carpet will be without soiling, deterioration, wear, or damage at time of completion.

C. Prior to furniture move in, heavy traffic areas will be protected with additional masonite sheets to protect the carpet from damage.

D. Damaged modular carpet will be rejected. As modular carpet is installed, remove trimmings, scraps of carpet and installation materials.

E. Maintain protection of carpeting on each floor or area until work is accepted.

END OF SECTION 09 6813