



**MKM**  
architecture + design

# Project Manual

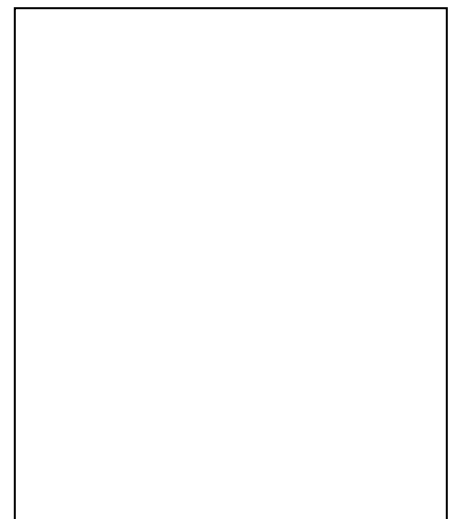
MKM No. 23029

## **The Landing 3.0** **New Construction**

**555 S. Harrison St.**  
**Fort Wayne, Indiana 46802**

Construction Documents

September 13, 2024



## THE LANDING 3.0

### PROJECT SPECIFICATIONS CONSTRUCTION DOCUMENTS

ISSUE DATE:  
SEPTEMBER 13,2024

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## DOCUMENT 003132 - GEOTECHNICAL DATA

### 1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical investigation report for Project, prepared by Alt & Witzing Engineering, Inc. dated April 29, 2024 is available for viewing **as appended to this Document**.
  - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
  - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Related Requirements:

**END OF DOCUMENT 003132**

**SUBSURFACE INVESTIGATION &  
GEOTECHNICAL RECOMMENDATIONS**

**THE LANDING 3  
FORT WAYNE, INDIANA  
A&W PROJECT No.: 24FW0008**

**PREPARED FOR:  
MODEL GROUP  
CINCINNATI, OHIO**

**PREPARED BY:  
ALT & WITZIG ENGINEERING, INC.  
GEOTECHNICAL DIVISION**

**APRIL 29, 2024**



**Alt & Witzig Engineering, Inc.**

208 East Collins Drive • Ft. Wayne, Indiana • 46825  
Ph (260) 484-0813 • Fax (800) 875-6028

April 29, 2024

Model Group  
1826 Race Street  
Cincinnati, Ohio 45202  
Attn: Mr. Zach Woolard

**Report of Subsurface Investigation and Geotechnical Recommendations**

RE: The Landing 3  
Fort Wayne, Indiana  
A&W Project No.: **24FW0008**

Dear Mr. Woolard:

In compliance with your request, Alt & Witzig Engineering, Inc. has completed a subsurface investigation for The Landing 3. The Statement of Objectives, Scope of Work, and results of our investigation are presented in the following report. It is our pleasure to transmit an electronic (.pdf) copy of the report.

The results of our test borings and laboratory tests completed to date are presented in the appendix of the report. Our recommendations for the project are presented in the “Geotechnical Analysis and Recommendations” section of the report. If you have any questions or comments regarding this matter, please contact us at your convenience.

Sincerely,  
**ALT & WITZIG ENGINEERING, INC.**

Daniel E. Desper, P.E.



Jason R. Bennett, P.E.

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## EXECUTIVE SUMMARY

Alt & Witzig Engineering, Inc. has performed a subsurface investigation and geotechnical analysis for The Landing 3 in Fort Wayne, Indiana. This investigation was performed for Model Group. Authorization to perform this investigation was in the form of an Alt & Witzig Engineering proposal accepted by of Model Group and an executed agreement.

In compliance with your request, a total of four (4) borings and one (1) test pit were conducted for the proposed building. It is understood that an up-to nine (9) story mixed-use building will be constructed as slab-on-grade.

The purpose of this investigation was to determine the various soil profile components, the engineering characteristics of the subsurface materials, and to provide geotechnical recommendations for design and construction of the proposed building.

The following conditions and concerns are relevant for this project.

- Our borings and test pit encountered four (4) to seven (7) inches of asphalt over four (4) to seven (7) inches of aggregate base. Below the pavement section, fills consisting of clays and sands with varying amounts of debris (brick, concrete, metal, glass, etc.) were encountered extending to a depth as great as thirteen (13) feet. Auger refusal in B-04 and excavator refusal in the test pit was encountered on buried debris, with a minimum length of ten (10) feet, at a depth of thirteen (13) feet. Beneath the fills, dry to wet, loose to very dense sand and gravel was encountered extending as deep as twenty-three (23) feet underlain by hard clays and silts to fifty-seven (57) feet. Dense to very dense sand and gravel was encountered underneath the clays extending to the termination of the boring as deep as seventy (70) feet.
- It is anticipated that final grade will be established at or near the current ground surface elevation. At the anticipated footing depth, the unsuitable fills mentioned above were encountered. Therefore, installation of the ground modification system with conventional footings or installation of a deep foundations system is recommended. However, due to the obstructions that were encountered during drilling and test pit operations, excavating large debris will be necessary to install the ground modification system.
- A ground modification system improves the soil beneath the foundations, provides an increased bearing capacity, and allows for construction of conventional foundations. Rammed aggregate piers can provide a net allowable soil bearing capacity up to 6,000 psf. A finalized net allowable soil bearing capacity should be provided by a specialty contractor. Total and differential settlements associated with the ground modification system can also be provided by the specialty contractor.

## **1.0 INTRODUCTION**

In compliance with your request, we have completed a subsurface investigation and geotechnical analysis at the above referenced site for The Landing 3 located in the northeast corner of South Harrison Street and West Columbia Street in Fort Wayne, Indiana.

This investigation was performed for Model Group. The proposed statement of objectives and scope of work were outlined in the form of an A&W Proposal Number 2401FW011 accepted by Model Group.

The purpose of this subsurface investigation was to determine the soil profile and the engineering characteristics of the subsurface materials and provide geotechnical parameters for design and construction of the proposed building.

The scope of this investigation included a review of geological maps of the area and a review of geologic and related literature; a reconnaissance of the immediate site; subsurface exploration; field and laboratory testing; and engineering analysis and evaluation of the materials. The scope or purpose of the investigation did not specifically or by implication provide an environmental assessment of the site.

### **1.1 Project Description**

Provided plans indicated a mixed-use building, with a maximum height of nine (9) stories, will be constructed as slab-on-grade. The first and second stories will consist of shell space and the remainder will consist of residential space.

Structural loads were not available at the time of this investigation. Therefore, maximum structural loads of 600 kips and 3.0 kips per lineal foot for column and wall footings, respectively, were assumed. If actual structural loads differ from those mentioned above, they should be submitted to Alt & Witzig Engineering, Inc. for review.

The grading plan was not available at the time of this investigation. It is anticipated that the final grade will be established at or near the current grade. Once the grading plan is available, it should be submitted to Alt & Witzig Engineering, Inc. for review.



**Exhibit 2: Site Location; Google Earth 2022**



**1.3 Site History**

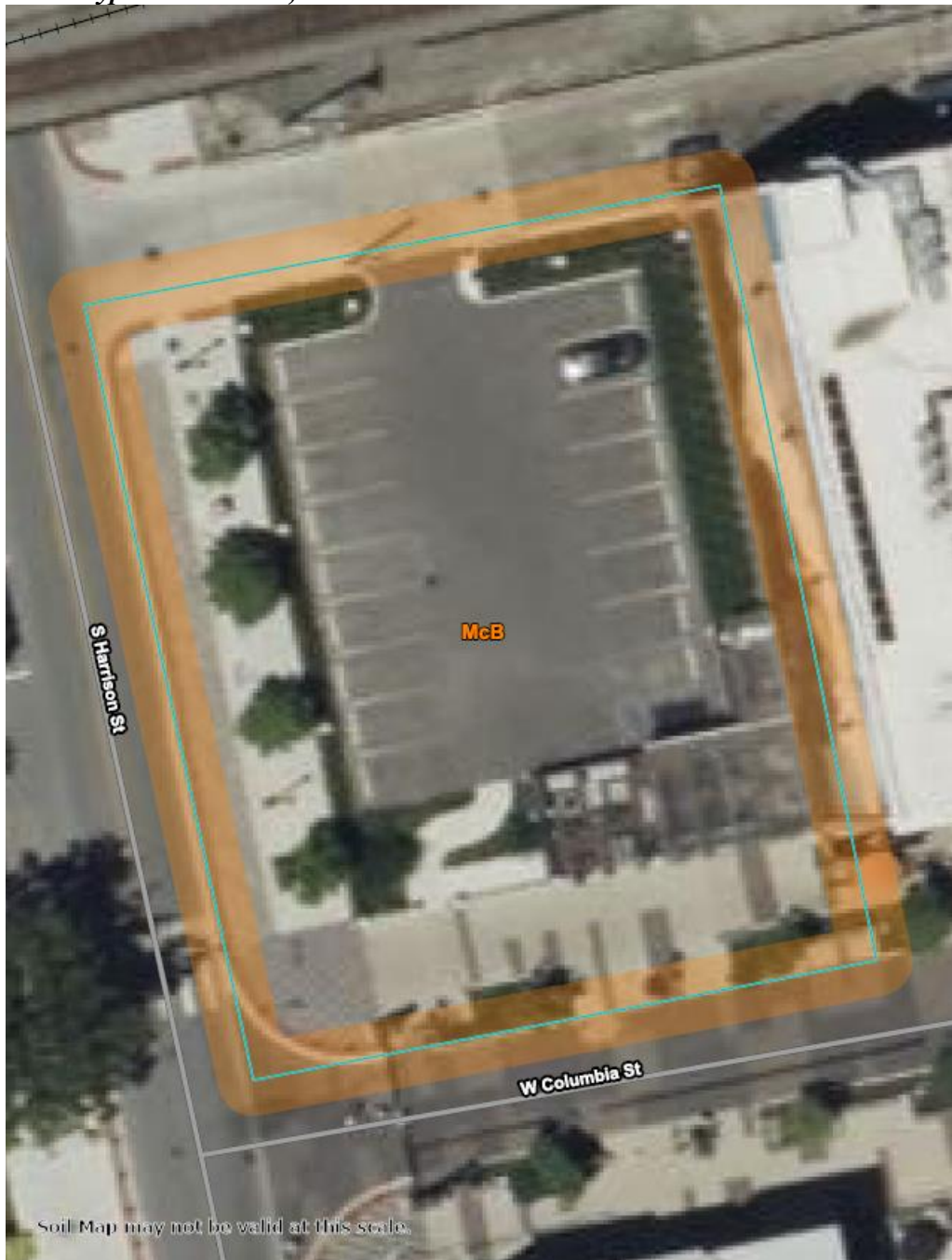
A review of historical aerial photographs was conducted as part of this investigation. This review indicated the site was occupied by former buildings that were demolished between aerial photographs dated 1973 and 1981. Earthmoving/site disturbance associated with demolition of the former building has taken place across the site.

**1.4 Regional Setting**

At the time of the field investigation, the site consisted of an asphalt parking lot. According to the Allen County, Indiana GIS, the ground surface across the site resides at approximate elevation 762 feet. Drainage along the project site typically runs across the ground surface into low-lying areas and stormwater collectors.

A review of the *Custom Soil Resource Report for Allen County, Indiana* indicated that the shallow natural soils over the project area consist mostly of Martinsville loam (McB) as shown in *Exhibit 3*, below. The *Custom Soil Resource Report for Allen County, Indiana* has been included in *Appendix B* of this report.

*Exhibit 3: Soil Types Across Site; USDA NRCS*

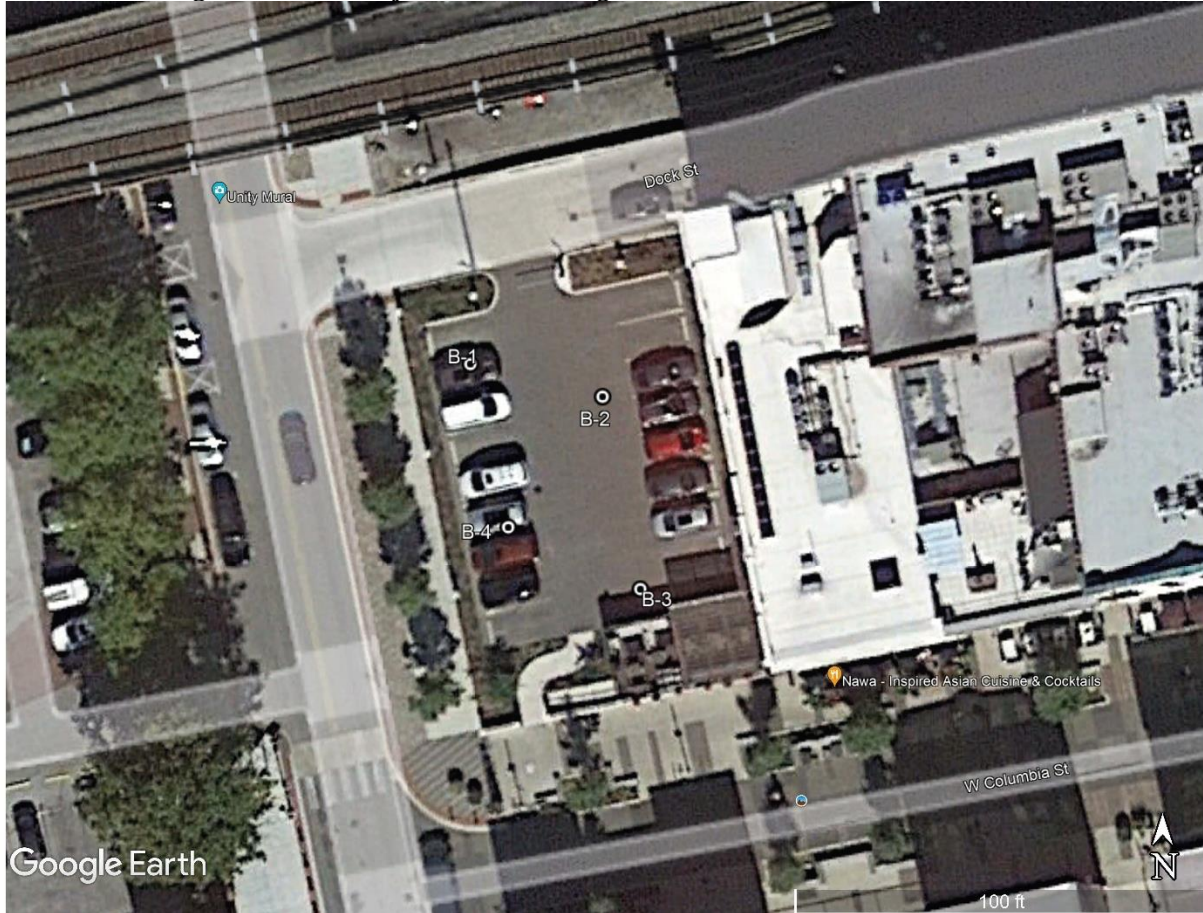


## 2.0 WORK PERFORMED

### 2.1 Boring Locations

Alt & Witzig Engineering, Inc. staked the locations of borings based on the approximate project location. The approximate project location, provided by The Model Group, was projected onto aerials provided by the Google Earth website allowing for the correlation of the approximate latitude and longitude coordinates with each boring location, as shown in *Exhibit 5*, below.

*Exhibit 5: Boring Locations Projected onto Google Earth Aerials*



### 2.2 Soil Sampling

The soil borings were performed with an ATV-mounted drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. During the sampling procedure, standard penetration tests were performed at regular intervals in accordance with ASTM Method D-1586 to obtain the standard penetration value of the soil. The standard penetration value is defined as the number of blows a one hundred forty (140)-pound hammer, falling thirty (30) inches, required to advance the split-spoon sampler twelve (12) inches into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Soil samples were field classified and placed in unpreserved glass jars with Teflon-lined lids for transport to our geotechnical laboratory for further analysis.

### **2.3 Laboratory Analyses for Soil Samples**

A supplementary laboratory investigation was conducted to ascertain additional pertinent engineering characteristics of the subsurface materials necessary in analyzing the behavior of the proposed building. The laboratory-testing program included:

- Moisture content of soils in general accordance with ASTM D 2216
- Visual classification of soils in general accordance with ASTM D 2488
- Samples of cohesive soils were tested utilizing a calibrated spring testing machine and a soil penetrometer to aid in determining the strength.
- Loss-on-ignition determinations in accordance with AASTHO T-267.

The values of the unconfined compressive strength as determined on soil samples from the split-spoon sampling must be considered approximate, recognizing the manner in which they were obtained since the split-spoon sampling techniques provide a representative but somewhat disturbed soil sample.

### **2.4 Groundwater Elevation**

Initial depths to groundwater were estimated based on where water was observed on the sampling rods. Upon completion of the drilling activities, the depth to water was measured using a tape measure with a weighted end. It should be noted that in granular soils, borings often experience caving or ‘plugging’ of the borehole opening due to sloughing. The depth of cave/plug is also recorded on the *Boring Logs*. The depths presented on the *Boring Logs* are accurate only for the day on which they were recorded.

### **3.0 INVESTIGATION RESULTS**

The types of subsurface materials encountered have been visually classified and are described in detail on the *Boring Logs*. The results of the field penetration tests, strength tests, water level observations and laboratory water contents are presented on the *Boring Logs* in numerical form. Representative samples of the soils encountered in the field were placed in sample jars and are now stored in our laboratory for further analysis if desired. Unless notified to the contrary, all samples will be disposed of after two (2) months.

#### **3.1 Site-Specific Geologic Results**

At the ground surface, our borings and test pit encountered four (4) to seven (7) inches of asphalt over four (4) to seven (7) inches of aggregate base. Below the pavement section, fills consisting of clays and sands with varying amounts of debris (brick, concrete, metal, glass, etc.) were encountered extending to a depth as great as thirteen (13) feet. Auger refusal in B-04 and excavator refusal in the test pit was encountered on buried debris, with a minimum length of ten (10) feet, at a depth of thirteen (13) feet.

Beneath the fills, dry to wet, loose to very dense sand and gravel was encountered extending as deep as twenty-three (23) feet underlain by hard clays and silts to fifty-seven (57) feet. Moisture content results of the clays ranged from 8.6% to 20.8%. Dense to very dense sand and gravel was encountered underneath the clays extending to the termination of the boring as deep as seventy (70) feet.

#### **3.2 Site-Specific Groundwater Elevations**

Groundwater level measurements taken during and immediately upon completion of the drilling operations indicated groundwater as shallow as eleven (11) feet below current grade. Due to the fills at this site, trapped water within the fills will likely be encountered during construction and was noted during the test pit excavation. The exact location of the water table shall be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff.

#### **3.3 Seismic Consideration**

Based on information obtained in the subsurface investigation and experience on other projects in this area, the Seismic Site Class C is appropriate for design in accordance with the Indiana Building Code guidelines. Maximum spectral response values of  $S_s=0.117$  and  $S_1=0.061$  may be used for seismic design.



## **4.0 GEOTECHNICAL ANALYSES AND RECOMMENDATIONS**

### **4.1 Project Description**

Provided plans indicated a mixed-use building, with a maximum height of nine (9) stories, will be constructed as slab-on-grade. The first and second stories will consist of shell space and the remainder will consist of residential space.

The location of the soil borings in relation to preliminary configuration of the site is shown on the enclosed *Boring Location Plan*.

Structural loads were not available at the time of this investigation. Therefore, maximum structural loads of 600 kips and 3.0 kips per lineal foot for column and wall footings, respectively, were assumed. If actual structural loads differ from those mentioned above, they should be submitted to Alt & Witzig Engineering, Inc. for review.

The grading plan was not available at the time of this investigation. It is anticipated that the final grade will be established at or near the current grade. Once the grading plan is available, it should be submitted to Alt & Witzig Engineering, Inc. for review.

### **4.2 Site Preparation**

An asphalt thickness of up to seven (7) inches was encountered at this site. The asphalt thicknesses on our boring logs are not exact and may not represent variations between boring locations. Therefore, the thicknesses should be used for estimating purposes only. The amount of stripping will also be dependent on the condition of the subgrade during earthmoving operations. Deep fills and buried debris were encountered to as deep as thirteen (13) feet. A representative of Alt & Witzig Engineering, Inc. should be present prior to and during stripping operations, and during removal of the unsuitable fills/debris to aide in determining where suitable soils are encountered.

Prior to the placement of fill, the exposed subgrade should be proof-rolled with equipment approved by a representative of Alt & Witzig Engineering, Inc. This proof-rolling will assist in determining if any pockets of soft unstable materials exist beneath this exposed subgrade. Where soft, yielding materials are encountered, it will be necessary to remediate the area prior to placement of fill materials. Remediation of these unstable areas will be dictated by the field conditions at that time and the proposed grading.

All fill placed with the intent of supporting foundations, floor slabs, and pavements should be placed in accordance with *Section 4.3*.

### **4.3 Compaction Specifications**

After remediation of soil/yielding soils identified in the proof-roll inspection, the site should be raised to subgrade elevation. Using approved material, it is recommended that the minimum dry density as determined in accordance with ASTM D-1557 be achieved in the various areas across the site mentioned in the following table. The following table illustrates the recommended compaction percentage in several areas of the site.

**Table 1: Compaction Specifications**

Area	Min. Percentage of Compaction ASTM D 1557	Acceptable Material	Typical Maximum Lift Thickness
<b>Roads, Drives, &amp; Parking Areas (including future areas)</b>	95%	Any besides ML, MH, CH, OL, OH	8"
<b>Under Foundations and Footings</b>	95%	Any besides ML, MH, CH, OL, OH	8"
<b>Sub grade Below Slab-On-Grade</b>	95%	INDOT #53 or other coarse-grained material approved by the geotechnical engineer	8"
<b>Construction of Permanent Slopes</b>	95%	Any besides ML, MH, SW, SP, GW, GP	8"
<b>Green Space (not including permanent slopes)</b>	85%	Any	12"
<b>Landscaped Areas (Upper 1 ft)</b>	Maximum 90%	Any	12"
<b>Utility Trench Backfill</b>	98%	SW, SP, GW, GP	10"
USCS Classifications: <b>GW-Well Graded Gravel</b> <b>GP-Poorly Graded Gravel</b> <b>GM-Silty Gravel</b> <b>GC-Clayey Gravel</b>	<b>SW-Well Graded Sand</b> <b>SP-Poorly Graded Sand</b> <b>SM-Silty Sand</b> <b>SC-Clayey Sand</b> <b>CL-Lean Clay</b>	<b>ML-Silt</b> <b>CH-Fat Clay</b> <b>MH-Elastic Silt</b> <b>OL-Organic Clay/Silt</b> <b>OH-Organic Clay/Silt</b>	

The ability to obtain the above-mentioned compaction requirements are dependent upon the moisture contents of the fill soils.

#### **4.4 Foundation Recommendations**

As indicated in *Section 4.1*, it is anticipated that final grade will be established at or near the current ground surface elevation. At the anticipated footing depth, unsuitable fills were encountered. Therefore, installation of a ground modification system with conventional footings or installation of a deep foundation system is recommended.

Ground modification such as rammed aggregate piers may be considered to support the proposed development. However, due to the obstructions that were encountered during drilling and test pit operations, excavating large debris may be necessary to install the ground modification system.

A ground modification system improves the soil beneath the foundations, provides an increased bearing capacity, and allows for construction of conventional foundations. Rammed aggregate piers may be able to provide a net allowable soil bearing capacity of up to 6,000 psf. A finalized net allowable soil bearing capacity should be provided by a specialty contractor. Total and differential settlements associated with the ground modification system can also be provided by the specialty contractor.

A deep foundations system may be considered, such as auger cast piles, as an alternative option to a ground modification system. If desired, recommendations for a deep foundation system can be provided in a report addendum upon request.

#### **4.5 Floor Slab Recommendations**

The shallow soils across the site consist of clay and sand fills with varying amounts of debris. Remediation of the subgrade below the floor slab can be achieved through installation of the rammed aggregate piers as recommended in *Section 4.4*. Alternatively, if some risk is allowed, removal of the upper eighteen (18) inches and placement of geogrid (BX 1200 or equivalent) and #53 crushed aggregate is recommended. A representative of Alt & Witzig Engineering, Inc. should be on-site to witness document the stripping and placement of the crushed stone.

After the site has been prepared in accordance with *Section 4.2* and the grade has been raised, a four (4) to six (6)-inch compacted granular material should be placed immediately beneath all floor slabs. This granular material will provide a uniform surface for construction of the floor slab and minimize capillary rise of water through the slab. The natural subgrade may be considered as the granular material granted it is free of excessive fines (less than 10% fines).

All finished subgrades should be proof-roll inspected before placing concrete to verify that the sub-grade is suitable to support the slab. If the subgrade should become disturbed, or excessively wet or dry prior to construction of the floor slabs, moisture conditioning of the soils will be necessary. Alternatively, the affected materials should be removed and replaced with suitable structural fill. Final conditioning of the finished subgrade should be performed immediately prior to placing the floor slab base course.

## **5.0 STATEMENT OF LIMITATIONS**

This report is solely for the use of Model Group and their assigned agents. Any reliance of this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties for other uses. This report shall only be presented in full and may not be used to support any other objectives than those set out in the scope of work, except where written approval and consent are provided by Model Group and Alt & Witzig Engineering.

Our subsurface investigation was conducted in accordance with guidelines set forth in the scope of services and applicable industry standards. The scope or purpose of this geotechnical investigation did not, either specifically or by implication, provide any environmental assessment of the site.

An inherent limitation of any geotechnical engineering study is that conclusions must be drawn on the basis of data collected at a limited number of discrete locations. The geotechnical parameters provided in this report were developed from the information obtained from the test borings that depict subsurface conditions only at these specific locations and on the particular date indicated on the boring logs. Soil conditions at other locations may differ from conditions encountered at these boring locations and groundwater levels shall be expected to vary with time. The nature and extent of variations between the borings may not become evident until the course of construction.

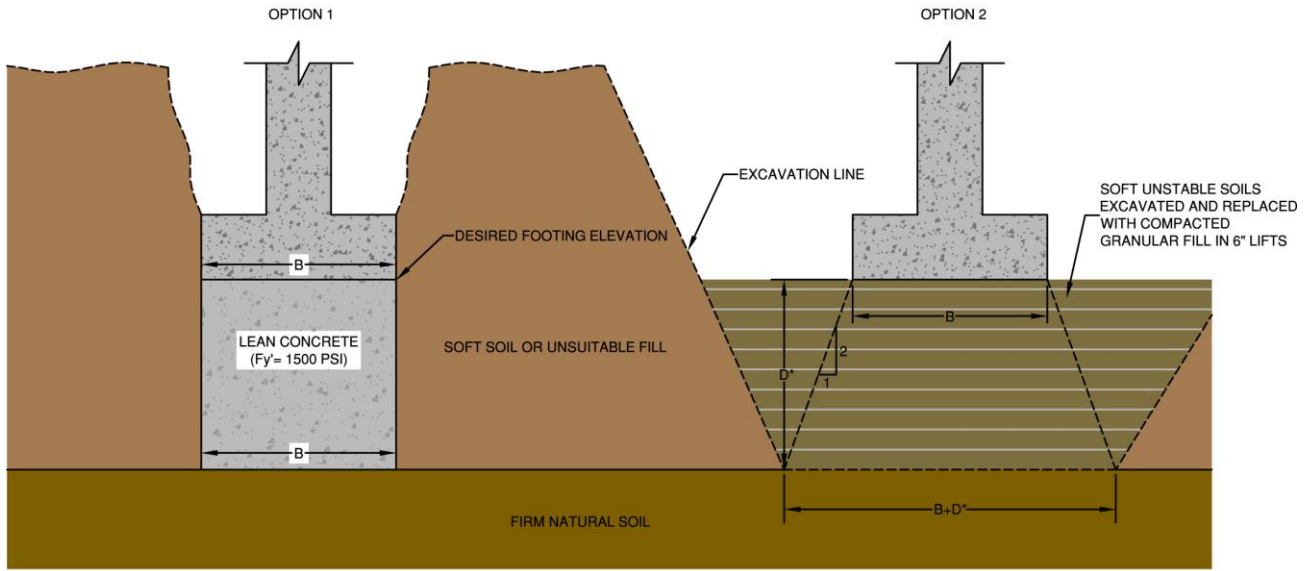
The exploration and analysis reported herein is considered in sufficient detail and scope to form a reasonable basis for preliminary design. The recommendations submitted are based on the available soil information and assumed design details enumerated in this report. If actual design details differ from those specified in this report, this information should be brought to the attention of Alt & Witzig Engineering, Inc. so that it may be determined if changes in the recommendations herein are required. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of Alt & Witzig Engineering, Inc.

We appreciate the opportunity to work with you on this project. Often, because of design and construction details that occur, questions arise concerning the soils conditions. If we can give further service in these matters, please contact us at your convenience.

**APPENDIX A**

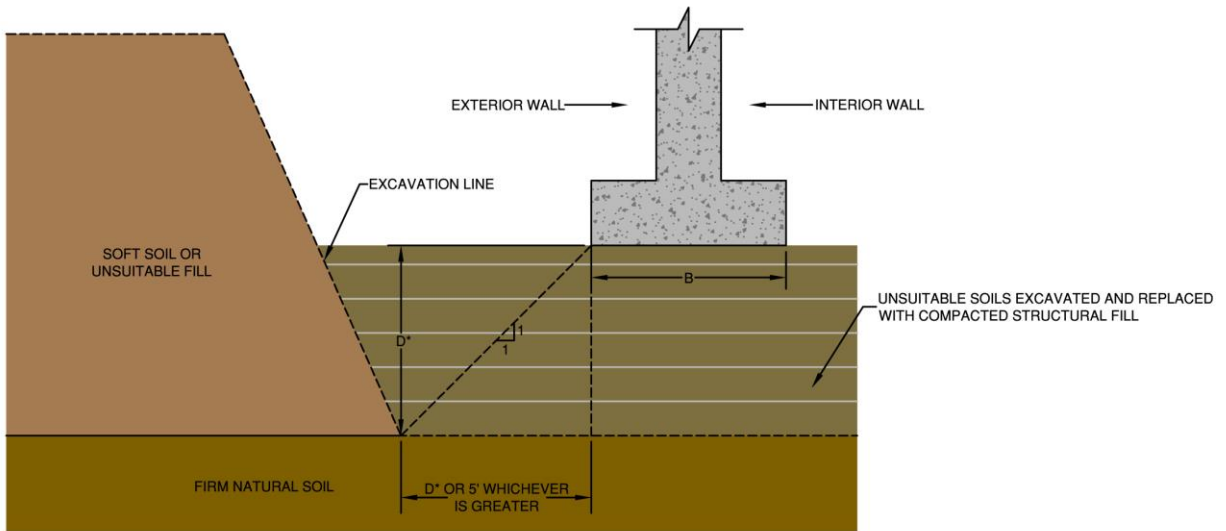
Undercut Detail for Footing Excavation in Unstable Materials  
Boring Location Plan  
Boring Logs  
General Notes

UNDERCUT EXCAVATION FOR ISOLATED FOOTINGS IN UNSTABLE MATERIALS



D\* IS DEPTH FOR SUITABLE SOILS

MASS EXCAVATION FOR FOOTINGS IN UNSTABLE MATERIALS

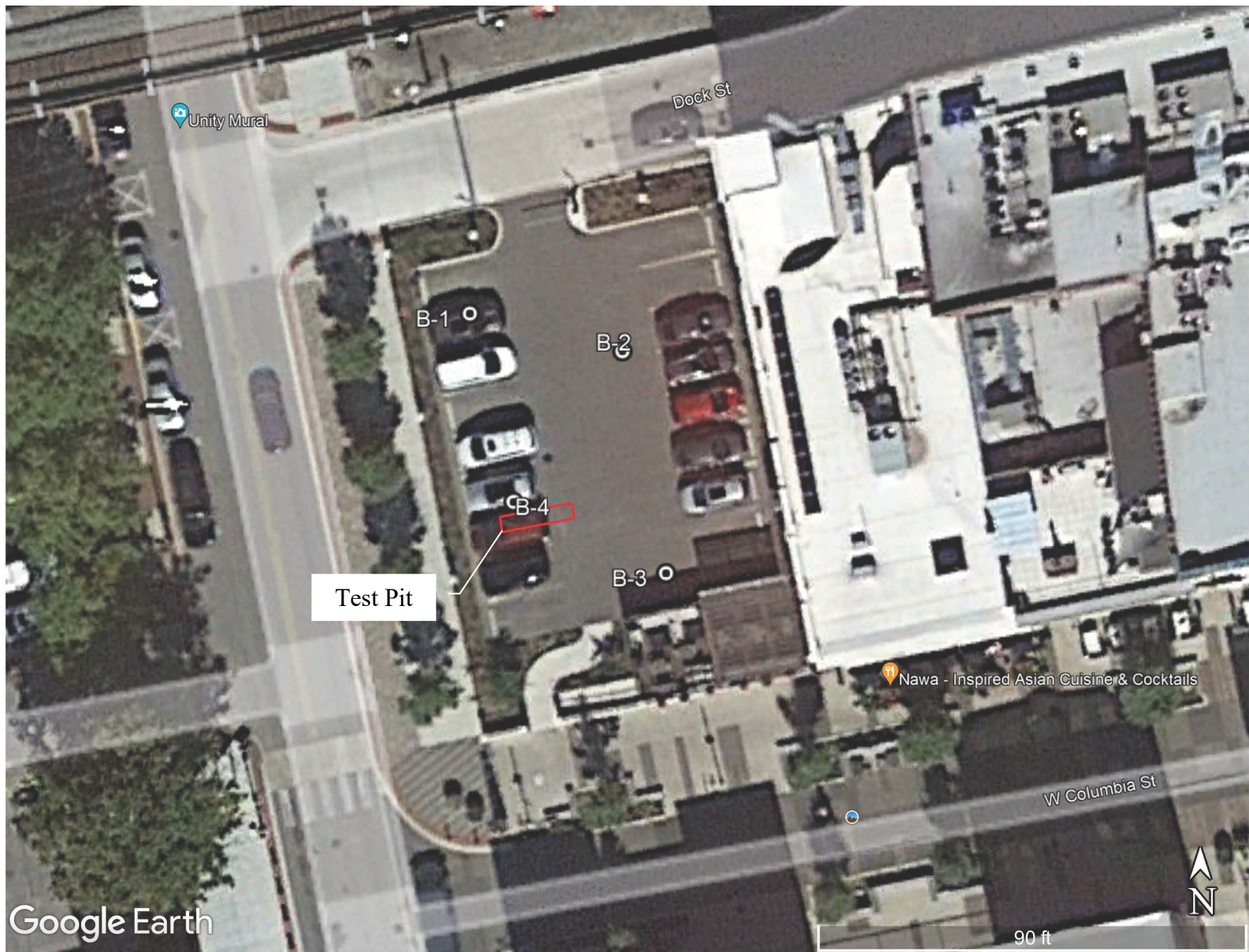


D\* IS DEPTH FOR SUITABLE SOILS

**Undercut Detail for Footing Excavation in Unstable Material**

**PROJECT:** The Landing III  
**LOCATION:** Fort Wayne, IN  
**CLIENT:** Model Group  
**A&W File No.:** 24FW0008

*A*  
*W* **Alt & Witzig Engineering Inc.**  
 208 E. Collins Dr.  
 Fort Wayne, Indiana 46825  
 TEL (260)484-0813  
[www.altwitzig.com](http://www.altwitzig.com)



### BORING LOCATION PLAN

**PROJECT:** The Landing III  
**LOCATION:** Fort Wayne, IN  
**CLIENT:** Model Group  
**A&W File No.:** 24FW0008

**A/W** Alt & Witzig Engineering Inc.  
208 E. Collins Dr.  
Fort Wayne, Indiana 46825  
TEL (260)484-0813  
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# BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Model Group  
 PROJECT NAME The Landing 3  
 PROJECT LOCATION Fort Wayne, IN

BORING # B-01  
 ALT & WITZIG FILE # 24FW0008

### DRILLING and SAMPLING INFORMATION

Date Started 2/27/24 Hammer Wt. 140 lbs.  
 Date Completed 2/27/24 Hammer Drop 30 in.  
 Boring Method HSA Spoon Sampler OD 2 in.  
 Driller D&T Drilling Rig Type A300

### TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	Brown SAND with Stone	0.7		1	SS			12				
	4" Asphalt	1.0										
	Brown Silty SAND with Brick, Concrete, and Metal Pieces (FILL)		5	2	SS			7				
				3	SS			12				
				4	SS			6				
		11.0	10	5	SS			7				
	Gray Silty SAND with a Trace of Gravel	13.0										
	Dark Gray Silty SAND with Gravel	15.0	15	6	SS			17			43.5	LOI=2.2%
				7	SS			36		4.5	9.3	
				8	SS			39		4.5	10.0	
	Gray SILT with a Trace of Gravel and Clay											
				9	SS			53	4.7	4.5	10.3	
				10	SS			57		3.5	10.7	
	End of Boring at 30 feet	30.0	30									

#### Sample Type

SS - Driven Split Spoon  
 ST - Pressed Shelby Tube  
 CA - Continuous Flight Auger  
 RC - Rock Core  
 CU - Cuttings  
 CT - Continuous Tube

#### Groundwater

○ During Drilling 14.5 ft.  
 ▼ At Completion 14.5 ft.  
 ☒ Caved At Completion 16.0 ft.

#### Boring Method

HSA - Hollow Stem Augers  
 CFA - Continuous Flight Augers  
 DC - Driving Casing  
 MD - Mud Drilling





# BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Model Group  
 PROJECT NAME The Landing 3  
 PROJECT LOCATION Fort Wayne, IN

BORING # B-02  
 ALT & WITZIG FILE # 24FW0008

### DRILLING and SAMPLING INFORMATION

Date Started 2/26/24 Hammer Wt. 140 lbs.  
 Date Completed 2/26/24 Hammer Drop 30 in.  
 Boring Method HSA Spoon Sampler OD 2 in.  
 Driller D&T Drilling Rig Type A300

### TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	7" Asphalt	0.6		1	SS	☒		21				
	Brown SAND and GRAVEL (FILL)	6.0	5	2	SS	☒		11				
	Black SAND with Silt (FILL)	8.0		3	SS	☒		4				
	Gray Silty Sandy CLAY with Organics and Brick (FILL)	13.0	10	4	SS	☒		3			33.1	
				5	SS	☒	▽	5			18.2	
	Gray, Wet SAND and GRAVEL	23.0	15	6	SS	☒	○	32			28.7	
				7	SS	☒		42				
				8	SS	☒		50/5"				
	Gray Silty CLAY with Gravel and Shale	42.5	25	9	SS	☒		86		4.5	10.7	
				10	SS	☒		88		3.5	10.1	
				11	SS	☒		50/2"		3.3	13.0	
				12	SS	☒		50/5"		4.5	8.6	
	Gray Clayey SILT with Gravel	53.0	45	13	SS	☒	■	50/2"				
				14	SS	☒		50/2"		4.5	20.8	
	Gray Silty CLAY with Gravel	57.0	50	15	SS	☒		32		4.5	14.0	
	Gray, Wet SAND and GRAVEL	63.5	55	16	SS	☒		67				
	Gray, Wet Silty SAND	70.0	60	17	SS	☒		59				
	End of Boring at 70 feet		65	18	SS	☒		39				

Sample Type  
 SS - Driven Split Spoon  
 ST - Pressed Shelby Tube  
 CA - Continuous Flight Auger  
 RC - Rock Core  
 CU - Cuttings  
 CT - Continuous Tube

Groundwater  
 ○ During Drilling 15.5 ft.  
 ▽ At Completion 13.0 ft.  
 ■ Caved At Completion 43.0 ft.

Boring Method  
 HSA - Hollow Stem Augers  
 CFA - Continuous Flight Augers  
 DC - Driving Casing  
 MD - Mud Drilling



# BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Model Group  
 PROJECT NAME The Landing 3  
 PROJECT LOCATION Fort Wayne, IN

BORING # B-03  
 ALT & WITZIG FILE # 24FW0008

### DRILLING and SAMPLING INFORMATION

Date Started 2/26/24 Hammer Wt. 140 lbs.  
 Date Completed 2/26/24 Hammer Drop 30 in.  
 Boring Method HSA Spoon Sampler OD 2 in.  
 Driller D&T Drilling Rig Type A300

### TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	Gray SAND with Stone (FILL)	2.5	1	1	SS			14				
	Brown Clayey SILT with Brick, Plastic, Fiber Glass, and Concrete Peices (FILL)	8.0	5	2	SS			14				
			3	SS			23					
			4	SS			9					
	Brown SAND and GRAVEL with a Trace of Silt	16.0	10	5	SS			35				
			15	6	SS			28				
	Gray Sandy SILT with a Trace of Gravel	30.0	15	7	SS			31		3.0	9.6	
			20	8	SS			36		4.5	10.4	
			25	9	SS			50	4.3	4.5	11.7	
			30	10	SS			81	3.0	4.5	9.8	
	End of Boring at 30 feet		30									

#### Sample Type

SS - Driven Split Spoon  
 ST - Pressed Shelby Tube  
 CA - Continuous Flight Auger  
 RC - Rock Core  
 CU - Cuttings  
 CT - Continuous Tube

#### Groundwater

○ During Drilling 13.0 ft.  
 ▼ At Completion 25.5 ft.  
 ☒ Caved At Completion 26.0 ft.

#### Boring Method

HSA - Hollow Stem Augers  
 CFA - Continuous Flight Augers  
 DC - Driving Casing  
 MD - Mud Drilling



# BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Model Group  
 PROJECT NAME The Landing 3  
 PROJECT LOCATION Fort Wayne, IN

BORING # B-04  
 ALT & WITZIG FILE # 24FW0008

### DRILLING and SAMPLING INFORMATION

Date Started 2/27/24 Hammer Wt. 140 lbs.  
 Date Completed 2/27/24 Hammer Drop 30 in.  
 Boring Method HSA Spoon Sampler OD 2 in.  
 Driller D&T Drilling Rig Type A300

### TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pct)	Remarks
0	5" Asphalt	0.4										
	7" Crushed Stone	1.0		1	SS			15				
	Brown SAND and GRAVEL with Brick (FILL)	5.0	5	2	SS			21				
	Brown SAND and GRAVEL with Brick (FILL)	7.0		3	SS			12				
	Gray Silty Sandy CLAY with Gravel	10.0	10	4	SS			3			21.4	
	Wood	12.5		5	SS		○	92				
	Auger Refusal @ 12.5 ft. End of Boring at 12.5 feet											Auger refusal encountered. Boring offset and redrilled. Auger refusal encountered on 2nd attempt.

Sample Type  
 SS - Driven Split Spoon  
 ST - Pressed Shelby Tube  
 CA - Continuous Flight Auger  
 RC - Rock Core  
 CU - Cuttings  
 CT - Continuous Tube

Groundwater  
 ○ During Drilling 11.0 ft.  
 ∇ At Completion Dry ft.

Boring Method  
 HSA - Hollow Stem Augers  
 CFA - Continuous Flight Augers  
 DC - Driving Casing  
 MD - Mud Drilling



**APPENDIX B**

U.S. Seismic Design Maps  
Custom Soil Resource Report for Allen County, Indiana

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout error*.  
 USGS web services are now operational so this tool should work as expected.



# The Landing III

Latitude, Longitude: 41.081448, -85.141643



<b>Date</b>	4/23/2024, 1:18:11 PM
<b>Design Code Reference Document</b>	IBC-2015
<b>Risk Category</b>	III
<b>Site Class</b>	C - Very Dense Soil and Soft Rock

Type	Value	Description
S <sub>S</sub>	0.117	MCE <sub>R</sub> ground motion. (for 0.2 second period)
S <sub>1</sub>	0.061	MCE <sub>R</sub> ground motion. (for 1.0s period)
S <sub>MS</sub>	0.14	Site-modified spectral acceleration value
S <sub>M1</sub>	0.104	Site-modified spectral acceleration value
S <sub>DS</sub>	0.093	Numeric seismic design value at 0.2 second SA
S <sub>D1</sub>	0.069	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F <sub>a</sub>	1.2	Site amplification factor at 0.2 second
F <sub>v</sub>	1.7	Site amplification factor at 1.0 second
PGA	0.055	MCE <sub>G</sub> peak ground acceleration
F <sub>PGA</sub>	1.2	Site amplification factor at PGA
PGA <sub>M</sub>	0.066	Site modified peak ground acceleration
T <sub>L</sub>	12	Long-period transition period in seconds
SsRT	0.117	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.127	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.061	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.069	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.6	Factored deterministic acceleration value. (Peak Ground Acceleration)

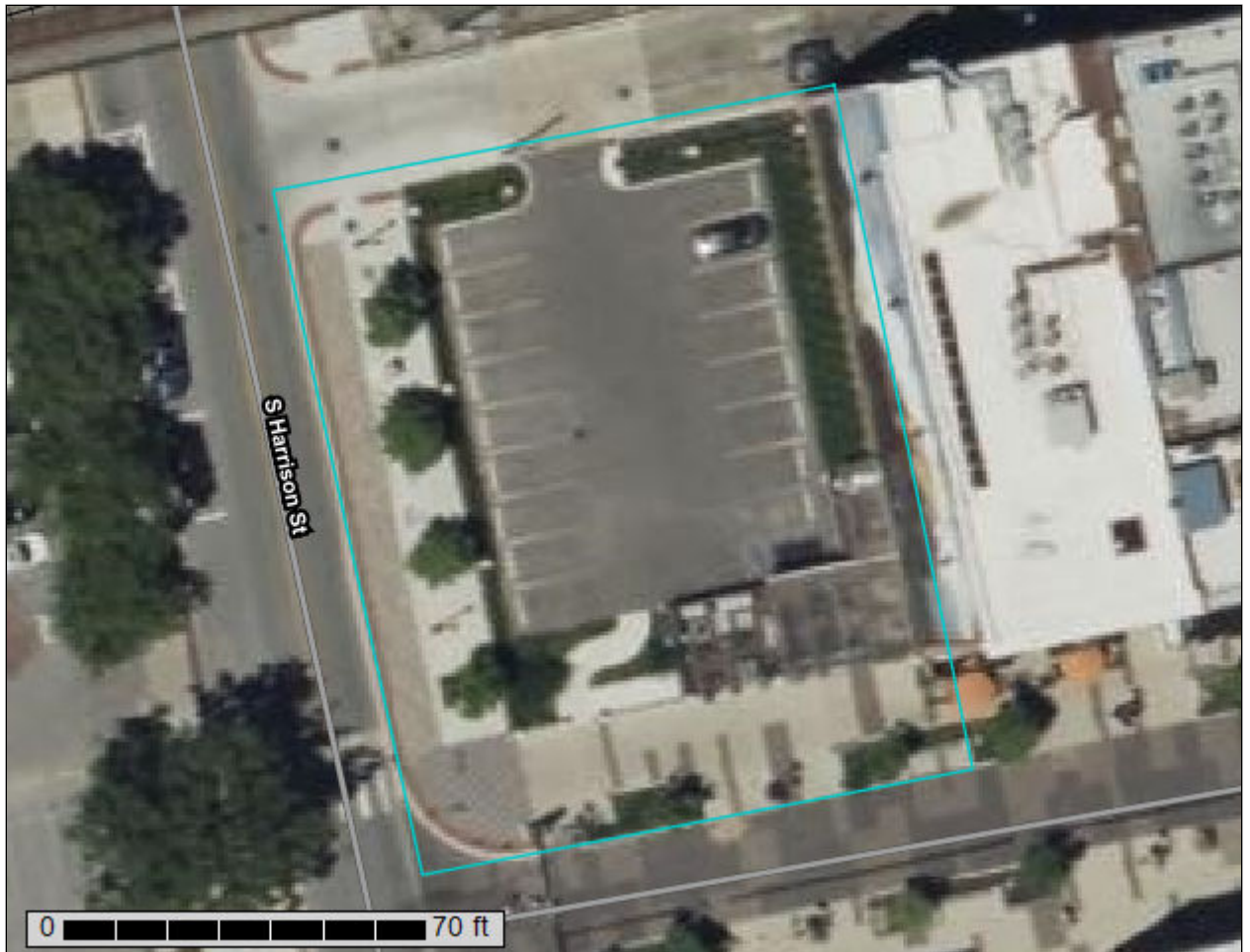
Type	Value	Description
$PGA_{UH}$	0.055	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
$C_{RS}$	0.918	Mapped value of the risk coefficient at short periods
$C_{R1}$	0.884	Mapped value of the risk coefficient at a period of 1 s
$C_V$		Vertical coefficient

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# Custom Soil Resource Report for **Allen County, Indiana**



# Preface

---

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

---

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

## Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

---

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



# Custom Soil Resource Report Soil Map



Map Scale: 1:320 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 16N WGS84

### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)


**Soils**


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

**Special Point Features**

 Blowout

 Borrow Pit


 Clay Spot


 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole

 Slide or Slip


 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

**Water Features**

 Streams and Canals


**Transportation**

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Allen County, Indiana  
 Survey Area Data: Version 23, Sep 1, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 18, 2022—Jun 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
McB	Martinsville loam, 2 to 6 percent slopes	0.3	100.0%
<b>Totals for Area of Interest</b>		<b>0.3</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

## Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Allen County, Indiana

### McB—Martinsville loam, 2 to 6 percent slopes

#### Map Unit Setting

*National map unit symbol:* 5jd4  
*Elevation:* 600 to 1,250 feet  
*Mean annual precipitation:* 36 to 43 inches  
*Mean annual air temperature:* 48 to 54 degrees F  
*Frost-free period:* 150 to 180 days  
*Farmland classification:* All areas are prime farmland

#### Map Unit Composition

*Martinsville and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Martinsville

##### Setting

*Landform:* Stream terraces, lake plains, outwash plains  
*Landform position (two-dimensional):* Shoulder, backslope  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear  
*Parent material:* Loamy outwash

##### Typical profile

*Ap - 0 to 8 inches:* loam  
*Bt1 - 8 to 17 inches:* sandy clay loam  
*Bt2 - 17 to 43 inches:* sandy clay loam  
*BC - 43 to 53 inches:* sandy loam  
*C - 53 to 80 inches:* stratified sand to silt loam

##### Properties and qualities

*Slope:* 2 to 6 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 40 percent  
*Available water supply, 0 to 60 inches:* High (about 10.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 2e  
*Hydrologic Soil Group:* B  
*Ecological site:* F111XA015IN - Dry Outwash Upland, F111XB404IN - Dry  
Outwash Upland  
*Other vegetative classification:* Trees/Timber (Woody Vegetation)  
*Hydric soil rating:* No

## Minor Components

### Wawaka

*Percent of map unit:* 5 percent  
*Landform:* Till plains  
*Landform position (two-dimensional):* Shoulder  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear  
*Other vegetative classification:* Trees/Timber (Woody Vegetation)  
*Hydric soil rating:* No

### Rawson

*Percent of map unit:* 5 percent  
*Landform:* Till plains  
*Landform position (two-dimensional):* Summit, shoulder  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear  
*Ecological site:* F111XE503IN - Till Ridge  
*Other vegetative classification:* Trees/Timber (Woody Vegetation)  
*Hydric soil rating:* No

### Haney

*Percent of map unit:* 5 percent  
*Landform:* Outwash plains, glacial drainage channels  
*Landform position (two-dimensional):* Summit  
*Landform position (three-dimensional):* Interfluvium  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* F111XB404IN - Dry Outwash Upland  
*Other vegetative classification:* Trees/Timber (Woody Vegetation)  
*Hydric soil rating:* No

### Digby

*Percent of map unit:* 5 percent  
*Landform:* Outwash plains, glacial drainage channels  
*Landform position (two-dimensional):* Summit  
*Landform position (three-dimensional):* Interfluvium  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* F111XB403IN - Outwash Upland  
*Other vegetative classification:* Trees/Timber (Woody Vegetation)  
*Hydric soil rating:* No

# **Soil Information for All Uses**

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## **Soil Properties and Qualities**

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

## **Water Features**

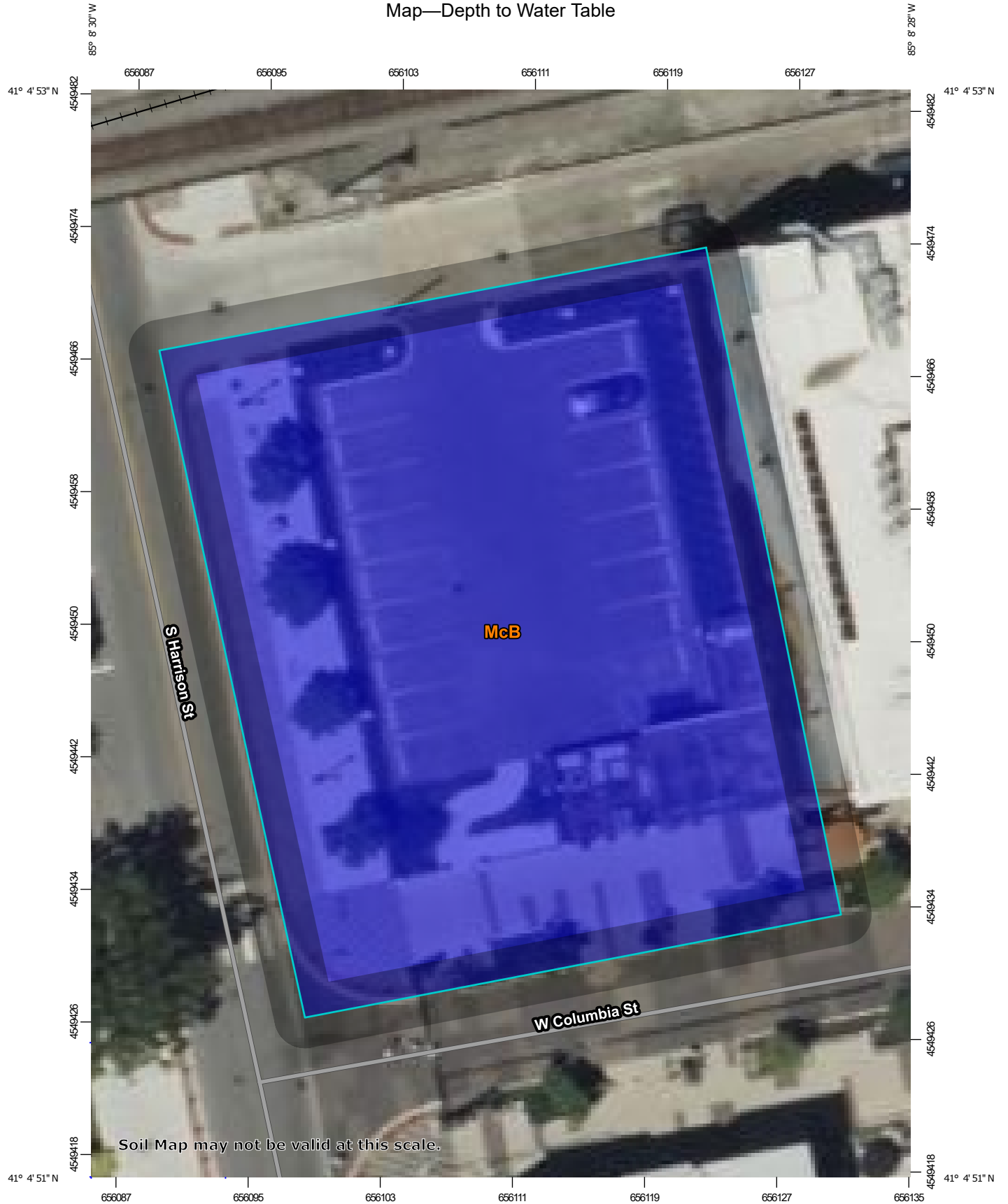
Water Features include ponding frequency, flooding frequency, and depth to water table.

## **Depth to Water Table**

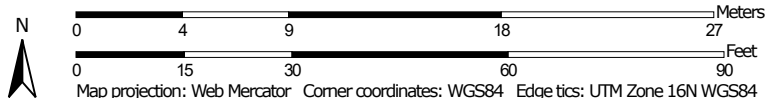
"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

# Custom Soil Resource Report Map—Depth to Water Table




Map Scale: 1:320 if printed on A portrait (8.5" x 11") sheet.












### MAP LEGEND








**Area of Interest (AOI)**  
 Area of Interest (AOI)

**Soils**







**Soil Rating Polygons**


-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

**Soil Rating Lines**






-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available


**Soil Rating Points**


-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200

**Water Features**  
 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**  
 Aerial Photography

 Not rated or not available

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Allen County, Indiana  
 Survey Area Data: Version 23, Sep 1, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 18, 2022—Jun 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Depth to Water Table**

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
McB	Martinsville loam, 2 to 6 percent slopes	>200	0.3	100.0%
<b>Totals for Area of Interest</b>			<b>0.3</b>	<b>100.0%</b>

### **Rating Options—Depth to Water Table**

*Units of Measure:* centimeters

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Lower

*Interpret Nulls as Zero:* No

*Beginning Month:* January

*Ending Month:* December

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- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

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## **SECTION 013300 - SUBMITTAL PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Where specific materials, trade names, or articles of certain manufacturers are mentioned, it is done to establish a basis of durability, efficiency, appearance and simplification of maintenance, and not for the purpose of limiting competition. Other materials or articles may be used if pre-approved by the Architect. However, the establishment of proof that said "equal" product is equal to the product specified, shall be the responsibility of the bidder, if said equality is questioned by the Architect.
- C. Related Requirements:
  - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

#### **1.3 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  - 4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled date of fabrication.
    - h. Scheduled dates for purchasing.
    - i. Scheduled dates for installation.
    - j. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Limited electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
  - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
  - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD.

- c. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
  - d. The following digital data files will be furnished for each appropriate discipline: By using the Digital files, the contractor takes the responsibility to verify existing conditions that may have changed and are not shown correctly in the digital files.
    - 1) Floor plans.
    - 2) Reflected ceiling plans.
    - 3) Site plan
    - 4) Foundation plan.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect, before being returned to Contractor.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.



1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:
  - a. Project name.
  - b. Date.
  - c. Name of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of subcontractor.
  - g. Name of supplier.
  - h. Name of manufacturer.
  - i. Submittal number or other unique identifier, including revision identifier.
    - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
  - j. Number and title of appropriate Specification Section.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  - a. Submit three copies of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
  - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
    - 1) Project name.
    - 2) Date.
    - 3) Destination (To:).
    - 4) Source (From:).
    - 5) Name and address of Architect.
    - 6) Name of Construction Manager.
    - 7) Name of Contractor.
    - 8) Name of firm or entity that prepared submittal.

- 9) Names of subcontractor, manufacturer, and supplier.
- 10) Category and type of submittal.
- 11) Submittal purpose and description.
- 12) Specification Section number and title.
- 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 14) Drawing number and detail references, as appropriate.
- 15) Indication of full or partial submittal.
- 16) Transmittal number, numbered consecutively.
- 17) Submittal and transmittal distribution record.
- 18) Remarks.
- 19) Signature of transmitter.

E. Electronic Submittals (preferred method): Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
  - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
  - a. Project name.
  - b. Date.
  - c. Name and address of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of firm or entity that prepared submittal.
  - g. Names of subcontractor, manufacturer, and supplier.
  - h. Category and type of submittal.
  - i. Submittal purpose and description.
  - j. Specification Section number and title.
  - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - l. Drawing number and detail references, as appropriate.
  - m. Location(s) where product is to be installed, as appropriate.
  - n. Related physical samples submitted directly.
  - o. Indication of full or partial submittal.
  - p. Transmittal number, numbered consecutively.

- q. Submittal and transmittal distribution record.
  - r. Other necessary identification.
  - s. Remarks.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
- 1. Submit electronic submittals via email as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return any additional copies over three.
  - 3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
  - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be

signed by an officer or other individual authorized to sign documents on behalf of that entity.

- a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
- b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
  - a. Manufacturer's catalog cuts.
  - b. Manufacturer's product specifications.
  - c. Standard color charts.
  - d. Statement of compliance with specified referenced standards.
  - e. Testing by recognized testing agency.
  - f. Application of testing agency labels and seals.
  - g. Notation of coordination requirements.
  - h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
  - a. Wiring diagrams showing factory-installed wiring.
  - b. Printed performance curves.
  - c. Operational range diagrams.
  - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
  - a. PDF electronic file.
  - b. Three paper copies of Product Data unless otherwise indicated. Architect will return any additional copies submitted that exceed the three required copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
  - a. Identification of products.
  - b. Schedules.
  - c. Compliance with specified standards.

- d. Notation of coordination requirements.
  - e. Notation of dimensions established by field measurement.
  - f. Relationship and attachment to adjoining construction clearly indicated.
  - g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches .
  3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
    - b. Three opaque copies of each submittal. Architect will retain three copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Architect will retain two sample sets; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- H. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- I. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

- J. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- K. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- L. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- M. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- N. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- O. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- P. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- Q. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- R. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.



- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

**END OF SECTION 013300**

**SUBMITTAL LOG**

Submittal #	Date Received	Description	Division #	Specification #	SAMPLES	PRODUCT DATA	SHOP DRAWINGS	# Received (E = Electronic)
		<b>03 CONCRETE</b>						
		CAST-IN PLACE CONCRETE	03	033000		X	x	
		GYPSUM CEMENT UNDERLAYMENT	03	035413		x		
		<b>04 MASONRY</b>						
		UNIT MASONRY	04	042000	X	X		
		ARCHITECTURAL STONE VENEER	04	042210	X	X	x	
		<b>05 METALS</b>						
		STRUCTURAL STEEL FRAMING	05	051200			X	
		COLD-FORMED METAL FRAMING	05	054000		X	X	
		METAL FABRICATIONS	05	055000			X	
		<b>06 WOODS, PLASTICS, AND COMPSITES</b>						
		ROUGH CARPENTRY	06	061000		X		
		SHEATHING	06	061600		X		
		SHOP-FABRICATED WOOD TRUSSES	06	061753			X	
		INTERIOR ARCHITECTURAL WOODWORK	06	064023	X	X		
		<b>07 THERMAL AND MOISTURE PROTECTION</b>						
		VOLTEX BENTONITE GEOTEXTILE WATERPROOFING	07	071115		X		
		THERMAL INSULATION	07	072100		X		
		SPRAYED FOAM INSULATION	07	072110		X		
		EIFS FINISH SYSTEMS	07	072400	X	X		
		WEATHER BARRIERS	07	072500		X		
		VAPOR RETARDERS	07	072600		X		
		METAL COMPOSITE PANLES	07	074213	X	X	X	
		FIBER CEMENT SIDING	07	074646	X	X	X	
		THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING	07	075423		X	X	
		SHEET METAL FLASHING AND TRIM	07	076200	X	X		
		MANUFACTURED ROOF SPECIALTIES	07	077100		X	X	
		ROOF ACCESSORIES	07	077200		X	X	
		APPLIED FIRE PROTECTION	07	078100		X	X	
		PENETRATION FIRESTOPPING	07	078413		X	X	
		JOINT SEALANTS	07	079200	X	X		
		<b>08 OPENINGS</b>						
		HOLLOW METAL DOORS AND FRAMES	08	081113		X	X	
		TIMLEY METAL FRAMES	08	081214		X	X	
		MOLDED COMPOSITE DOORS	08	081600	X	X	X	
		ACCESS DOORS AND FRAMES	08	083113		X		
		ALUMINUM STOREFRONT SYSTEMS	08	084113	X	X	X	
		ALUMINUM WINDOWS	08	085113	X	X	X	
		DOOR HARDWARE	08	087100		X	X	
		GLAZING	08	088000	X	X	X	
		FIRE RATED GLASS	08	088170	X	X	X	
		<b>09 FINISHES</b>						
		GYPSUM BOARD SHAFT-WALL ASSEMBLIES	09	092116.23		X		
		NON-STRUCTURAL METAL FRAMING	09	092216		X		

**SUBMITTAL LOG**

Submittal #	Date Received	Description	Division #	Specification #	SAMPLES	PRODUCT DATA	SHOP DRAWINGS	# Received (E = Electronic)
		GYPSUM BOARD	09	092900		X		
		CERAMIC TILING	09	093013	X	X		
		ACOUSTICAL PANEL CEILINGS	09	095113		X		
		RESILIENT BASE AND ACCESSORIES	09	096513	X	X		
		RESILIENT SHEET FLOORING	09	096516	X	X		
		RESILIENT TILE FLOORING	09	096520	X	X		
		TILE CARPETING	09	096813	X	X		
		FIBERGLASS REINFORCED PLASTIC PANELS	09	097725	X	X		
		EXTERIOR PAINTING	09	099113	X	X		
		INTERIOR PAINTING	09	099123	X	X		
		<b>10 SPECIALTIES</b>						
		TOILET, BATH, AND LAUNDRY ACCESSORIES	10	102800		X		
		FIRE PROTECTION SPECIALTIES	10	105200		X		
		USPS-DELEVERY POSTAL SPECIALTIES	10	105500.13		X	X	
		<b>11 EQUIPMENT</b>						
		RESIDENTIAL APPLIANCES	11	113013		X		
		<b>12 FURNISHINGS</b>						
		HORIZONTAL LOUVER BLINDS	12	122113	X	X		
		RESIDENTIAL CASEWORK	12	123530	X	X	X	
		QUARTZ COUNTERTOPS	12	123661	X	X	X	
		<b>14 CONVEYING EQUIPMENT</b>						
		ELECTRIC TRACTION ELEVATORS	14	142100	X	X	X	
		TRASH CHUTE	14	149182		X	X	
		<b>21 FIRE SUPPRESSION</b>						
		FIRE SUPPRESSION	21	210100		X	x	
		FIRE SUPPORESION BOOSTER PUMP	21			X		
		<b>22 – PLUMBING</b>						
		PLUMBING FIXTURES	22			x		
		DOMESTIC WATER PIPING	22			X		
		DOMESTIC WATER PIPING SPECIALTIES	22			X		
		DOMESTIC WATER PIPING INSULATION	22			X		
		DOMESTIC WATER BOOSTER PUMPS	22			X	X	
		SANITARY WASTE PIPING	22			X		
		PLUMBING FIXTURES	22			x		
		ELECTRIC WATER HEATERS	22			x		
		<b>23 - HVAC</b>						
		SPLIT SYSTEM ELECTRIC FAN COIL UNITS	23			x		
		ELECTRIC HEAT PUMPS CONDENSING UNITS	23			x		
		PACKAGED ROOF TOP UNITS	23			x	x	
		EXHAUST FANS	23			x		
		ELECTRIC UNIT HEATERS	23			x		
		REGISTERS, GRILLES AND DIFFUERS	23			x		

**SUBMITTAL LOG**

Submittal #	Date Received	Description	Division #	Specification #	SAMPLES	PRODUCT DATA	SHOP DRAWINGS	# Received (E = Electronic)
		<b>26 - ELECTRICAL</b>						
		LOW VOLTAGE POWER CONDUCTORS AND CABLES	26	260519		X		
		GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	26	260526		X		
		HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	26	260529		X		
		RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	26	260533		X		
		PANELBOARDS	26	262416		X	X	
		WIRING DEVICES	26	262726		X	X	
		ENCLOSED SWITCHES AND CIRCUIT BREAKERS	26	262816		X	X	
		INTERIOR LIGHTING	26	265100		X		
		EXTERIOR LIGHTING	26	265600		X		
		<b>26 - ELECTRONIC SAFETY AND SECURITY</b>						
		ADRESSIBLE FIRE ALARM SYSTEMS	28			X	X	

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Extent of concrete work is shown in Drawings

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

#### 1.4 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For each product type.
- C. Design Mixtures: For each concrete mixture submit mix designs prepared in accordance with ACI 301. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Include the following items with each mix design submitted:
    - a. Mixture identification.
    - b. Intended use of the mix
    - c. Minimum 28-day compressive strength.
    - d. Durability exposure class.
    - e. Maximum w/cm.
    - f. Slump limit.

- g. Air content.
    - h. Nominal maximum aggregate size.
    - i. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
    - j. Intended placement method.
    - k. History of performance of the mix
  
  - D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
    - 1. Sections shall be provided to clearly show bar positions and clearances to forms.
    - 2. On wall sections indicate spacers used to maintain clearances.
    - 3. Shop drawings shall include all details, sections, and installation instructions indicated on the structural drawings that are required by the contractor to place the reinforcement without using the structural drawings.
    - 4. Reinforcement grades shall be indicated on each shop drawing.
  
  - E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
    - 1. Location of construction joints is subject to approval of the Engineer.
  
  - F. Concrete Schedule: For each location of each concrete mix indicated in "Concrete Mixtures" Article, including the following:
    - 1. Location within Project.
    - 2. Exposure Class designation.
    - 3. Formed Surface Finish designation and final finish.
    - 4. Final finish for floors.
    - 5. Curing process.
    - 6. Floor treatment if any.
  
  - G. Concrete curing methods and materials
  
  - H. Cold weather placement procedures
  
  - I. Wet weather protection procedures
  
  - J. Hot weather placement procedures
  
  - K. Prior to making structural repairs, patching materials and method of application
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data.

- B. Welding Certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Fiber reinforcement.
  - 4. Form materials and form-release agents.
  - 5. Steel reinforcement and accessories.
  - 6. Waterstops.
  - 7. Curing compounds.
  - 8. Floor and slab treatments.
  - 9. Bonding agents.
  - 10. Adhesives.
  - 11. Vapor barriers.
  - 12. Semirigid joint filler.
  - 13. Joint-filler strips.
  - 14. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Portland cement.
  - 2. Fly ash.
  - 3. Slag cement.
  - 4. Blended hydraulic cement.
  - 5. Silica fume.
  - 6. Performance-based hydraulic cement.
  - 7. Aggregates.
  - 8. Admixtures:
    - a. Admixture compatibility certification letter
    - b. Admixture Manufacturer's "Product Data Sheets"
    - c. Admixture Manufacturer's certification of conformance with appropriate ASTM standards
- E. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.
- F. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.
  - 1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
    - 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
  - C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
    - 1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
  - D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
    - 1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.
  - E. Admixtures shall be from a single manufacturer, where possible. If multiple manufacturers are required each shall submit a letter certifying compatibility with all ingredients in the proposed mix designs.
  - F. If the Contractor is concerned about the workability and finish-ability of the design concrete mixes, the Contractor may produce a test batch of concrete using the intended mix design. The test batch may be used to pour a portion of the slab on grade where the Contractor can review the workability and finish-ability of the design concrete mix.
  - G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."
  - H. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
    - 1. ACI 301, "Specifications for Structural Concrete,"
    - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Comply with ASTM C94 and ACI 301.
  - B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.



- C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## 1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
  - 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 3. Do not use frozen materials or materials containing ice or snow.
  - 4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
  - 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
  - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

### 2.2 FORM-FACING MATERIALS

- A. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
- B. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
  - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.

- b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
  - c. Structural 1, B-B or better; mill oiled and edge sealed.
  - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum (or as indicated on Drawings).
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
- 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bar (where bars are to be welded to structural steel): ASTM A 706, deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

## 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports

from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  2. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
- C. Mechanical splices, as indicated on the Drawings, shall develop in tension at least 125 percent of the specified yield strength.

## 2.5 CONCRETE MATERIALS

### A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

### B. Cementitious Materials:

1. Portland Cement: ASTM C150, Type I, or ASTM C595, Type 1L, or unless otherwise acceptable to Engineer.
2. Fly Ash: ASTM C618, Class C or F.
  - a. Fly ash shall not alter specified levels of air entrainment nor reduce strength requirements for any mix
3. Slag Cement: ASTM C989, Grade 100 or 120.
4. Silica Fume: ASTM C1240 amorphous silica.

### C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Aggregates shall have a total water soluble chloride ion content below 0.02 percent by weight of aggregate, unless a higher limit is approved by Engineer by adding corrosion inhibitor to mixture to offset additional chloride ion.
4. For exterior exposed surfaces, do not use fine or coarse aggregate containing spalling-causing deleterious substances.
5. Local aggregates not complying with ASTM C 33, but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to Engineer.

### D. Water and Water Used to Make Ice: ASTM C 94, Clean, free of oil, acids, alkalis, and organic matter, and potable.

## 2.6 ADMIXTURES

- A. Admixtures shall be used to provide proper workability, finish-ability, and setting times at low water-cement ratios and to increase compressive strength, of concrete as approved by Engineer. However cement content shall not be reduced.
- B. Use approved admixtures and dosage rates as necessary unless indicated otherwise on the Contract Drawings. Follow Manufacturer's recommendations. Admixtures shall be added at separate intervals or locations of the mix cycle.
- C. Prohibited Admixtures include: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions by weight of cement.
- D. Specific admixtures are to be selected by the Admixture Representative and subject to the approval of Engineer.
- E. Air-Entraining Admixture: ASTM C260.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C494, Type A.
  - 2. Retarding Admixture: ASTM C494, Type B.
  - 3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
  - 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

## 2.7 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured half-circle, rectangular, or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete.
  - 1. Elements with 2 layers of reinforcing (8" minimum thickness): 3/4" by 1".
  - 2. Elements with 1 layer of reinforcing (6" minimum thickness): 3/4" by 3/8".
  - 3. When specifically called out on the Drawings use size indicated on the Drawings.
  - 4. Follow manufacturer's edge distance requirements.

## 2.8 VAPOR BARRIERS

- A. Sheet Vapor Barriers: Provide vapor barrier under slabs-on-grade unless otherwise noted. Provide a polyethylene sheet not less than 15 mils thick which is resistant to decay when tested in accordance with ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
- D. Curing Paper: Eight-foot-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- E. Water: Potable or complying with ASTM C1602.
- F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- G. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## 2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips:
  - 1. ASTM D1751, asphalt-saturated cellulosic fiber.
  - 2. ASTM D4819, Type II, closed cell.
- B. Self-Leveling Sealant: Multi-component self-leveling polyurethane sealant, ASTM C920, Type M, Grade P, Class 25
  - 1. BASF MasterSeal SL2 or approved equal.
- C. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Floor Slab Protective Covering: Eight-foot-wide cellulose fabric.
- F. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

- G. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch-thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

#### 2.11 GROUT

- A. Non-precision, non-shrink, non-stain, non-metallic grout in strict accordance with Manufacturer's recommendations.
  - 1. ASTM C 1107
  - 2. Color of cured grout shall match surrounding concrete color.

#### 2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Submit each proposed mix design to the Engineer at least 15 days prior to the start of Work. Do not begin concrete production until mixes have been reviewed by Engineer.
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash: 20 percent by mass
  - 2. Combined Fly Ash and Other Pozzolans: 20 percent by mass.
  - 3. Slag Cement: 50 percent by mass.
  - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 20 percent.
  - 5. Silica Fume: 10 percent by mass.
  - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 20 percent and silica fume not exceeding 10 percent.
  - 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 20 percent and silica fume not exceeding 10 percent.
  - 8. Weight of fly ash, silica fume, and GGBS additives shall be included with the weight of cement to determine water-cementitious material ratio.
- D. Chloride-Ion Concentration
  - 1. Limit water-soluble, chloride-ion content in hardened concrete to the percent by weight of cement as noted on the Drawings.
- E. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use admixtures in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).
4. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
5. Use air-entraining admixture in exposed exterior concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement as specified on the Drawings.

F. The effects of pumping shall be considered in the concrete mix design.

#### 2.13 CONCRETE MIXTURES

- A. Proportion concrete mixtures as specified on Drawings.
- B. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

#### 2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94, and furnish batch ticket information.
  1. All concrete trucks shall not have concrete build-up on drum or have worn fins. Engineer may require inspections to verify conformance to NRMCA Quality Control Manual, Section 3.
  2. Time of discharge after batching shall not exceed 90 minutes or be after drum has revolved 300 revolutions, unless otherwise approved by Engineer.
  3. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
  4. Batch ticket information shall include:
    - a. Type of aggregate
    - b. Total water content
    - c. Water withheld (if any)
    - d. Air Entrainment

- e. Slump
- f. Fly ash (if used) content per cubic yard of concrete
- g. GGBS (if used) content per cubic yard of concrete
- h. Water-cementitious material ratio
- i. Admixture(s)

B. Slump adjustment

1. Concrete mix designs without any water reducing admixtures shall have a slump as shown on Drawings.
2. ASTM C 143. Contractor will provide slump guidelines adhering to strength and water/cementitious ratio requirements. Mix design shall provide slump for concrete prior to and after addition of superplasticizers.
3. Water is not to be added at site to meet specified slump, unless specifically indicated as being withheld on batch ticket and approved by Engineer.
4. High range water reducing admixtures (superplasticizers), if added at batch plant, may be redosed at job site. Manufacturers should provide a redoseage chart for this purpose. If superplasticizers are added at batch plant, concrete delivery time, placement, and finishing procedures shall account for limited time affect. If superplasticizer is added at site after verification of initial slump, concrete shall be completely retested after proper mixing. All concrete containing superplasticizer shall have a maximum 9" slump unless otherwise approved by Engineer.

2.15 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
  2. Class B, 1/4 inch for rough-formed finished surfaces.



- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete. Use 3/4" chamfer unless otherwise indicated.
- I. Form openings, chases, offsets, recesses, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
  - 1. Daily access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
  - 4. Security and protection for test samples and for testing and inspection equipment at Project site.

### 3.3 INSTALLATION OF EMBEDDED ITEMS

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

### 3.4 REMOVING AND REUSING FORMS

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

### 3.5 INSTALLATION OF VAPOR BARRIER

- A. Sheet Vapor Barriers: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  - 1. Install vapor barrier with longest dimension parallel with direction of concrete pour.
  - 2. Face laps away from exposed direction of concrete pour.
  - 3. Lap vapor barrier over footings and grade beams not less than 6 inches, sealing vapor barrier to concrete.

4. Lap joints 12 inches and seal with manufacturer's recommended tape.
5. Terminate vapor barrier at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor barrier manufacturer's instructions.
7. Protect vapor barrier during placement of reinforcement and concrete.
  - a. Repair damaged areas by patching with vapor barrier material, overlapping damages area by 12 inches on all sides, and sealing to vapor barrier.

### 3.6 STEEL REINFORCEMENT

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

### 3.7 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Engineer.
  2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  6. Space vertical joints in walls as indicated on Drawings or approved by Engineer. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
  7. Use a bonding agent or epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Exterior Slabs: Tooled or Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Interior Slabs: Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
  4. Install elastomeric sealants when temperature is in the lower third of temperature range recommended by manufacturer for installation.
  5. Joint sealant manufacturers include:
    - a. Dow Corning Corp. (Midland, Michigan)
    - b. General Electric Co. (Waterford, N.Y.)
    - c. Trencor, Inc. (Cleveland, Ohio)
    - d. W.R. Meadows, Inc. (Elgin, Illinois)
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.

2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

### 3.8 WATERSTOPS

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

### 3.9 EXAMINATION

- A. Verification of Conditions:
  1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
  2. Do not proceed until unsatisfactory conditions have been corrected.

### 3.10 CONCRETE PLACEMENT

- A. General: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
- B. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor barrier is complete and that required inspections are completed.
  1. Immediately prior to concrete placement, inspect vapor barrier for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor barrier during concrete placement and make necessary repairs to damaged areas as Work progresses.
- C. Notify Engineer and testing and inspection agencies 48 hours prior to commencement of concrete placement.
- D. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer in writing, but not to exceed the amount indicated on the concrete delivery ticket.
  1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
  1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- F. Pump hoses shall be supported independently and not laid on reinforcement.
- G. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
  - 1. If a section cannot be placed continuously, provide construction joints as indicated.
  - 2. Deposit concrete to avoid segregation.
  - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- H. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Do not place concrete floors and slabs in a checkerboard sequence.
  - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 3. Maintain reinforcement in position on chairs during concrete placement.
  - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 5. Level concrete, cut high areas, and fill low areas.
  - 6. Slope surfaces uniformly to drains where required.
  - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  - 8. Do not further disturb slab surfaces before starting finishing operations.
- I. Grout used to prime concrete pump and pump line shall not be placed into Work.
- J. During periods of setting, no material shall be placed and no loads imposed in any manner on slabs. Plank runways for accommodation of workmen or for other traffic shall be supported by blocking.
- K. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
  4. Record air temperature no less than twice per 24 hour period.
  5. Cast expendable thermostats or thermo-couplers in concrete at a rate of at least one per 100 cubic yards of concrete placed for supported structure. Monitor internal temperature of concrete at twelve hour maximum intervals throughout the curing process.
  6. Specified non-corrosive accelerator may be used.
  7. Do not place concrete unless air temperature is at least 20° F and rising.
  8. Use evaporation retarder or water fog after finishing to assure that plastic shrinkage cracking of concrete surface does not occur.
  9. Cure shall consist of visqueen and insulated blankets placed on slab as soon as possible after concrete will support them without deformation.
  10. Do not wet cure concrete placed under cold weather conditions.
  11. Curing of supported slabs (continuous presence of visqueen and blankets) shall be maintained no less than 10 days.
  12. Measures will be required to ensure that the formwork and concrete do not freeze during the curing process.
- L. Hot-Weather Placement: Comply with ACI 305 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
  3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
  4. Protect flatwork during finishing operations as follows:
    - a. Immediately following screeding, apply an evaporator retarding agent in accordance with recommendations of Manufacturer. Additional applications of evaporation retarding agent may be required.
    - b. Continuously fog spray air above slab between finishing operations.
    - c. Cover concrete with an approved moisture-retaining cover as soon as concrete will support it without deformation. Keep mats constantly wet for 7 days minimum. Leave mats in place for 3 additional days after discontinuing wetting process.

### 3.11 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-2.0 (rough form finish): As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/4 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class B.
  - e. Locations: Apply to concrete surfaces not exposed to public view and bottom of concrete slabs.
2. ACI 301 Surface Finish SF-3.0 (smooth form finish):
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/8 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class A.
  - e. Locations: Apply to concrete surfaces to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

#### B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings.

##### 1. Smooth-Rubbed Finish:

- a. Perform no later than one day after form removal.
- b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
- c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
- d. Maintain required patterns or variances as approved by Architect.

#### C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.12 FINISHING FLOORS AND SLABS

- #### A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.



- B. Float Finish:
1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
  2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
  3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- C. Trowel Finish:
1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
  2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
  3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  4. Do not add water to concrete surface.
  5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
  6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system or as noted on the Drawings.
  7. Finish surfaces, in accordance with ASTM E1155, for a randomly trafficked floor surface as noted on the Drawings.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
1. Coordinate required final finish with Architect before application.
  2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  2. Coordinate required final finish with Architect before application.
- F. Finish all concrete slabs to proper elevations to ensure that all surface moisture will drain freely to floor drains (if applicable) that no puddle areas exist. Contractor shall bear cost of any corrections to provide for positive drainage.
- G. Finishing of concrete slabs:

1. Finish concrete using procedure to preclude plastic and drying shrinkage cracking. Note the use of low water/cementitious ratio concrete and GGBS will essentially eliminate bleed water.
2. Fog misting air above flat work is recommended. Free standing water is not allowed. No spraying of water directly on flat work will be allowed.
3. Fog misting is not to be used to apply water to surface of concrete to facilitate lubrication for finishing purposes.
4. Fog misting is required when conditions of hot weather concrete exist per "Hot Weather Concreting" as specified herein. Fogging shall continue after finishing operation until moisture retaining cover is placed over concrete.

### 3.13 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

#### A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

#### B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

#### C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
4. For supported equipment, install anchor bolts per equipment supplier requirements.
5. Prior to pouring concrete, place and secure anchorage devices.
  - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - b. Cast anchor-bolt insert into bases.
  - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

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

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

#### E. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

### 3.14 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
  - 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
  - 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
  - 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.
  
- B. Additional precautions may need to be taken to prevent excessive slab moisture loss in plastic shrinkage when any combination of air temperature, concrete temperature, relative humidity, and/or wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square foot per hour as determined by ACI 308.
  
- C. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
  - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
  - 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
  - 3. If forms remain during curing period, moist cure after loosening forms.
  - 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
    - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
      - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
      - 2) Maintain continuity of coating and repair damage during curing period.
  
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
  
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to exterior slabs and curbs in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
- F. Curing methods shall be compatible with slab finishes to be applied at a later date. Verify with floor finish and Architect prior to use.
- 3.15 TOLERANCES
- A. Conform to ACI 117.
- 3.16 JOINT FILLING
- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

### 3.17 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
  1. Repair and patch defective areas when approved by Architect.
  2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
    - a. Limit cut depth to 3/4 inch.
    - b. Make edges of cuts perpendicular to concrete surface.
    - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    - d. Fill and compact with patching mortar before bonding agent has dried.
    - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
    - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
  - a. Correct low and high areas.
  - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
  - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
  - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  - b. Feather edges to match adjacent floor elevations.
6. Correct other low areas scheduled to remain exposed with repair topping.
  - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
  - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
  - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
  - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
  - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
  - d. Place, compact, and finish to blend with adjacent finished concrete.
  - e. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
  - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.

- b. Dampen cleaned concrete surfaces and apply bonding agent.
  - c. Place patching mortar before bonding agent has dried.
  - d. Compact patching mortar and finish to match adjacent concrete.
  - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

### 3.18 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Contractor will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
  - 2. Testing agency shall immediately report to Engineer, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Engineer, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports shall include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.
      - 6) Date and time of concrete placement.
      - 7) Location in Work of concrete represented by samples.
      - 8) Date and time sample was obtained.
      - 9) Truck and batch ticket numbers.
      - 10) Design compressive strength at 28 days.
      - 11) Concrete mixture designation, proportions, and materials.
      - 12) Field test results.
      - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.

14) Type of fracture and compressive break strengths, listing age of cylinder.

- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
1. Pile Caps
    - a. The inspector must be present full time during the entire placement of the first pile cap concrete pour and then must be present at the start of 100% of all other concrete pours.
    - b. Verify cap dimensions.
    - c. Verify cap reinforcement prior to placement of cap concrete.
    - d. Verify anchor rods and/or dowels are installed with the proper embedment and projection lengths.
    - e. Verify proper engagement of piles into pile cap prior to placement of cap concrete.
  2. Shallow Foundations
    - a. The inspector must be present full time during the entire placement of the first shallow foundation concrete pour and then must be present at the start of 100% of other concrete pours.
    - b. Verify approval of the footing subgrade prior to placement of foundation concrete.
    - c. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
    - d. For earth-formed foundations, verify that earth forms are sufficiently uniform to allow for proper dimensions and required concrete cover over reinforcement.
    - e. Verify foundation dimensions.
    - f. Verify anchor rods and/or dowels are installed with the embedment and projected lengths and in accordance with the contract documents.
    - g. Verify foundation reinforcement prior to placement of concrete.
    - h. Verify concrete placement as outlined in this specification.
  3. Foundation Walls, Piers, and Pits
    - a. The inspector must be present full time during the entire placement of the first concrete pour and then must be present at the start of 100% of other concrete pours.
    - b. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
    - c. Verify dimensions.
    - d. Verify anchor rods and/or dowels are installed with the embedment and projected lengths and in accordance with the contract documents.
    - e. Verify reinforcement prior to placement of concrete.
    - f. Verify water stops are properly installed and anchored into position prior to placement of concrete.



- g. Verify that foundation and pit walls with uneven backfill conditions are not backfilled until floor construction at top of wall is complete or temporary bracing is provided in accordance with the contract documents.
  - h. Verify concrete placement as outlined in this specification.
4. Slabs-on-Grade
- a. The inspector must be present full time during the entire placement of the first slab-on-grade concrete pour and then must be present at the start of 100% of all other concrete pours.
  - b. Observe subgrade preparation including backfilling, compaction, and performance of compaction tests by the testing laboratory prior to concrete placement.
  - c. Note any alteration and subsequent replacement of subgrade materials required by other trades.
  - d. Verify that required moisture retarder or vapor barrier is lapped properly, and is not torn or punctured.
  - e. Observe that formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.
  - f. Observe placement of screeds to obtain proper level and thickness of slabs. observe location of slab depressions and steps in slab while maintaining required slab thickness.
  - g. Observe location of slab depressions and steps in slab while maintaining required slab thickness.
  - h. Verify the pour area is free of standing water and other debris.
  - i. Verify placement of reinforcement and observe concreting operations as outlined in this inspection plan.
  - j. Check that the location and type of slab control joints and construction joints conform to the contract documents.
  - k. Verify that sawcut control joints on slab-on-grades are cut within 12 hours of placement.
  - l. Verify that flatness and levelness measurements are performed as required.
  - m. Verify concrete placement methods, including conveying and depositing.
  - n. Verify concrete curing procedures and maintenance of curing temperature.
  - o. Verification of concrete strength before removal of shores and forms for beams and slabs.
  - p. Verify concrete placement as outlined in this specification.
5. Reinforcing Steel
- a. Verify that reinforcement surfaces are free of excess rust or other coatings that may adversely affect bonding capacity. If oiling of forms is required, verify that it is applied before reinforcing is placed.
  - b. Verify all reinforcing bars for compliance with contract documents and approved shop drawings as follows:
    - 1) Material Grade,
    - 2) Reinforcement size,
    - 3) Quantity, spacing, and layering,
    - 4) Proper hook type and location.
    - 5) Splice locations and required length of lap.

- 6) Proper clearance and cover requirements from concrete surfaces.
  - 7) Sufficient spacing between reinforcement for concrete placement.
  - 8) Verify that unscheduled/additional reinforcing bars shown on plan, in details, or specified in notes are provided and are in compliance with contract documents and approved shop drawings.
  - 9) Mechanical splices:
    - a) Provide visual inspection of 100% of the mechanical splices (tension and/or compression) on the project.
    - b) Verify compliance with specifications and conformance with the manufacturer's recommendations for installation.
    - c) Verify that the manufacturer is present for the first installation of each type of splice on the project.
  - 10) Verify that welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.
  - 11) Inspect headed stud shear reinforcement to ensure that it conforms to the project requirements:
    - a) Review type and spacing.
    - b) Verify that reinforcing is adequately supported to resist displacement or shifting during concrete placement.
    - c) Verify welding of reinforcement is performed according to AWS requirements and that it is inspected by the testing laboratory.
6. Concrete Placement
- a. Verify that debris and foreign materials have been removed before concrete is placed.
  - b. Verify that quality control testing is provided in accordance with the project requirements.
  - c. Verify the following with regard to the testing laboratory:
    - 1) Verify contractor is coordinating with testing agency to allow testing technician to be available to make tests as required.
    - 2) Verify slump is measured at the point of placement.
    - 3) Verify concrete test cylinders are taken in accordance with the contract documents.
  - d. Periodically inspect concrete upon arrival to verify the following:
    - 1) Proper concrete mix number, type of concrete, and concrete strength for the placement location.
    - 2) Verify that the concrete is not over 90 minutes old at the time of placement.
  - e. Obtain a copy of all concrete delivery tickets.
  - f. Verify that hot-weather or cold-weather techniques are being applied as required.
  - g. Verify that concrete being deposited is uniform, that the vertical drop does not exceed six feet, and that concrete is not permitted to drop freely over reinforcement causing segregation.
  - h. Verify that the concrete is properly vibrated.
  - i. Verify that embedded items and reinforcing steel are not adversely altered during placement. Note if anything was displaced or otherwise altered during placement.

- j. Verify that there are no cold joints within the area of the pour.
  - k. Verify that the curing process is as specified in the contract documents and that any curing compound used is applied in accordance with manufacturer's printed application instructions.
7. Construction Joints
- a. Verify the location of vertical and horizontal construction joints for compliance with the construction joint location plan submitted by the contractor to engineer of record.
  - b. Verify that reinforcement, dowels, keys, and bulkheads at construction joints are in conformance with the contract documents.
  - c. Embedded items:
    - 1) Verify that conduits placed in the concrete are reasonably spaced to ensure structural integrity and comply with the requirements of the contract documents. Verify conduit placement allows for proper concrete cover of the reinforcement.
    - 2) Review load carrying embedded items as placed for compliance with the contract documents. Relocation of embedded items in conflict with reinforcing shall not be permitted without the prior approval of the engineer of record.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 shall be performed in accordance with the following requirements:
- 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 100 cu. yd. or fraction thereof.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C143:
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    - b. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C231 pressure method, for normal-weight concrete.
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 4. Concrete Temperature: ASTM C1064:
    - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
  - 5. Compression Test Specimens: ASTM C31:

- a. Cast and laboratory cure five standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39.
    - a. Test one laboratory-cured specimen at seven days and three specimens at 28 days. Reserve the fifth specimen as a space for testing at the discretion of the Engineer as needed.
    - b. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.
  7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
    - a. Test results shall be reported in writing to Structural Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for all tests performed
  8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  9. Additional Tests:
    - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
    - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Engineer.
      - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
  10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.19 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

## SECTION 035413 - GYPSUM CEMENT UNDERLAYMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. Gypsum-cement-based, underlayment for application below interior floor coverings.
2. Acoustical underlayment for gypsum based underlayment's.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product certificates and assembly fire ratings.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.
- C. Fire-Resistance Ratings: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- D. All materials, unless otherwise indicated, shall be manufactured by Maxxon Corporation and shall be installed in accordance with its current printed directions and by a Maxxon Corporation Authorized Applicator.
- E. Underlayment mix shall be tested for a slump using a 2" (i.d.) x 4" (50 mm x 101 mm) cylinder resulting in a patty size of 9" (229 mm) plus or minus 1 inch (25 mm) diameter.
- F. Compressive strength tested in accordance with ASTM C472M.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
  - 1. Place gypsum-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

PART 2 - PRODUCTS

2.1 GYPSUM-CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Gypsum-cement-based, self-leveling product that can be feathered at edges to match adjacent floor elevations.
  - 1. Products: Subject to compliance with requirements, provide the following:
    - a. Basis-of-Design: Maxxon Corporation; Gyp-Crete 2000 Multifamily
      - 1) Thickness: 1"
    - 2. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C 219.
    - 3. Compressive Strength: Not less than 2000 psi (13.8 MPa) at 28 days when tested according to ASTM C 109/C 109M.
    - 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: As recommended by underlayment manufacturer.
  - 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- D. Reinforcement: Not Required
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
  - 1. Material Standard: Comply with specifications outlined in manufacturer's Design and Installation Guide for wood.

- F. Sealer: To be provided by flooring installer as required for each type of finished flooring specified.

## 2.2 ACOUSTICAL SOUND CONTROL UNDERLAYMENT

- A. Underlayment: entangled polymeric filament mat.
  - 1. Products: Subject to compliance with requirements, provide the following:
    - a. Basis-of-Design: Maxxon Corporation; Acousti-Mat .
    - b. Thickness: 1/8-inch.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prior to underlayment installation Construction manager shall perform flatness inspections on 4-6 locations randomly selected throughout the project are to verify that substrate receiving gypsum underlayment falls within the flatness requirements of the finish underlayment product as specified within section 3.2.C below.
- B. General: Prepare and clean substrate according to manufacturer's written instructions.
  - 1. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment.
  - 2. Fill substrate voids to prevent underlayment from leaking.
- C. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

### 3.2 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
  - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
  - 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.



3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
  1. Apply a final layer without aggregate to product surface.
  2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack bond with substrate, including areas that emit a "hollow" sound when tapped.
- G. Protect construction lower floor levels from damage during installation of underlayment.
- H. Sealing: Sealer to be provided by flooring installer as required for each type of finished flooring specified.

### 3.3 FIELD QUALITY CONTROL

- A. Slump Test: Underlayment mix shall be tested for slump as it's being pumped using a 2-inch by 4-inch (50 mm by 101 mm) cylinder resulting in a patty size of 8 inches (203 mm) plus or minus 1 inch (25 mm) diameter.
- B. Field Samples: At least one set of 3 molded cube samples shall be taken from each day's pour during the underlayment application. Cubes shall be tested as recommended by the manufacturer in accordance with modified ASTM C 472. Test results shall be available to architect and/or contractor upon request from applicator.

### 3.4 PROTECTION

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

END OF SECTION 035413

## SECTION 042000 - UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Face brick (Brick Veneer).

#### 1.2 Related Sections

- A. Section 042210 – Architectural Stone Veneer.
- B. Section 047200 – Cast Stone Veneer
- C. Section 079200 – Sealant Joints

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

#### 1.4 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- B. Mock-Ups: Provide full-size units for use in construction of mock-ups. See Mockup elevation on drawings for more info. Approved mock-ups shall become the standard for appearance and workmanship for project.
  - 1. Mock-ups shall **not** remain as part of the completed Work. At Architect's direction, demolish mock-ups and remove debris.

#### 1.5 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## PART 2 - PRODUCTS

### 2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

### 2.2 CONCRETE MASONRY UNITS

- A. Note used

### 2.3 FACE BRICK

- A. General: Provide shapes indicated and as follows:
  - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
  - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Face Brick: Facing brick complying with ASTM C 216.
  - 1. The project is scheduled to receive (3) colors of brick veneer.
    - a. Mas-01: See drawings for Brick Basis of design.
    - b. Mas-02: See drawings for Brick Basis of design.
    - c. Mas-02: See drawings for Brick Basis of design.
  - 2. Approved manufacturers:
    - a. Acme Brick Co (Fort Worth, Texas)
    - b. Belden Brick Co (Canton, Ohio)
    - c. Endicott Clay Products Co (Fairbury, Nebraska)
    - d. Glen-Gery Corp (Wyomissing, Pennsylvania)
    - e. Sioux City Brick (Sioux City, Iowa)

3. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
5. Standard Modular Brick (Actual Dimensions): 7 5/8" x 2 1/4" x 3 5/8".

#### 2.4 MORTAR AND GROUT MATERIALS

- A. 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.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- F. Mortar Colors: Architect to select from manufacturer's full color range. (See drawings for basis of design mortar colors.)
- G. Colored Cement (as applicable): Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
- H. Aggregate for Mortar: ASTM C 144.
  1. White-Mortar Aggregates: Natural white sand or crushed white stone.
  2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- I. Aggregate for Grout: ASTM C 404.
- A. Cold-Weather Admixture: Cold-Weather Admixtures are not permitted.
- B. Water: Potable.

#### 2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
  - 1. Interior Walls: Hot-dip galvanized, carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
  - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
  - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
  - 5. Wire Size for Veneer Ties: 0.148-inch (3.77-mm) diameter.
  - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
  - 7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

## 2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
  - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
  - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.
- C. Adjustable Masonry-Veneer Anchors:
  - 1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
    - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
    - b. Basis of Design: DW-10HS Veneer Anchor; HB, Inc. , Hauppauge, NY 11788, (631) 234-0600, [www.h-b.com](http://www.h-b.com)
      - 1) Hot-dipped galvanized, 12 ga.
      - 2) Tie lengths to vary based upon air space. See drawings.
- D. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

## 2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual", Section 076200 "Sheet Metal Flashing and Trim" and as follows:
1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
    - a. Drip edges to be provided at through wall flashing at grade ONLY. See drawings
  2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
  2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use the following unless otherwise indicated:
1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.

- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  - 1. Basis of Design: Mortar Net Solutions<sup>®</sup>, 326 Melton Road, Burns Harbor, IN 46304, (800)664-6638, www.MortarNet.com
  - 2. Provide the following configurations:
    - a. Strips, full-depth of cavity and min 12 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep.

## 2.9 MASONRY CLEANERS

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

## 2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  - 1. For masonry below grade or in contact with earth, use Type M.
  - 2. For reinforced masonry, use Type S.
  - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
  - 1. Pigments shall not exceed 10 percent of portland cement by weight.
  - 2. Pigments shall not exceed 5 percent of masonry cement by weight.
  - 3. Application: Use pigmented mortar for exposed mortar joints.

- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
- F. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. 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.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

#### 3.2 TOLERANCES

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
  - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
  - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
  - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
  - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
  - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.



4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

### 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
  - 2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

### 3.6 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
  - 2. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
  - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 4. Space anchors as indicated, but not more than 32 inches (406 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

### 3.7 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. 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. Install vents at

shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
  - a. Install metal drip edges beneath flexible flashing at exterior face of wall at through wall flashing at grade only. See drawings .
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep vents in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

### 3.8 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

### 3.9 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
  1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

**END OF SECTION 042000**

## SECTION 04 22 00 - CONCRETE UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

#### 1.2 DEFINITIONS

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

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

#### 1.4 INFORMATIONAL SUBMITTALS

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

#### 1.5 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by

frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

### 2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. CMUs: ASTM C90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
  - 2. Density Classification: Normal weight.
- C. Concrete Building Brick: ASTM C55.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
  - 2. Density Classification: Normal weight.

## 2.3 CONCRETE LINTELS

- A. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

## 2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, 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.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Masonry Cement: ASTM C91/C91M.
- D. Aggregate for Mortar: ASTM C144.
  - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C404.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- G. Water: Potable.

## 2.5 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

## 2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
  - 2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.

3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

## 2.7 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. For reinforced masonry, use portland cement-lime or masonry cement mortar.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type M.

2. For reinforced masonry, use Type S.

3. For mortar parge coats, use Type S or Type N.

4. For interior nonload-bearing partitions, Type N.

C. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

2. Proportion grout in accordance with ASTM C476, Table 1 for specified 28-day compressive strength indicated, but not less than 2000 psi.

3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.



### 3.2 TOLERANCES

#### A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

#### B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

#### C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

### 3.5 REINFORCED UNIT MASONRY

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

### 3.6 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
  - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

### 3.7 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
  - 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

### 3.8 MASONRY WASTE DISPOSAL

- A. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

## **SECTION 04 22 10 - ARCHITECTURAL STONE VENEER**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Architectural Stone Veneer

#### **1.2 RELATED SECTIONS**

- C. Section 042000 – Unit Masonry.
- D. Section 047200 – Cast Stone Veneer
- F. Section 079200 – Sealant Joints

#### **1.3 REFERENCES**

- A. ASTM A 615/A 615M - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- B. ASTM A767/A767M - Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
- C. ASTM C 33 - Concrete Aggregates.
- D. ASTM C 90 - Loadbearing Concrete Masonry Units.
- E. ASTM C 140 - Sampling and Testing Concrete Masonry Units and Related Units.
- F. ASTM C 150 - Portland Cement.
- G. ASTM C 270 - Mortar for Unit Masonry.
- H. ASTM C 426 - Linear Drying Shrinkage of Concrete Masonry Units.
- I. ASTM C 494 - Chemical Admixtures for Concrete.
- J. ASTM C 666 - Resistance of Concrete to Rapid Freezing and Thawing.
- K. ASTM C 979 - Pigments for Integrally Colored Concrete.
- L. ACI 530 "Building Code Requirements for Masonry Structures"

#### **1.4 DEFINITIONS**

- A. Architectural Stone Veneer (RockCast's Architectural Masonry Veneer Series): An architectural stone unit manufactured to copy fine grain texture and color of natural cut stone. Meets ASTM C 90 requirements.

- B. Dry Cast Concrete Products: Manufactured from zero-slump concrete.
- C. Machine Casting Method: Vibratory compaction by machine of earth-moist, zero-slump concrete against rigid mold until it is densely compacted.

### 1.5 SUBMITTALS

- B. Product Data: Submit manufacturer's product data.
- C. Shop Drawings: Submit manufacturer's shop drawings, including profiles, cross sections, modular unit lengths, reinforcement (if required), exposed faces, anchors and anchoring method recommendations (if required), and annotation of architectural stone units, types and location.
- D. Samples: Submit pieces of manufacturer's architectural stone units that represent general range of texture and color proposed to be furnished for project.
- E. Test Results:
  - 1. Submit manufacturer's test results from architectural stone units previously made by manufacturer using materials from same sources proposed for use in project.
- F. Manufacturer's Project References: Submit list of projects similar in scope, including project name and location, name of architect, and type and quantity of architectural stone units installed.
- G. Warranty: Submit manufacturer's standard warranty.

### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Sufficient plant facilities to provide quality, shapes, quantities, and sizes of architectural stone units required without delaying progress of the Work.
  - 2. Minimum of 15 years experience in producing masonry units.
  - 3. Custom Cast Stone Series and Architectural Masonry Veneer Series are to be manufactured from a similar mix design to match color and texture.
- B. Mock-Ups: Provide full-size architectural stone units for use in construction of mock-ups. See Mockup elevation on drawings for more info. Approved mock-ups shall become the standard for appearance and workmanship for project.
  - 1. Mock-ups shall not remain as part of the completed Work. At Architect's direction, demolish mock-ups and remove debris.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
  - 1. Deliver architectural stone units secured to shipping pallets and protected from damage and discoloration.
  - 2. Provide itemized shipping list.
  - 3. Number each piece individually, as required, to match shop drawings and schedules.

- B. Storage:
  - 1. Store architectural stone units and installation materials in accordance with manufacturer's instructions.
  - 2. Store architectural stone units on pallets with nonstaining, waterproof covers.
  - 3. Do not double stack pallets.
  - 4. Ventilate units under covers to prevent condensation.
  - 5. Prevent contact with dirt and splashing.
  
- C. Handling:
  - 1. Protect architectural stone units, including corners and edges, during storage, handling, and installation to prevent chipping, cracking, staining, or other damage.
  - 2. Handle long units at center and both ends simultaneously to prevent cracking.
  - 3. Do not use pry bars or other equipment in a manner that could damage units.

## 1.8 SCHEDULING

- A. Schedule and coordinate production and delivery of architectural stone units with unit masonry work.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Reading Rock, Inc., 4600 Devitt Drive, Cincinnati, Ohio 45246  
Phone (800) 482-6466 Fax (513) 874-2361  
Web Site [www.readingrock.com](http://www.readingrock.com) e-mail [info@readingrock.com](mailto:info@readingrock.com)  
Contact: Marty Sweeney, 513-260-8683, [sweeneym@readingrock.com](mailto:sweeneym@readingrock.com)
- B. Continental Select Stone. Continental Cast stone Manufacturing INC.
- C. Or equal as approved by architect

### 2.3 ARCHITECTURAL STONE VENEER (ARCHITECTURAL MASONRY VENEER SERIES)

- A. Architectural Stone Veneer: RockCast's Architectural Masonry Veneer Series.
- B. Compliance: ASTM C 90.
- C. Casting Method: Machine.
- D. Texture: [Smooth]
- D. Color:
  - A. CS-01 [Olive Buff] In locations noted on drawings.
- F. Units: Profiles A, B, C, D, E, F, G. as indicated on drawings in Cast Stone profile Legend.
- G. Test Results:

1. Compressive Strength, ASTM C 140: Typical RockCast's Architectural Masonry Veneer Series compressive strength range is 3,000 - 5,000 psi at 28 days.
  2. Absorption, ASTM C 140: Typically less than 6 percent at 28 days.
  3. Linear Shrinkage, ASTM C 426: Maximum .065 percent.
  4. Density, ASTM C 140: Typically greater than 120 pounds per cubic foot.
- H. Curing: Cure in enclosed chamber at 95 percent relative humidity and 95 to 120 degrees F for 12 to 18 hours and yard cure for 350 degree-days.

#### **2.4 ARCHITECTURAL STONE VENEER MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or III. White and/or gray as required to match specified color.
- B. Coarse Aggregates: ASTM C 33, except for gradation. Granite, quartz, or limestone.
- C. Fine Aggregates: ASTM C 33, except for gradation. Manufactured or natural sands.
- D. Pigments: ASTM C 979, except do not use carbon black pigments. Inorganic iron oxide pigments.
- E. Water Reducing, Retarding, and Accelerating Admixtures: ASTM C 494.
- F. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
- G. Water: Potable.

#### **2.5 TEXTURE AND COLOR**

- A. General: Match texture and color of full-size sample on file with Architect.
- B. Texture of Surfaces Exposed to View:
  1. Fine-grained texture similar to natural stone and architectural stone units.
  2. Approximately equal to approved sample when viewed in direct daylight at 10 feet.
- C. Surface Air Voids:
  1. Size: Maximum 1/32 inch.
  2. Density: Less than 3 occurrences per any 1 square inch.
  3. Viewing Conditions: Not obvious under direct daylight at 10 feet.
- D. Finish:
  1. Minor chipping resulting from shipping and delivery shall not be grounds for rejection of units.
  2. Minor chips shall not be obvious under direct daylight at 20 feet, as determined by Architect.
  3. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.
- E. Color Variation:
  1. Viewing Conditions: Compare in direct daylight at 10 feet, between units of similar age, subjected to similar weathering conditions.

## 2.6 MORTAR

- A. Mortar: [ASTM C 270, Type N] [As specified in Section 04060] [As specified in Section 04200] [As specified in Section 04220].
- B. Mortar Materials: [As specified in Section 04060] [As specified in Section 04200] [As specified in Section 04220].

## 2.7 ACCESSORIES

- A. Anchors: Non-corrosive type, sized for conditions. [Hot-dip galvanized steel]
- B. Sealant: As specified in Section 079200 joint sealants.
- C. Cleaner: Prosoco Sure Klean Custom Masonry Cleaner, Prosoco Sure Klean 600 Detergent Prosoco Sure Klean Vana Trol, Prosoco Light Duty Cleaner \* or EaCo Chem NMD-80. If EaCo Chem NMD-80 is used follow their application process.

## 2.8 FABRICATION

- A. Shapes: As indicated in Cast Stone Profile legend on drawings.

## 2.9 TOLERANCES

- A. General: Manufacture architectural stone units within tolerances in accordance with ASTM C 90, unless otherwise specified.
- B. Length, height, width: Do not deviate by more than plus or minus 1/8 inch from approved dimensions. These requirements do not apply to split faced units.

## 2.10 PRODUCTION QUALITY CONTROL

- A. Mix Designs: Test new and existing mix designs for applicable compressive strength and absorption compliance before manufacturing architectural stone units.
- B. Plant Production Testing: Tests to be conducted by certified laboratory testing technicians. Test from specimens selected at random from plant production in accordance with ASTM C 140.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine construction to receive architectural stone units. Notify Architect if construction is not acceptable. Do not begin installation until unacceptable conditions have been corrected.



- B. Examine architectural stone units before installation. Do not install unacceptable units.
  - 1. Waste: For various reasons due to shipping, handling or the manufacturing process, a small amount of RockCast's Architectural Masonry Veneer Series units may have blemishes or chips and should be used for field cutting for maximum material utilization. When ordering material, please allow for waste (approximately 2 to 3%) and saw cutting in your estimate.
  - 2. All RockCast products are shipped on a pallet and have one unfinished side. Textured units are to be set with the texture face forward and smooth units are stacked "face up" on the pallet.
  - 3. RockCast's Architectural Masonry Veneer Series units have an unfinished back, one finished face, and approximately 40 to 60% of the units have one smooth finished end. Architectural machine made split and chiseled faced units can be ordered with a matching finished end upon request.

### 3.2 INSTALLATION

- A. Install units in conjunction with masonry, as specified in Section 042000 Unit Masonry.
- B. Pull units from multiple cubes during installation to minimize variation in color and help with natural blending.
- C. Cut units using motor-driven masonry saws. Finished ends should be turned to the visible side and the saw cut turned to the inside of the mortar joint to hide exposed aggregates and saw marks.
- D. Do not use pry bars or other equipment in a manner that could damage units.
- E. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- F. Use Type N mortar (ASTM C 270), unless specified otherwise.
- G. Per ACI 530.1, it is not necessary, nor recommended, to wet the units prior to installation.
- H. Set units in full bed of mortar, unless otherwise indicated on the drawings.
- I. Fill vertical joints with mortar.
- J. Make joints 3/8 inch, unless otherwise indicated on the drawings.
- K. Tuck point mortar joints to slight concave profile (unless specified otherwise).
- L. Remove excess mortar immediately.
- M. Remove mortar fins and smears before tooling joints.
- N. Cover wainscot for protection with plastic, felt paper or other approved products.

- O. Cover freshly installed masonry products as required to assist with the curing process.
- P. Sealant Joints:
  - 1. As specified in Section 079200 Sealant Joints.
  - 2. Prime ends of units, insert properly sized backing rod, and install sealant.
  - 3. Provide sealant joints at following locations:
    - a. Joints at relieving angles.
    - b. Control and expansion joints.
    - c. As indicated on the drawings.

### 3.3 TOLERANCES

- A. Installation Tolerances:
  - 1. Variation from Plumb: Do not exceed 1/8 inch in 5 feet or 1/4 inch in 20 feet or more.
  - 2. Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
  - 3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch or 1/4 of nominal joint width, whichever is greater.
  - 4. Variation in Plane Between Adjacent Surfaces: Do not exceed 1/8-inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

### 3.4 CLEANING

- A. Clean exposed units after mortar is thoroughly set and cured.
- B. Perform test of cleaner on small area of 4' x 4' on each type and color and receive approval by Architect before full cleaning. Let test area dry 4 to 5 days before inspection. Keep test area for future comparison.
- C. Clean units by wetting down the surface first, before using the specified cleaner (as specified in Section 2.7.C). Brush on cleaner, let dwell for 2 to 3 minutes. Reapply cleaner, scrub surface with masonry brush and rinse off thoroughly. Areas with heavy soiling use a wood block or non-metallic scraper.
- D. Apply cleaner to units in accordance with cleaner manufacturer's instructions.
- E. Do **not** use the following to clean units:
  - 1. Muriatic acid.
  - 2. Power washing.
  - 3. Sandblasting.
  - 4. Harsh cleaning materials or methods that would damage or discolor surfaces.

### 3.5 REPAIR

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
- B. Repair with touchup materials provided by manufacturer in accordance with manufacturer's instructions.
- C. Repair methods and results to be approved by Architect.

**3.6 INSPECTION AND ACCEPTANCE**

- A. Inspect completed installation in accordance with ACI 530 requirements.

**3.7 WATER REPELLANT**

- A. Sealer: Prosoco Sure Klean Weather Seal Siloxane WB or PD or Hydrozo Enviroseal 7 according to manufacturer's recommendations. Apply water repellant for weatherproofing in accordance with water repellant manufacturer's instructions.
- B. Apply water repellant after installation, cleaning, repair, inspection, and acceptance of units are completed.

**3.8 PROTECTION**

- A. Protect installed units from splashing, stains, mortar, and other damage.

**END OF SECTION**

## SECTION 050519 – POST-INSTALLED ANCHORS

### 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: Drilled in anchors for concrete and masonry. Type, size, and locations as indicated on Drawings.

#### 1.3 SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion and undercut anchors.
- C. Quality Assurance Submittals:
  - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. ICC ES Evaluation Reports.
- D. Manufacturer's installation instructions.
- E. Installer Qualifications & Procedures: Submit installer qualifications as stated in Section 1.4.A. Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Drilled-in anchors shall be installed by an installer with at least three years of experience performing similar installations.
- B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the installer on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
  - 1. hole drilling procedure

2. hole preparation & cleaning technique
  3. adhesive injection technique & dispenser training / maintenance
  4. rebar dowel preparation and installation
  5. proof loading/torquing
- C. Certifications: Unless otherwise authorized by the Engineer, anchors shall have one of the following certifications:
1. ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Division 1 Section—Product Storage and Handling Requirements.
1. Store anchors in accordance with manufacturer's recommendations.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Fasteners and Anchors:
1. Carbon and Alloy Steel Nuts: ASTM A563.
  2. Carbon Steel Washers: ASTM F436.
  3. Carbon Steel Threaded Rod: ASTM A36; or ASTM A193 Grade B7; or ISO 898 Class 5.8.
  4. Wedge Anchors: ASTM A510; or ASTM A108.
  5. Zinc Plating: ASTM B633.
  6. Hot-Dip Galvanizing: ASTM A153.
  7. Reinforcing Dowels: ASTM A615

#### 2.2 DRILLED-IN ANCHORS

- A. Wedge Anchors: Wedge type, torque-controlled, with impact section to prevent thread damage complete with required nuts and washers. Provide anchors with length identification markings conforming to ICC ES AC01 or ICC ES AC193. Type and size as indicated on Drawings.
- B. Screw Anchors: screw type. Pre-drilling of the hole requires a standard ANSI drill bit with the same diameter as the anchor and installing the anchor will be done with an impact wrench. Provide anchors with a diameter and anchor length marking on the head. Type and size as indicated on Drawings.
- C. Cartridge Injection Adhesive Anchors: Threaded steel rod, inserts or reinforcing dowels, complete with nuts, washers, polymer or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

#### A. Drilled-In Anchors:

1. Drill holes with rotary impact hammer drills using carbide-tipped bits or hollow drill bit system. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.
  - a. Cored Holes: Where anchors are permitted to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Properly clean cored hole per manufacturer's instructions.
  - b. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
  - c. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
2. Perform anchor installation in accordance with manufacturer instructions.
3. Wedge Anchors, Heavy-Duty Sleeve Anchors, and Undercut Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.
4. Cartridge Injection Adhesive Anchors: Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive. Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
5. Capsule Anchors: Perform drilling and setting operations in accordance with manufacturer instructions. Clean all holes to remove loose material and drilling dust prior to installation of adhesive. Remove water from drilled holes in such a manner

as to achieve a surface dry condition. Capsule anchors shall be installed with equipment conforming to manufacturer recommendations. Do not disturb or load anchors before manufacturer specified cure time has elapsed.

6. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors and capsule anchors.

### 3.2 REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following inspections:
  1. Mechanical Anchors:
    - a. Inspect installation of the first 10 post-installed mechanical anchors for each individual installer with each individual anchor product.
    - b. Inspect 10% of the remaining anchor installations after the initial verification.
  2. Adhesive Anchors and Reinforcing Dowels:
    - a. Inspect installation of the first 10 post-installed adhesive anchors for each individual installer with each individual anchor product.
    - b. Inspect 10% of the remaining anchor installations after the initial verification.
  3. Verify that each inspected anchor and dowel is installed in accordance with manufacturer's printed installation instructions as well as the following requirements:
    - a. Anchor/product type, manufacturer and material grade
    - b. Anchor diameter, length and installed embedment depth
    - c. Hole diameter and depth
    - d. Hole preparation (cleaning procedure and cleanliness)
    - e. Edge distances and spacing
    - f. Inspect expansion bolt installation for proper torque.
  4. The following additional requirements apply to adhesive anchors and reinforcing dowels:
    - a. Verify the proper adhesive product is used in each application.
    - b. Verify the adhesive product being used has not exceeded its expiration date.
    - c. Verify proper mixing and installation of the adhesive.

END OF SECTION 050519

## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Structural steel, including:
  - a. Lintels
  - b. Loose angles
  - c. Embed plates
  - d. Bearing plates
- 2. Shear stud connectors.
- 3. Shrinkage-resistant grout.

- B. Related Sections:

- |                           |                |
|---------------------------|----------------|
| 1. Cast-in-Place Concrete | Section 033000 |
| 2. Unit Masonry           | Section 042200 |
| 3. Post-Installed Anchors | Section 050519 |
| 4. Steel Decking          | Section 053100 |

#### 1.3 DEFINITIONS

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

#### 1.4 COORDINATION

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



### 1.5 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For each type of product.
- C. Shop Drawings: Show fabrication of structural-steel components. The fabricator shall neither use nor reproduce any part of the Drawings as part of the shop or erection drawings.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment Drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
  - 5. Identify members not to be shop primed.
- D. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads (other than simple shear connections), include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.6 INFORMATIONAL SUBMITTALS

- A. AISC Certification Data for fabricator. Shop drawings will not be reviewed until AISC Certification Data is supplied by the fabricator.
- B. AISC Certification Data for erector. Shop drawings will not be reviewed until AISC Certification Data is supplied by the fabricator.
- C. Qualification Data: For fabricator and testing agency.
- D. Welding certificates.
- E. Mill test reports for structural-steel materials, including chemical and physical properties.
- F. Product Test Reports.
- G. Survey of existing conditions.
- H. Source quality-control reports.
- I. Field quality-control reports.

## 1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.
- C. Deliver items which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.
- D. Deliver materials to site at such intervals to insure uninterrupted progress of work.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
  - 1. ANSI/AISC 303.
  - 2. ANSI/AISC 360.
  - 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using schematic details indicated and AISC 360.

2. Where end reactions are not shown on the Contract Documents, design simple shear connections for at least 50% of the allowable uniform load given in the beam tables in Chapter 3 of the AISC "Steel Construction Manual" for the given span and beam size. Use allowable stress design values unless noted otherwise.

## 2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992 Grade 50.
- B. Channels, Angles: ASTM A36.
- C. Plate and Bar: ASTM A36.
- D. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C, structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
  1. Finish: Black except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

## 2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
  1. Finish: Hot-dip or mechanically deposited zinc coating.
- D. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

## 2.4 RODS

- A. Anchor Rods: ASTM F1554, unheaded type unless noted otherwise.
  1. Grade: As indicated.
  2. Configuration: Straight.

3. Nuts: ASTM A563 heavy-hex carbon steel.
4. Plate Washers: ASTM A36 carbon steel.
5. Washers: ASTM F436, Type 1, hardened carbon steel.
6. Finish:
  - a. Plain unless noted otherwise.
  - b. Hot-dip zinc coating, ASTM A153/A153M, Class C when exposed to weather or earth.

B. Threaded Rods: ASTM A36 unless noted otherwise.

1. Nuts: ASTM A563 heavy-hex carbon steel.
2. Washers: ASTM F436, Type 1, hardened or ASTM A36 carbon steel.
3. Finish: Plain unless noted otherwise.

## 2.5 PRIMER

A. Steel Primer:

1. Comply with Painting and High Performance Coating requirements in Division 9.
2. Unless noted otherwise in Division 9, Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanizing Repair Paint: SSPC-Paint 20.

C. Refer to Division 9 for painting specifications.

## 2.6 SHRINKAGE-RESISTANT GROUT

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

## 2.7 FABRICATION

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

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

6. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Fabricate for delivery sequence, which will expedite erection and minimize field handling of materials.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, mechanically thermal cut or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1 unless noted otherwise.
- G. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1 and manufacturer's written instructions.
- H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  1. Cut, drill, or punch holes perpendicular to steel surfaces.
  2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- I. Metal Surfaces: For fabrication of work which will be exposed to view, use only material which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

## 2.8 SHOP CONNECTIONS

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

2. For welding of reinforcing bars to structural steel comply with AWS D1.4 for requirements including preheat as required.

## 2.9 GALVANIZING

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

## 2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces of high-strength bolted, slip-critical connections.
  4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  5. Galvanized surfaces unless indicated to be painted.
  6. Unless noted elsewhere.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Coordinate minimum surface-preparation requirements with selections of primers, paint, and coating systems.
- C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.11 SOURCE QUALITY CONTROL

- A. If the fabricator is one that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, the following requirements do not need to be performed by an independent agency. However, the reports of any nondestructive testing of welds are to be reviewed by the independent testing agency. At the completion of fabrication, the AISC Certified fabricator shall submit a certificate of compliance stating that the materials supplied and work performed by the fabricator are in accordance with the construction documents.

- B. Testing Agency: Contractor shall engage a qualified testing agency to perform shop tests and inspections.
1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
  2. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1 and the following inspection procedures:
    - a. Inspect 100% of complete joint penetration shop welds.
    - b. Inspect 100% of partial joint penetration shop welds.
    - c. Inspect 100% of fillet shop welds in lateral-load-resisting braced frames and moment frames.
    - d. Inspect 10% of other fillet shop welds.
    - e. Visually inspect shop welds according to AWS D1.1.
    - f. Verify welding procedures are in accordance with AWS requirements.
    - g. Perform pre-welding inspections, including:
      - 1) Verifying welding procedure specifications (WPSs).
      - 2) Manufacturer certifications for welding consumables.
      - 3) Proper storage of welding rods.
      - 4) Material identification (type/grade).
      - 5) Welder identification system in place.
      - 6) Fit-up of groove welds.
      - 7) Configuration and finish of weld access holes.
      - 8) Fit-up of fillet welds.
    - h. Perform inspections during welding, including:
      - 1) Use of qualified welders.
      - 2) Control and handling of welding consumables.
      - 3) Not welding over cracked tack welds.
      - 4) Proper environmental conditions for welding.
      - 5) WPSs followed.
      - 6) Correct welding techniques utilized.
      - 7) Inspect pre-heat, post-heat and surface preparation between passes.
    - i. Perform inspections after welding, including:
      - 1) Welds cleaned.
      - 2) Welder identification is legible.
      - 3) Size, length and location of welds.
      - 4) Welds meet visual acceptance criteria.
      - 5) Check for arc strikes.
      - 6) Wide flange member k-areas checked for cracks where welds have been performed in the k-area.
      - 7) Backing bars and weld tabs removed (if applicable).
      - 8) Repair activities completed.
      - 9) Welded joint acceptance/rejection documented.

- j. Provide continuous inspection for full-penetration and partial-penetration groove welds and multi-pass fillet welds.
  - k. All Complete-Joint-Penetration groove welds subject to transversely applied tension loading shall be tested using Ultrasonic Testing. 10% of the joints are to be tested. Refer to Drawings for joints subject to this requirement.
3. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts." Inspect bolted connections as follows:
- a. Inspect 100% of shop bolted connections in lateral-load-resisting braced frames and moment frames.
  - b. Inspect 20% of all other bolted shop connections.
  - c. Perform per-bolting inspections including:
    - 1) Check manufacturer certifications for fastener materials.
    - 2) Verify fasteners marked in accordance with ASTM requirements.
    - 3) Proper fasteners (grade, type, length) used for the joint detail.
    - 4) Proper bolting procedure selected for the joint detail.
    - 5) Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.
    - 6) Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used (not required for snug-tight connections).
    - 7) Proper storage provided for fasteners and associated components.
  - d. Perform inspections during bolting including:
    - 1) Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.
    - 2) Joint brought to the snug-tight condition prior to the pretensioning operation (if required).
    - 3) Fastener component not turned by the wrench prevented from rotating.
    - 4) Fasteners pretensioned (if required) in accordance with the RCSC Specification systematically from the most rigid point toward the free edges.
    - 5) Monitoring of installation not required for snug-tight connections.
  - e. Perform inspections after bolting including:
    - 1) Verify quantity, size and grade of bolts, and proper fit-up of connected elements.
    - 2) Documentation of acceptance/rejection of bolted connections.
4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1 for stud welding and as follows:



- a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
  - b. Conduct tests in accordance with requirements in AWS D1.1 on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.
5. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Anchor Rods: Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work.
  1. Furnish templates and other devices as necessary for presetting rods and other anchors to accurate locations.
  2. Refer to Division 3 of these specifications for anchor rod installation requirements in concrete.
- C. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  1. Set plates for structural members on wedges, shims, or setting nuts as required.

2. Weld plate washers to top of baseplate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- D. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- E. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
  2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- F. Splice members only where indicated.
- G. Do not use thermal cutting during erection unless written approval is provided by Engineer of Record. Finish thermally cut sections within smoothness limits in AWS D1.1.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
1. Ceramic rings to be removed after installation of shear connectors.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with ANSI/AISC 303 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

### 3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780.
- B. Touchup Painting:
  - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Cleaning and touchup painting are specified in Division 9.
- C. Touchup Priming: Cleaning and touchup priming are specified in Division 9.

### 3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
  - 1. Visually inspect structural steel elements as follows:
    - a. Inspect 100% of beam and girder construction and assemblies
    - b. Inspect 100% of all braced frames and moment frames
  - 2. Visually inspect steel as it is received for possible damage in shipping, workmanship, and piece marking.
  - 3. Review certified mill test reports and identification markings on wide-flange shapes, high-strength bolts, nuts and welding electrodes.
  - 4. Verify that steel member sizes and steel grade conform to the contract documents and approved shop drawings.
  - 5. Check the installation of base plates for proper leveling.
  - 6. Verify the proper grout type and installation procedures are followed.
  - 7. Verify that anchor rod washers are welded to the base plates, at locations specified on the Drawings, prior to anchor rod tops being covered up.
  - 8. Inspect field welded connections as follows:
    - a. Inspect 100% of complete joint penetration field welds.
    - b. Inspect 100% of partial joint penetration field welds.
    - c. Inspect 100% of fillet field welds in lateral-load-resisting braced frames and moment frames.
    - d. Inspect 10% of other fillet field welds.
    - e. Visually inspect field welds according to AWS D1.1.
    - f. Verify welding procedures are in accordance with AWS requirements.
    - g. Perform pre-welding inspections, including:

- 1) Verifying welding procedure specifications (WPSs).
  - 2) Manufacturer certifications for welding consumables.
  - 3) Proper storage of welding rods.
  - 4) Material identification (type/grade).
  - 5) Welder identification system in place.
  - 6) Fit-up of groove welds.
  - 7) Configuration and finish of weld access holes.
  - 8) Fit-up of fillet welds.
- h. Perform inspections during welding, including:
- 1) Use of qualified welders.
  - 2) Control and handling of welding consumables.
  - 3) Not welding over cracked tack welds.
  - 4) Proper environmental conditions for welding.
  - 5) WPSs followed.
  - 6) Correct welding techniques utilized.
  - 7) Inspect pre-heat, post-heat and surface preparation between passes.
- i. Perform inspections after welding, including:
- 1) Welds cleaned.
  - 2) Welder identification is legible.
  - 3) Size, length and location of welds.
  - 4) Welds meet visual acceptance criteria.
  - 5) Check for arc strikes.
  - 6) Wide flange member k-areas checked for cracks where welds have been performed in the k-area.
  - 7) Backing bars and weld tabs removed (if applicable).
  - 8) Repair activities completed.
  - 9) Welded joint acceptance/rejection documented.
- j. Provide continuous inspection for full-penetration and partial-penetration groove welds and multi-pass fillet welds.
9. Inspect bolted connections as follows:
- a. Inspect 100% of bolted connections in lateral-load-resisting braced frames and moment frames
  - b. Inspect 20% of all other bolted connections.
  - c. Perform per-bolting inspections, including:
    - 1) Check manufacturer certifications for fastener materials.
    - 2) Verify fasteners marked in accordance with ASTM requirements.
    - 3) Proper fasteners (grade, type, length) used for the joint detail.
    - 4) Proper bolting procedure selected for the joint detail.

- 5) Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.
  - 6) Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used (not required for snug-tight connections).
  - 7) Proper storage provided for fasteners and associated components.
- d. Perform inspections during bolting, including:
- 1) Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.
  - 2) Joint brought to the snug-tight condition prior to the pretensioning operation (if required).
  - 3) Fastener component not turned by the wrench prevented from rotating.
  - 4) Fasteners pretensioned (if required) in accordance with the RCSC Specification systematically from the most rigid point toward the free edges.
  - 5) Monitoring of installation not required for snug-tight connections.
- e. Perform inspections after bolting, including:
- 1) Verify quantity, size and grade of bolts, and proper fit-up of connected elements.
  - 2) Documentation of acceptance/rejection of bolted connections.
10. Inspect steel frame for compliance with structural drawings, including bracing, member configuration and connection details.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.
1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  2. Welded Connections:
    - a. Visually inspect field welds in accordance with AWS D1.1. Any welds that warrant further evaluation following a visual inspection, shall be tested and inspected in accordance with AWS D1.1 and the following inspection procedures, at the testing agency's option:
      - 1) Liquid Penetrant Inspection: ASTM E165.
      - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      - 3) Ultrasonic Inspection: ASTM E164.
      - 4) Radiographic Inspection: ASTM E94.

- b. All Complete-Joint-Penetration groove welds subject to transversely applied tension loading shall be tested using Ultrasonic Testing. 10% of the joints are to be tested. Refer to Drawings for joints subject to this requirement.

END OF SECTION 051200

## SECTION 053100 - STEEL DECKING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Roof deck.
- 2. Composite floor deck.

- B. Related Sections:

- 1. Cast-In-Place Concrete                      Section 033000
- 2. Structural Steel Framing                      Section 051200

#### 1.3 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For each type of deck, accessory, and product indicated.
- C. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

#### 1.4 INFORMATIONAL SUBMITTALS

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

- D. Research Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those 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 of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.



## 2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 50, G60 zinc coating.
  2. Deck Profile: As indicated.
  3. Profile Depth: As indicated.
  4. Design Uncoated-Steel Thickness: As indicated.
  5. Span Condition: Triple span or more (unless noted otherwise).

## 2.3 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 50, G60 zinc coating.
  2. Profile Depth: As indicated.
  3. Design Uncoated-Steel Thickness: As indicated.
  4. Span Condition: Triple span or more (unless noted otherwise).

## 2.4 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws. See Drawings for allowable deck fasteners.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter, unless indicated otherwise on the Drawings.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth unless otherwise indicated.

- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Roof sump pans: Fabricate from single piece of 14 gage galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1-1/2" below roof deck surface, unless otherwise shown or required by deck configuration.
- I. Galvanizing Repair Paint: ASTM A780.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 INSTALLATION

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

- I. Mechanical fasteners may be used in lieu of welding to fasten deck when indicated as such on the Drawings. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- J. End Bearing: Install deck ends over supporting frame with a minimum end bearing as indicated by SDI or manufacturer's requirements, whichever is more stringent.
- K. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and fasten flanges to top of deck. Space fasteners not more than 12 inches apart with at least one fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports.
- L. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- M. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- N. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- O. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- P. Fasten roof deck units according to the Drawings and in accordance with SDI requirements.
- Q. Fasten floor deck units according to SDI requirements as a minimum and unless a more stringent fastening pattern is indicated on the Drawings.

### 3.3 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
  - 1. Visually inspect the deck for damage.

2. Verify that the deck depth, gauge, type, properties and finish comply with the contract documents.
  3. Verify that the deck attachment to the supporting steel is as specified in the contract documents.
  4. Verify that the proper deck support is used around openings.
  5. Verify that deck accessories are being installed according to the contract documents and approved shop drawings.
  6. Inspect welding of metal deck in accordance with AWS D1.3, including:
    - a. Verification of welding consumables.
    - b. Verification of welding procedure specifications.
    - c. Verification of welding personnel qualifications prior to welding operations.
    - d. Observation of the welding in progress.
    - e. Visual inspection of all complete welds.
  7. Inspect mechanically fastened metal deck, including:
    - a. Verification of the fasteners to be used prior to installation.
    - b. Observe fastening in progress to confirm installation is in conformance with manufacturer's recommendations.
    - c. Visual inspection of the completed installation.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.
- C. Field welds will be subject to inspection.
- D. Prepare test and inspection reports.

END OF SECTION 053100

## SECTION 054000 - COLD-FORMED 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. Exterior non-load-bearing wall framing.
- 2. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
- 3. Soffit framing.

- B. Related Sections:

- 1. Non-Structural Metal Framing                      Section 092216

#### 1.3 PREINSTALLATION MEETINGS

#### 1.4 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For each product type.
- C. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- D. Delegated-Design Submittal: For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified engineer responsible for their preparation.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports.
- E. Research Reports:
  - 1. For nonstandard cold-formed steel framing from ICC-ES.
  - 2. For power-actuated fasteners, from ICC-ES.
- F. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code - Steel."
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated on Drawings.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Non-Load-Bearing Wall Framing (Unless Noted Otherwise): Horizontal deflection of 1/240 of the wall height.
    - b. Exterior Non-Load-Bearing Wall Framing (Brick Veneer): Horizontal deflection of 1/600 of the wall height.
    - c. Interior Non-Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft..
  3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
  4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Deflection tracks and vertical deflection clips shall be designed to accommodate 3/4" of movement in the primary steel structure.
  5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
1. Floor and Roof Systems: AISI S210.
  2. Wall Studs: AISI S211.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 2.2 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
1. Grade: 33 ksi for 43 mil and thinner, 50 ksi for 54 mil and thicker.
  2. Coating:
    - a. Unless noted otherwise: G60, A60, AZ50, or GF30.
    - b. For exterior walls supporting masonry veneer: G90
- B. Steel Sheet for Clips: ASTM A653, structural steel, zinc coated, of grade and coating as follows:
1. Grade: As required by structural performance.
  2. Coating: G60 or G90.

### 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Base-Metal Thickness: As required by structural performance (0.0428 inch (18 gage) minimum)
  - 2. Flange Width: As indicated on Drawings or as required by structural performance.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

### 2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance.
  - 2. Flange Width: As required by structural performance.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:



- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  - 1. Base-Metal Thickness: As required by structural performance (0.0428 inch (18 gage) minimum)
  - 2. Flange Width: As required by structural performance.

## 2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

## 2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- D. Welding Electrodes: Comply with AWS standards.

## 2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780.
- B. Cement Grout: Portland cement, ASTM C150, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

## 2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
  - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
  - E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
  - F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
  - G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
  - H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
  - I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- 3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
  - B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
    1. Stud Spacing: As indicated on Drawings.
  - C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
  - D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
    1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at 96-inch centers or as indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
1. Stud Spacing: 16 inches or as indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at 96-inch centers or as indicated on Shop Drawings.

- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.6 INSTALLATION TOLERANCES

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

### 3.7 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

### 3.8 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a qualified special inspector to perform the following special inspections:
  - 1. Visually inspect elements as follows:
    - a. 10% of stick-framed bearing wall construction and assemblies
  - 2. Inspect framing member sizes, configuration and spacing.
  - 3. Verify material gauges meet indicated requirements.
  - 4. Verify proper material yield strengths.
  - 5. Verify proper connection materials are used (clips, brackets, etc.). Visually observe size, type, configuration and installation of fasteners. Verify proper engagement into connected materials.
  - 6. Visually inspect welding for size, quantity and quality.
  - 7. Verify framing assemblies are constructed to the configurations required and that all materials are provided for a complete assembly. Review installation of all permanent bridging and bracing.
  - 8. Verify proper alignment of supported elements on load-bearing walls, including assemblies requiring supported elements to be installed directly above supporting studs.
- B. Testing: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- C. Field and shop welds will be subject to testing and inspecting.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.

- E. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.9 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

## SECTION 055000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Miscellaneous steel trim.
3. Steel pipe bollards.
4. Metal ladders.

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

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

#### 1.2 QUALITY ASSURANCE

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

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

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

#### 1.3 COORDINATION

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

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

#### 1.4 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.



## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

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

### 2.2 FERROUS METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

### 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless-steel fasteners for fastening aluminum.
  - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

- D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

## 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

## 2.6 MISCELLANEOUS STEEL TRIM

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

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

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- B. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
  - 1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 18 inches (600 mm) o.c. staggered.
- C. Fabricate steel columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to column with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

## 2.8 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.
  - 1. Steel angle frames are required all roof penetrations and floor penetrations.
    - a. Duct work penetrations thru the steel floors.
    - b. Steel angle at loading dock areas and loading dock equipment.
    - c. Other areas noted on the drawings.

## 2.9 TYPICAL PIPE STEEL BOLLARDS

- A. Fabricate from Schedule 40 steel pipe.
  - 1. Contractor to provide 6" pipe bollards. Pipe length shall be 8'-0".
  - 2. Cap bollards with 1/4-inch- (6.4-mm-) thick steel.
- B. Bollards shall be galvanized.
- C. Fully prime with zinc-rich primer for field finish
  - 1. Color: to be selected by Architect from full range of colors.

2.10 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with zinc-rich primer.

2.11 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.
  - 1. Steel angle frames are required all roof penetrations and floor penetrations.
    - a. Structural steel supports for ceiling mounted medical equipment.
    - b. Other areas noted on the drawings.

2.12 METAL LADDERS

- A. General:
  - 1. Comply with ANSI A14.3, except for elevator pit ladders.
  - 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
  - 1. Space siderails 18 inches apart unless otherwise indicated. ( Confirm size and location with elevator vendor final shop drawings.)
  - 2. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
  - 3. Rungs: 3/4-inch- (19-mm-) diameter, steel bars.
  - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  - 5. Provide nonslip surfaces on top of each rung.
  - 6. Galvanize ladders, including brackets.

2.13 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

## 2.14 STEEL AND IRON FINISHES

- A. Exterior Installations: Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Interior Installations: Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with universal shop primer
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirement indicated below:
  - 1. SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 INSTALLING PIPE STEEL BOLLARDS

- A. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Fill bollards solidly with concrete, mounding top surface to shed water.
- C. Prime bollard for painting.

### 3.3 INSTALLING LOOSE BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with non-shrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.4 INSTALLATION OF METAL LADDERS

- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
- B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

### 3.5 ADJUSTING AND CLEANING

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

END OF SECTION 055000

## SECTION 061000 - ROUGH CARPENTRY

### 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. Section Includes:

- 1. Framing with dimension lumber.
- 2. Framing with engineered wood products (including LVLs).
- 3. Rooftop equipment bases and support curbs.
- 4. Wood blocking, cants, and nailers.
- 5. Wood furring and grounds.
- 6. Wood sleepers.
- 7. Plywood backing panels.

- B. Related Sections:

- |                                    |                |
|------------------------------------|----------------|
| 1. Post-Installed Concrete Anchors | Section 050519 |
| 2. Sheathing                       | Section 061600 |
| 3. Shop Fabricated Wood Trusses    | Section 061753 |

#### 1.2 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.
  - 3. SPIB: The Southern Pine Inspection Bureau.
  - 4. WCLIB: West Coast Lumber Inspection Bureau.
  - 5. WWPA: Western Wood Products Association.

#### 1.4 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For each type of process and factory-fabricated product.

1. LVLs.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated wood.
  2. Fire-retardant-treated wood.
  3. Engineered wood products.
  4. Power-driven fasteners.
  5. Post-installed anchors.
  6. Metal framing anchors.
- C. Certificate: Certification by LVL manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Protect products from damage due to weather and breakage.
- C. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  1. Factory mark each piece of lumber with grade stamp of grading agency.



2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  4. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  5. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. 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.
  - 2. 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 unless otherwise indicated.
  - 3. Use interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
  - 1. All wood in exterior walls.

## 2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Stud grade.
  - 1. Species:
    - a. Southern pine or mixed southern pine; SPIB.
    - b. Spruce Pine Fir; WWPA.
- B. Exterior, Load-Bearing, and Shear Walls: As indicated on the Drawings
- C. Joists, Rafters, Beams, Headers: As indicated on the Drawings

## 2.5 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
1. Extreme Fiber Stress in Bending, As indicated on Drawings
  2. Modulus of Elasticity: As indicated on Drawings

## 2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
  3. Rooftop equipment bases and support curbs.
  4. Cants.
  5. Furring.
  6. Grounds.
- B. Dimension Lumber Items: Stud grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
1. Southern pine: No 3 grade; SPIB.
  2. Spruce Pin Fir: No. 3 grade, WWPA

## 2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

## 2.8 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

- C. Nails: ASTM F 1667.
  - 1. Use length and diameter indicated.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

## 2.9 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preserved-treated lumber and where indicated.

## 2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. ICC-ES evaluation report for fastener.
- I. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

### 3.2 PROTECTION

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

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:

1. Visually inspect elements as follows:
  - a. 25% of stick-framed bearing wall construction and assemblies
  - b. 100% of all shear walls, holdown anchors and related connections
2. Inspect sill anchorages for wall construction. Inspect connections and connection hardware for proper size, type, configuration and quantity of fasteners.
3. Verify materials are in accordance with specification requirements including: type, grade, moisture content, material properties, etc.
4. Inspect framing sizes and configurations.
5. Verify treated lumber is used where required.
6. Inspect size, configuration, blocking and fastening of shear walls and diaphragms. Verify sheathing panel grade and thickness. Inspect holdown anchors and fasteners into chord members.
7. Verify field drilled holes in framing members for MEP systems fall within the guidelines provided on the Drawings.

END OF SECTION 061000

## SECTION 061600 - SHEATHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Subflooring.

B. Related Sections:

- |                                 |                |
|---------------------------------|----------------|
| 1. Rough Carpentry              | Section 061000 |
| 2. Shop fabricated Wood Trusses | Section 061753 |

#### 1.3 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

#### 1.4 INFORMATIONAL SUBMITTALS

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

#### 1.5 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 PERFORMANCE REQUIREMENTS

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

### 2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

### 2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not indicated.
  - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.



- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings. All sheathing on exterior walls to be treated.

#### 2.4 WALL SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exposure 1 sheathing.
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1 sheathing.

#### 2.5 ROOF SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exposure 1 sheathing.
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1 sheathing.

#### 2.6 PARAPET SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exposure 1 sheathing.
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1 sheathing.

#### 2.7 SUBFLOORING

- A. Plywood Subflooring: DOC PS 1, Exposure 1, tongue & groove single-floor panels or sheathing.
- B. Oriented-Strand-Board Subflooring: DOC PS 2, Exposure 1, tongue & groove single-floor panels or sheathing.

#### 2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof, parapet, and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
  - 2. For roof, parapet, and wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

## 2.9 MISCELLANEOUS MATERIALS

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
  - 3. ICC-ES evaluation report for fastener.
- D. Coordinate wall, parapet, and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Subflooring:
    - a. Glue and nail to wood framing.
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.
  - 2. Wall and Roof Sheathing:

- a. Nail to wood framing.
- b. Screw to cold-formed metal framing.
- c. Space panels 1/8 inch apart at edges and ends.

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
  1. Visually inspect elements as follows:
    - a. 100% of all shear walls, hold-down anchors and related connections
  2. Verify materials are in accordance with specification requirements including: type, grade, moisture content, material properties, etc.
  3. Verify treated sheathing is used where required.
  4. Inspect size, configuration, blocking and fastening of shear walls and diaphragms. Verify sheathing panel grade and thickness. Inspect holddown anchors and fasteners into chord members. Sheathing to be fastened to each member of built-up posts.
  5. Verify sheathing nails into a common member as depicted on the Drawings. If wall panels are shop fabricated, the sheathing is to lap the adjacent panel or adjacent panel studs are to be fastened together as shown on the Drawings.
  6. Verify sheathing extends across joints as specifically noted on the Drawings.

END OF SECTION 061600

## SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

### 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. Section Includes:

1. Wood roof trusses.
2. Wood floor trusses.
3. Wood girder trusses.
4. Wood truss bracing.

- B. Related Sections include the following:

- |                    |                |
|--------------------|----------------|
| 1. Rough Carpentry | Section 061000 |
| 2. Sheathing       | Section 061600 |

#### 1.3 DEFINITIONS

- A. Shop Fabricated Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimensional lumber and cut and assembled before delivery to Project site.
- B. TPI: Truss Plate Institute, Inc.

#### 1.4 ACTION SUBMITTALS

- A. Do not submit MSDS or SDS sheets with product data submittal. Engineer of Record is not responsible for review of this information.
- B. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- C. Shop Drawings: Prepared and certified by a qualified professional engineer, licensed in the state of Indiana.
  1. Building Code used for design.
  2. Show fabrication and installation details for trusses.

3. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  4. Show locations of all joints and support locations, including required bearing width.
  5. Indicate sizes, stress grades, and species of lumber. Indicate number of plies if more than one.
  6. Clearly indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
  7. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  8. Adjustments to wood member and metal plate design values based on conditions of use.
  9. Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
  10. Truss-to-truss connections and truss field assembly requirements.
  11. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Design must meet the minimum requirements of the locally adopted building code or the design loading listed on the Contract Drawings, whichever is more stringent.
  12. Indicate calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and KCR as applicable.
- D. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- B. Evaluation Reports: For the following, from ICC-ES:
  1. Metal-plate connectors.
  2. Metal truss accessories.
- C. Qualification Data: For metal-plate manufacturer, professional engineer, fabricator, and installer.

#### 1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
  1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Engineer and authorities having jurisdiction.
  - C. Source Limitations for Connector Plates: Obtain metal connector plates from a single manufacturer.
  - D. Comply with applicable requirements and recommendations of the following publications:
    1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
    2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
    3. BCSI, "Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

#### 1.7 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

## 2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Provide dressed lumber, S4S.
  - 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Grade and Species: For truss chord and web members, provide dimension lumber of any species (unless noted otherwise on Drawings), graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
- C. Minimum Chord Size for Trusses: See Drawings for any specific chord size requirements.
- D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

## 2.3 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpine Engineered Products, Inc.
  - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
  - 3. CompuTrus, Inc.
  - 4. Eagle Metal Products.
  - 5. Jager Building Systems, Inc.
  - 6. MiTek Industries, Inc.
  - 7. Robbins Engineering, Inc.
  - 9. Truswal Systems Corporation.
- B. General: Fabricate connector plates to comply with TPI 1.
- C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

## 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.

2. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.

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

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

## 2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. Allowable design loads, as published by manufacturer, shall comply with or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation.

## 2.6 FABRICATION

A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.



- E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
  - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not comply with requirements.

### 3.2 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a special inspector to perform the following special inspections:
  - 1. Visually inspect 100% of all wood truss anchorage connections.
  - 2. Verify materials are in accordance with specification requirements including: type, grade, moisture content, material properties, etc.
  - 3. Inspect framing sizes and configurations.
  - 4. Inspect shop fabrication and quality control procedures for wood truss plant.
  - 5. Inspect the installation of wood trusses for proper location and fastening to supports.
  - 6. Verify permanent bracing is installed in accordance with project plans and truss shop drawings.

END OF SECTION 061753

## SECTION 064023 – INTERIOR ARCHITECTURAL WOODWORK

### 1.1 SUMMARY

#### A. Section Includes:

1. Interior standing and running trim.
2. Interior frames and jambs.
3. Shop priming of interior architectural woodwork.

#### B. Related Requirements:

1. Section 099123 "Interior Painting" for painting of interior finish carpentry.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For the each type and profile of standing and running trim , casings, wall base.
- B. Shop Drawings: NONE
- C. Samples: For each exposed product and for each shop-applied color and finish specified.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **[Installer]**.
- B. Field quality-control reports.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in **[AWI's Quality Certification Program]**
  1. Installer Qualifications: **[Manufacturer of products]**

### 1.5 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between **60 and 90 deg F (16 and 32 deg C)** and relative humidity between **[20 and 70]** percent during the remainder of the construction period.

## PART 2 - PRODUCTS

### 2.1 ARCHITECTURAL WOODWORK MANUFACTURERS

### 2.2 ARCHITECTURAL WOODWORK, GENERAL

### 2.3 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Hardwood Lumber Trim for Opaque finish:
1. Species and Grade: Pine, FAS grade.
  2. Maximum Moisture Content: 15 percent.
  3. Finger Jointing: Allowed.
  4. Wood Moisture Content: **[5 to 10]** percent.

### 2.4 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- a. Species and Grade: Pine, FAS grade.
- b. Maximum Moisture Content: 15 percent.
- c. Finger Jointing: Allowed.
- d. Wood Moisture Content: **[5 to 10]** percent.

### 2.5 MISCELLANEOUS MATERIALS

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

### 2.6 FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
1. Ease edges to radius indicated for the following:
    - a. Edges of Solid-Wood (Lumber) Members: **1/16 inch (1.5 mm)** unless otherwise indicated.
    - b. Edges of Rails and Similar Members More Than **3/4 Inch (19 mm)** Thick: **1/8 inch (3 mm)**.

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

## 2.7 SHOP PRIMING

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

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

### 3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion.
  - 1. Shim as required with concealed shims.
  - 2. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

- E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
  - 1. Secure with countersunk, concealed fasteners and blind nailing.
  - 2. Use fine finishing nails[ **or finishing screws**] for exposed fastening, countersunk and filled flush with interior architectural woodwork.
  - 3. For shop-finished items, use filler matching finish of items being installed.
  
- F. Standing and Running Trim:
  - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
  - 2. Do not use pieces less than **96 inches (2400 mm)** long, except where shorter single-length pieces are necessary.
  - 3. Scarf running joints and stagger in adjacent and related members.
  - 4. Fill gaps, if any, between top of base and wall with [**latex sealant, painted to match wall**].
  - 5. Install standing and running trim with no more variation from a straight line than **1/8 inch in 96 inches (3 mm in 2400 mm)**.

END OF SECTION 064023

## SECTION 071115 - VOLTEX BENTONITE GEOTEXTILE WATERPROOFING

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions, and Division 1 General requirements, apply to the work of this section.

#### 1.02 WORK SUMMARY

- A. The work of this section includes, but is not limited to the furnishing and installing the following materials, per project specifications and drawings:
  - 1. Voltex sodium bentonite geotextile sheet waterproofing membrane with all applicable accessory products.
  - 2. Location: Elevator pit surround and concrete foundation.

#### 1.03 SYSTEM DESCRIPTION

- A. Provide bentonite waterproofing and prefabricated drainage composite system to prevent the passage of liquid water and install without defects, damage or failure. Waterproofing shall be two high strength geotextiles interlocked encapsulating minimum 1.10 lbs. per square foot (5.37 kg/sqm) granular Volclay sodium bentonite.

#### 1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, with complete general and specific installation instructions, recommendations, and limitations.
- B. Waterproofing Material and Labor Warranty: At time of bid, submit a sample copy of the Manufacturer's Waterproofing warranty complete with all coverage's, limitations, and conditions.

#### 1.06 QUALITY ASSURANCE

- A. Materials: obtain waterproofing membrane and accessory products from a single source to assure material compatibility.

#### 1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage and prolonged weather exposure. Remove damaged material from site and dispose of in accordance with applicable regulations.

- B. Storage: Do not double-stack pallets during shipping or storage. During storage protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation.

#### 1.08 PROJECT CONDITIONS

- A. Substrate Condition: Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system. All plumbing, electrical, mechanical and structural items to be under or passing through the waterproofing shall be positively secured in their proper positions prior to waterproofing system installation. Substrate preparation shall be per waterproofing manufacturer's guidelines.
- B. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the waterproofing materials. Do not apply waterproofing materials into standing water or over ice and snow. Though exposure to precipitation and ground water seepage typically will not adversely affect Voltex, the Contractor shall maintain site conditions to remove standing water from precipitation or ground water seepage in a timely manner. Should Voltex be subjected to prehydration as a result of prolonged immersion, inspection of the material and written acceptance from CETCO is required prior to concrete or backfill placement.

#### 1.09 WARRANTY

- A. Waterproofing Warranty: Upon completion and acceptance of the work required by this section, the waterproofing materials manufacturer will provide a written five (5) year warranty, covering both materials and labor, to the project owner. Manufacturer's warranty shall be independent from any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with the other warranties.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURER

- A. Provide Voltex bentonite interlocked-geotextile waterproofing with applicable accessories as manufactured by Colloid Environmental Technologies Company (CETCO), 2870 Forbs Ave, Hoffman Estates, IL 60192. 1-800-527-9945

#### 2.02 MATERIALS

- A. Sodium Bentonite: Specially selected Wyoming granular sodium bentonite with 90% passing through a 20-mesh sieve and less than 10% passing through a 200-mesh sieve. Sodium bentonite shall have a 2 gram free swell minimum volume of 16 cc and a maximum fluid loss of 18ml in de-ionized water.

B. NSF Certified: Standard bentonite geotextile waterproofing membrane shall be certified by NSF International to conform to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effects.

C. VOLTEX BENTONITE GEOTEXTILE WATERPROOFING

1. Volclay Voltex®: 4' x 15' roll of interlocked geotextiles encapsulating a minimum of 1.10 lbs. per square foot of granular sodium bentonite. Composite shall consist of one woven and one non-woven polypropylene geotextile, interlocked using a needle-punching process that produces several interlocks per square inch over the entire surface area of product.

Volclay Voltex performance properties:

PROPERTY	TEST METHOD	TYPICAL VALUE
Peel Adhesion to Concrete	ASTM D 903 mod	A5 lbs/in (2.6kN/m)
Hydrostatic Pressure Resistance	ASTM D 5385 mod	70.2M
Permeability	ASTM D 5084	1 x 10 <sup>-9</sup> cm/sec.
Grab Tensile Strength	ASTM D 4632	422 N
Puncture Resistance	ASTM D 4833	100 lb (445N)
Low Temperature Flexibility	ASTM D 1970	Unaffected at -25°F (-32°C)

D. ACCESSORY WATERPROOFING PRODUCTS: All accessory waterproofing materials shall be provided by the bentonite waterproofing manufacturer or shall have manufacturer's written approval for substitution.

1. Volclay Bentoseal: Trowel grade sodium bentonite compound used as detailing mastic around penetrations, corner transitions and grade terminations.
2. Volclay Hydrobar Tubes: 2" diameter x 2' long, water soluble tube container filled with granular sodium bentonite
3. Volclay Waterstoppage: 50 lbs. bag of granular Volclay sodium bentonite.
4. Volclay SeamTape: 2" wide butyl rubber sealant tape.
5. Termination Bar: Min. 1" wide x 1/8" thick aluminum bar with pre-punched holes on 12" centering for fastening.
6. Volclay Waterstop-RX 101: 1" x 3/4" x 16'8" rolls of a flexible strip of bentonite and butyl rubber compound for use in concrete construction joints- not designed for expansion joints. WATERSTOP-RX 101RH: 1" x 3/4" x 16'8" rolls of a flexible strip of rapid hydrating bentonite and butyl rubber compound for use in concrete construction joints- not designed for expansion joints.
7. Manufacturer's recommended fasteners for securing the voltex to the concrete foundation walls.
8. MFG's recommended fasteners for securing the rigid insulation protection board to the concrete foundation walls.
9. CETSEAL single component polyether general sealant and adhesive.
10. GF-40SA – self adhering flashing membrane used for grade and thru wall detailing.
11. Manufacture recommended Envirosheet grade flashings system as noted on drawings.



E. PROTECTION LAYER

1. Extruded-Polystyrene Protection Board Insulation: ASTM C 578 for type indicated below:
  - a. 1 layer of 2" thick rigid insulation will be required.
  - b. Type V, 3-lb/cu. ft. (48-kg/cu. m) minimum density for sheet waterproofing protection board.
    - 1). Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

PART 3 – EXECUTION

Comply with contract documents and manufacturer's product data, including product application and installation instructions.

3.01 SUBSTRATE INSPECTION AND CONDITIONS

- A. The installer, with the Owner's Independent Inspector present, shall examine conditions of substrates and other conditions under which this section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements. General substrate conditions acceptable for the waterproofing installation are listed below. For conditions not covered in this Section, contact the waterproofing manufacturer for guidance.
- B. SOIL SUBSTRATES: Site conditions allowing, Voltex applications do not require a mud-working slab. Grade substrates should consist of well-leveled soils without voids and debris, and compacted per the geotechnical report.
- C. MECHANICAL OR OTHER PENETRATIONS: Mechanical, structural, or architectural materials that will pass through the plane of the waterproofing membrane shall be properly installed and secured in their final position prior to installation of the waterproofing system.
- D. CONCRETE: Concrete to be waterproofed shall be properly placed and consolidated. Cast-in-place concrete to receive waterproofing shall be of sound structural grade with a smooth finish, free of debris, oil, grease, laitance, dirt, dust, or other foreign matter which will impair the performance of the waterproofing and drainage system and which do not comply with manufacturer's warranty requirements. Voltex can be installed on green structural concrete as soon as the forms are removed provided the contractor gains written approval from project structural engineer listing any site specific concrete curing time requirement.
  1. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing and drainage system.

2. Protect adjacent work areas and finished surfaces from damage or contamination from waterproofing products during installation operations.
3. Form fins, ridges, ponding ridges and other protrusions should be level and smooth with concrete surface.
4. Honeycombing, aggregate pockets, tie-rod holes and other voids shall be completely filled with non-shrink cementitious grout and level with monolithic concrete surface.

### 3.02 SURFACE PREPARATION

- A. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing and drainage system.
5. Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.

### 3.03 GENERAL INSTALLATION GUIDELINES

- A. Install Voltex Waterproofing System with the dark gray woven geotextile side facing the concrete to be waterproofed in both horizontal and vertical applications. Overlap Voltex membrane edges a minimum 4" or greater per MFG's Requirements.

### 3.04 SLAB/FOOTING EDGE VOLTEX TRANSITION COURSE

- A. Provide a minimum of 6" overlap between top of horizontal slab and vertical wall waterproofing. Secure overlap with washer-head fasteners a minimum of 24" on center and apply Bentoseal to the overlap edge.

### 3.05 BACKFILLED CAST-IN-PLACE CONCRETE WALLS

- A. Place Hydrobar Tubes along the wall/footing intersection with ends "buted" tightly together to form a continuous installation.
- B. Trowel 3/4" (18 mm) thick, continuous Bentoseal fillet at all inside wall corner transitions. Trowel Bentoseal form-tie pockets/patches and any slightly irregular honeycomb areas.
- C. Install Volcay Watersop RX as shown on the drawings and per MFG's requirements.
- D. Terminate at base of foundation with metal termination bar fastened 12" on center. Cover bottom edge of Voltex with 1/2" thick, 2" wide layer of Bentoseal.
- E. Starting at the base of the foundation, install Voltex sheet horizontally covering the complete footing and extending up over the Hydrobar Tubes and extending onto the foundation wall a minimum of 6". Attach Voltex using washer-headed mechanical fasteners centered 24"

around the sheet edge. Overlap all adjacent sheet edges a minimum 4". Stagger all vertical overlap seams a minimum of 12".

- F. After the bottom horizontal course, Voltex sheets can be installed either vertically or horizontally oriented. Continue Voltex installation up wall to finished grade elevation, staggering all sheet roll ends of adjacent courses a minimum 12". Do not allow horizontal Voltex overlap joints to run at same elevation as the concrete pour lift joints. Overlap all adjacent Voltex sheet edges a minimum 4" and secure with washer headed fasteners at 24" o.c.. Detail all Voltex sheet edge overlaps with 3/4" cant of Bentoseal.
- G. Cut Voltex to fit snugly around penetrations. Detail around all penetrations with 3/4" cant of Bentoseal. Completely fill any space between the penetration and Voltex edge. Extend Bentoseal 1/4" thick over substrate a minimum radius of 1-1/2" and onto penetration.
- H. Terminate at grade with metal termination bar fastened 12" on center. Cover top edge of Voltex with 1/2" thick, 2" wide layer of Bentoseal.
- I. Inspect finished Voltex installation and repair any damaged material prior to backfill placement. Assure that Voltex is not displaced during backfill placement or soil compaction.

### 3.06 BACKFILL EXCAVATED CAST-IN-PLACE CONCRETE WALLS

- A. Closely coordinate Voltex installation with Backfill work. Care should be used during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added in 6" to 12" lifts and compacted per the geotechnical report.

### 3.07 CLEAN UP

- A. Clean areas where adjacent finished surfaces are soiled by work of this Section. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

END OF SECTION 071115

## SECTION 072100 - THERMAL INSULATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Extruded polystyrene foam-plastic board.
  2. Glass-fiber blanket.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 Related sections

- A. See Section 072600 "Vapor retarders" for sheet vapor retarders to be installed over interior of insulation on exterior walls.
- B. See Section 072500 "weather barriers" for weather barriers to be installed on exterior of walls.
- C. See section 072100 "spray foam insulation" for spray foam insulation for insulating first floor structural steel and around windows and door openings as noted in drawings..

### PART 2 - PRODUCTS

#### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Foundation Boards:
1. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi (173-kPa) minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
  2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
  3. Manufacturers:
    - a. Basis-of-Design: Owens Corning fomular 250 (xps) Insulation or equal.
      - 1) Thickness: 2"
      - 2) Edges: Square
      - 3) Full depth of foundation

## 2.2 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Manufacturers:

- a. Basis-of-Design: Owens Corning Eco Touch Pink Insulation or equal.

1) Walls

- a) Thickness: 3 ½" or 5 ½" matching wall cavity. See plan.  
b) R-Value: 13 – 21  
c) See insulation schedule for more information.

## 2.3 SILL SEALERS

Sill Plate Seal: Provide flexible polyethylene foam gasketing strip between top of foundation and sill plate.

## 2.4 ACCESSORIES

A. Insulation for Miscellaneous Voids:

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

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

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

D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 36 inches (915 mm) below exterior grade line. (See construction documents.)

### 3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
  - 5. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

### 3.5 INSULATION SCHEDULE

#### A. Blanket Insulation:

1. Exterior Walls: 5.5" thick , R-21 (glass fiber blanket insulation).
2. Unit demising & Corridor walls: 5.5" thick , R-19 (glass fiber blanket insulation).
3. Interior none unit demising walls: 3 ½" thick, R-13 (glass fiber blanket insulation).

#### B. Rigid Foundation Insulation:

1. Foundations: R-10 for entire height of foundation

#### C. Sill Sealers

1. Foam sill sealer below all wall plates resting on concrete foundation walls.

END OF SECTION 072100

## SECTION 072110 SPRAYED FOAM INSULATION

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Spray polyurethane foam (SPF) insulation – Closed Cell at all exterior wall locations.
- B. Low expanding door and window spray polyurethane foam insulation

#### 1.2 RELATED SECTIONS

- A. Section 072100 – Thermal insulation.

#### 1.3 REFERENCES

- A. ASTM C 1029 – Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
- B. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- C. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- D. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- E. ASTM D 2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.
- F. ASTM E 119 – Standard Test Methods for Fire Test of Building Construction Materials
- G. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- I. NFPA 259 (UBC 26-1) Standard Test Method for Potential Heat of Building Materials

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data on products to be installed.
  - 1. Application or installation instructions.
  - 2. Listing, classification, and approval certifications.



3. Safety and handling instructions for storage, handling and use of the materials.
- C. Product Certification: Spray Polyurethane Foam Alliance accreditation program documentation for materials.
- D. Certifications: If manufacturer's published data sheets do not indicate compliance with all specification requirements, provide letter of certification that all products comply with the specification requirements; include primers (if required), foam, vapor retarder and thermal barriers.
- E. Shop Drawings: Show materials and details of fabrication of sheet metal, accessories, or other fabricated items.
- F. Qualification Statement:
  1. Manufacturer qualifications.
  2. Installer qualifications.
  3. Independent inspector qualifications.
- G. Applicator's Field Quality Control Procedures: Written description of procedures to be utilized to insure proper preparation and installation of foam, vapor retarder thermal barriers, detail work and follow-up inspection.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: A firm with experience installing insulation systems of the type specified.
  1. Show contractor/supplier level accreditation by Spray Polyurethane Foam Alliance Accreditation Program or other equivalent industry training.
  2. Approved or certified by the foam manufacturer as qualified to install the specified system.
  3. Provide information concerning projects similar in nature to the one proposed including location and person to be contacted.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Provide materials packaged in the manufacturer's original, tightly sealed containers or unopened packages, clearly labeled with the manufacturer's name, product identification, safety information, and batch or lot numbers where appropriate. Where materials are covered by a referenced specification, the labels shall bear the specification number, type and class, as applicable.
- B. Store materials out of the weather and out of direct sunlight in locations where the temperatures are within the limits specified by the manufacturer.

#### **1.7 PROJECT CONDITIONS**

- A. Comply with the manufacturer's instructions and industry recommendations as to handling and safety procedures.

## 1.8 PACKAGING WASTE MANAGEMENT

- A. Remove packaging materials from site and dispose of at appropriate recycling facilities.
- B. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate onsite bins or dumpsters on site for recycling as applicable.
- C. All material placed in the recycling bins or dumpsters shall be broken down into smaller parts to maximize dumpster capacity.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: HUNTSMAN BUILDING SOLUTIONS  
3315 East Division Street, Arlington, TX 76011.  
(855) 942-7273  
[architect@huntsmanbuilds.com](mailto:architect@huntsmanbuilds.com)  
<http://www.huntsmanbuildingsolutions.com>
- B. Or equal as approved by Architect

### 1.1 SPRAY FOAM INSULATION

- A. Spray Applied Rigid Polyurethane Foam Insulation System: HEATLOK® HFO High Lift
  - 1. Manufacturer: HUNTSMAN BUILDING SOLUTIONS, Arlington, TX
  - 2. Product Approval:
    - a. ICC-ES Evaluation Report ESR-4073.
    - b. Approved for use in building types I, II, III, IV, and V construction under IBC and dwellings for IRC.
    - c. AC377 Appendix X compliant NFPA 286
  - 1. Installation Thickness:
    - a. Metal Stud Exterior walls and Soffits: 3" nominal Thickness R-22
    - b. Structural Steel Members exposed to exterior of building as noted on drawings: 2" nominal Thickness R-14
  - 2. Application Options:
    - a. Application with a prescriptive Thermal Barrier: **To be used in location where spray foam is shown inside wall, ceiling cavities or inside structural steel tube members or inside metal stud headers and jambs..**

- 1) There is no thickness limit when installed in floors or ceilings behind 1/2 inch gypsum wall board or equivalent 15 minute thermal barrier in accordance with IBC 2603.4 or IRC R316.4.
- b. Application without a prescriptive Thermal Barrier: **To be used in areas of first floor where structural steel is noted to receive 1 1/2" min. closed cell insulation to be exposed in open ceiling plenum.**
  - 1) Up to 9-1/2 inches (241 mm) on the underside of the roof sheathing or in floor assemblies and 6-1/2 inches (165 mm) on vertical surfaces with:
    - (a) A minimum of 16 wet mils (11 dry mils) of No-Burn Plus ThB intumescent coating

## 1.2 ACCESSORY PRODUCTS

### A. Water Based Intumescent coating:

1. Product: DC315, Manufactured by International Fireproof Technology, Inc.
2. Product: No-Burn Plus ThB, Manufactured by No-Burn, Inc.

### B. Primers:

1. Product: Adbond manufactured by Adfast or Thermo-Prime by HUNTSMAN BUILDING SOLUTIONS
  - a. Application: Follow manufacturer's application recommendations.
  - b. Recommended for oily surfaces and galvanized steel like Z-bar, PVC, curtain walls and steel decks

## 2.2 WIDOW & DOOR SPRAY FOAM

### A. Dow "GREAT STUFF PRO", no-warp polyurethane foam sealant

- a. Density 1.3-1.8 lbs/cu. ft.
- b. Thermal resistance ASTM C-518.
- c. R-value 4.5 per inch thickness.
- d. No CFC and no HCFC.
- e. No urea formaldehyde.
- f. UL 1715 Fire Test – Flame Spread – 10 and Smoke Development -15.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Comply with the instructions and recommendations of the foam material manufacturers.
- B. Familiarize all installers with correct and safe application and handling procedures:
  1. See API Bulletin AX-119, "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal."

2. Refer to appropriate Materials Safety Data Sheets (MSDS) for additional safety information.

### 3.2 PREPARATION

- A. Remove loose dirt, dust and debris by using compressed air, vacuum equipment or brooming. Remove oil, grease, form release agents, laitance, and other contaminants using proper cleaning solutions. Do not wash wood or porous materials with water.
- B. Grout, tape, or calk all joint openings that exceed 1/4 inch (6 mm) in width.
- C. Spray Foam material will be sprayed against the densglass gold 5/8" exterior sheathing and the 6" metal studs on the exterior wall.

### 3.3 FOAM APPLICATION

- A. Spray foam will be located at the following locations:
  1. At metal stud box headers above exterior windows and doors.
  2. At all double stud jamb locations at windows and door opening.
  3. At the joint between the store front windows and walls – Head, jambs and sill.
  4. At the joint between all windows and walls – Head, jambs and sill.
  5. At the joint between the exterior door jambs and walls – Head, jambs and sill.
  6. First floor structural steel areas noted to be concealed within closed cell spray foam. See first floor ceiling plan.
  7. At the structural tube locations at exterior walls.
- B. Do not begin application of foam until all preparation requirements have been completed. Contractor to ensure that all penetrations thru the exterior wall are complete and in place. If penetrations are added once the spray foam has been installed, the new penetrations will need to re sealed for air infiltration.
- C. GREAT STUFF PRO" no warp polyurethane foam sealant shall be used around all doors and windows in the project. The gap around the doors and windows shall not exceed 1/2" per the MFG's requirements.
- D. Do not apply foam when the temperature is below that specified by the manufacturer for ambient air and substrate. Do not apply foam when temperature is within 5 degrees F (3 degrees C) of dew point.
- E. Apply foam in accordance with the manufacturer's specifications and instructions. Mask off all conduits back boxes etc that need to be protected prior to the installation of the spray foam insulation.
- F. Apply foam to a 1" inch thickness at wall cavity, with pass thickness of 1/2 inch to 1 inch. Complete the full thickness of foam in any area prior to the end of each day.
- G. Door and window foam. Fill void between exterior walls and windows full depth minus 1 1/2" to allow of backer rod and sealant installation on the exterior and interior side of the frames.

- H. Do not apply spray foam insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in exterior walls are completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- I. Protect installed spray foam 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.
- I. Damaged spray foam insulation shall be repaired prior to the installation of the vapor barrier, batt insulation and drywall.
- J. Contractor to clean up any overspray for the spray foam insulation on metal studs, doors windows, etc.

END OF SECTION 072110

## Section 072400 EIFS Finish System

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls
- B. Related Sections
  - 1. Section 06 16 00: Sheathing
  - 2. Section 07 25 00: Weather Barriers

#### **1.2 SUBMITTALS**

- A. Manufacturer's specifications, details, installation instructions and product data
- B. Manufacturer's code compliance report
- C. Manufacturer's standard warranty
- D. Applicator's industry training credentials
- E. Physical samples for each finish/ texture specified as well as physical color chart for color selections by architect or owner.
- F. Sealant manufacturer's certificate of compliance with ASTM C 1382
- G. Prepare and submit project-specific details for review and approval by the architect. Including detailed elevations showing colors & textures & details of specific reveals and flashing conditions.

#### **1.3 REFERENCES**

- A. ASTM Standards:
  - B 117 Test Method for Salt Spray (Fog) Testing
  - C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
  - C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
  - C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
  - C 1382 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
  - D 968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
  - D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

- D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- D 3273 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- E 72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 96 Test Methods for Water Vapor Transmission of Materials
- E 119 Method for Fire Tests of Building Construction and Materials
- E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 1233 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference
- E 2098 Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution
- E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)
- E 2178 Test Method for Air Permeance of Building Materials
- E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
- E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- E 2485 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistant Barrier Coatings
- E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
- E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
- E 2570 Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
- G 153 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
- G 154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials
- B. Building Code Standards
  - AC 235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November, 2009)
- C. National Fire Protection Association (NFPA) Standards
  - NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source

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

D. Other Referenced Documents

1. American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test
2. APA Engineered Wood Association E 30, Engineered Wood Construction Guide
3. ICC-ES ESR-1233, StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-Resistive Barriers and StoEnergy Guard
4. ICC-ES ESR-1748, StoTherm® ci

## 1.4 DESIGN REQUIREMENTS

A. Wind Load

1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
2. Design for maximum allowable system deflection, normal to the plane of the soffit, of L/360.
3. Design for wind load in conformance with code requirements.
4. Maximum wind load resistance:  $\pm 188$  psf (9.00 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.

B. Moisture Control

1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:
  - a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall. **As indicated on drawings.**
  - b. Air Leakage Prevention – provide **Fluid applied air barrier behind all xps EIFS insulation systems.**

C. Joints

1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction. Size joints to correspond with anticipated movement. **As indicated in drawings.**



2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).
  3. Backer rod and Sealant shall be evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.
- D. Trim, Projecting Architectural Features and Reveals
1. All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All reveals must have minimum 3/4 inch (19 mm) insulation thickness at the bottom of the reveal. All horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface.. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat.
- E. Insulation Thickness
1. Minimum EXP insulation thickness is 1 inch (25 mm).
  2. Maximum XPS insulation thickness is 12 inches (305 mm), except as noted below for fire-resistance rated wall assemblies.
- F. Fire Protection
1. Do not use EPS foam plastic in excess of 12 inches (305 mm) thick on types I, II, III, or IV construction unless approved by the code official.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Comply with ASTM E 2570 (Air/Moisture Barrier) and ASTM E 2568 (EIFS)

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Requirements
1. Member in good standing of the EIFS Industry Members Association (EIMA)
  2. Air/moisture barrier and EIFS manufacturer for a minimum of thirty (30) years
  3. Manufacturing facilities ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System
- B. Contractor Requirements
1. Engaged in application of similar systems for a minimum of three (3) years
  2. Knowledgeable in the proper use and handling of Sto materials
  3. Employ skilled mechanics who are experienced and knowledgeable in air/moisture barrier and EIFS application, and familiar with the requirements of the specified work

4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project
  5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications
- C. Insulation Board Manufacturer Requirements
1. XPS board listed by an approved agency
  2. XPS board manufactured under Sto licensing agreement and recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements
  3. XPS board labeled with information required by Sto, the approved listing agency, and the applicable building code.
- D. Mock-up
1. Construct full-scale mock-up as indicated on drawings.

#### **1.7 DELIVERY, STORAGE AND HANDLING**

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product
- B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.
- C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

#### **1.8 PROJECT/SITE CONDITIONS**

- A. Maintain ambient and surface temperatures above 40°F (4°C) during application and drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS products
- B. Provide supplementary heat for installation in temperatures less than 40°F (4°C)
- C. Provide protection of surrounding areas and adjacent surfaces from application of products

#### **1.9 COORDINATION/SCHEDULING**

- A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches (150 mm) or as required by code
- B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and moisture barrier
- C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall

- D. Install window and door head flashing immediately after windows and doors are installed
- E. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior
- F. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter tracks, and similar details to form a shingle lap that directs incidental water to the exterior
- G. Install copings and sealant immediately after installation of the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface
- H. Schedule work such that air/moisture barrier is exposed to weather no longer than 180 days if Sto Gold Coat is used, 90 days if Sto AirSeal is used.
- I. Attach penetrations through the EIFS to structural support and provide water tight seal at penetrations

#### **1.10 WARRANTY**

- A. Provide manufacturer's standard warranty

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier
- B. The following are acceptable manufacturers:
  - 1. Sto Corp. – Air/Moisture Barrier, EIFS
  - 2. Plastic Components, Inc. – EIFS Accessories
  - 3. Dryvit US

#### **2.2 AIR/MOISTURE BARRIER**

- A. StoGuard®
  - 1. Joint Treatment, Rough Opening Protection, and Detail Components:
    - a. Sto Gold Coat® - ready mixed coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar ship lap details
    - b. Sto RapidGuard® - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other transitions in above grade wall construction.

2. Waterproof Coating:
  - a. Sto Gold Coat® - ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing
3. Transition Detail Components:
  - a. StoGuard Transition Membrane - flexible air barrier membrane for continuity at static transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and shingle lap transitions to flashing. Also used for floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction
  - b. Sto RapidGuard: one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap transitions to flashing, wall to balcony floor slab or ceilings, and through wall penetrations – pipes, electrical boxes, and scupper penetrations.

### **2.3 ADHESIVE**

- A. Sto TurboStick™ – one component polyurethane spray foam adhesive

### **2.4 INSULATION BOARD**

- A. Foamular® CI-C – Type X extruded polystyrene (XPS) rigid foam plastic insulation board.
- B. Dow STYROFOAM™ Panel Core 20 Insulation - Type X extruded polystyrene (XPS) rigid

### **2.5 BASE COAT**

- C. Sto BTS® Xtra - one component polymer modified cement based high build base coat for insulation board. Also used as a leveler for concrete and masonry surfaces
- D. Waterproof Base Coat
  1. Sto Flexyl – fiber reinforced acrylic based waterproof base coat mixed with portland cement (for use as a waterproof base coat over Sto BTS Plus or BTS Xtra for foundations, parapets, splash areas, trim and other projecting architectural features)

### **2.6 REINFORCING MESHES**

- A. Standard Mesh
  1. Sto Mesh – nominal 4.5 oz/yd<sup>2</sup> (153 g/m<sup>2</sup>), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials
    - a. For use on all EFIS facades above 6'0" above finish grade.

2. Sto Detail Mesh – nominal 4.2 oz/yd<sup>2</sup> (143 g/m<sup>2</sup>), flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials
  - a. For use in all detail components as detailed in drawings.

## 2.7 PRIMER

- A. StoPrime Sand – acrylic based tintable primer with sand for roller application
  1. For use on at ALL EFIS locations.

## 2.8 FINISH COAT

- A. Stolit® Lotusan® – acrylic based textured wall finish with graded marble aggregate and self-cleaning properties
  1. Project will require (3) finishes/ textures : See Material Legend on Building Elevation for more info.

## 2.9 JOB MIXED INGREDIENTS

- A. Water – clean and potable
- B. Portland cement – Type I, Type II, or Type I-II in conformance with ASTM C 150

## 2.10 ACCESSORIES

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

## 2.11 MIXING

- A. Sto Gold Fill – mix with a clean, rust-free high speed mixer to a uniform consistency
- B. Sto Gold Coat – mix with a clean, rust-free high speed mixer to a uniform consistency
- C. Sto AirSeal – mix with a clean, rust-free high speed mixer to a uniform consistency
- D. Sto BTS Plus – mix ratio with water: 5-6.5 quarts (4.7-6.2 L) of water per 47 pound (21.3 kg) bag of Sto BTS Plus. Pour water into a clean mixing pail. Add Sto BTS Plus, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Plus or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum water amount in mix ratio.

- E. Sto BTS Xtra – mix ratio with water: 4.75- 5 quarts (4.5-4.7 L) of clean potable water per 38 pound (17.2 kg) bag of Sto BTS Xtra. Pour water into a clean mixing pail. Add Sto BTS Xtra, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Xtra or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum amount of water in mix ratio.
- F. Sto Flexyl – mix ratio with portland cement: 1:1 ratio by weight. Pour Sto Flexyl into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary with additional Sto Flexyl and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.
- G. Sto Watertight Coat – pour liquid component into a clean mixing pail. Add dry component, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.
- H. Sto primer – mix with a clean, rust-free high speed mixer to a uniform consistency
- I. Stolit Lotusan – mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.
- J. Mix only as much material as can readily be used
- K. Do not use anti-freeze compounds or other additives

### **PART 3 EXECUTION**

#### **3.1 ACCEPTABLE INSTALLERS**

- A. Prequalify under Quality Assurance requirements of this specification (section 1.06 B)

#### **3.2 EXAMINATION**

- A. Inspect concrete and masonry substrates prior to start of application for:
  - 1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances
  - 2. Surface absorption and chalkiness
  - 3. Cracks—measure crack width and record location of cracks
  - 4. Damage and deterioration such as voids, honeycombs and spalls
  - 5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage
  - 6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane)

- B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:
  - 1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177
  - 2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E 30
  - 3. Cementitious sheathing – consult manufacturer
  - 4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional
  - 5. Fasteners seated flush with sheathing surface and not over-driven
- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

### **3.3 SURFACE PREPARATION**

- A. Remove surface contaminants on concrete, concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces
- B. Repair cracks, spalls or damage in concrete and concrete masonry surfaces and level concrete and masonry surfaces to comply with required tolerances
- C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness
- D. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material
- E. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement
- F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details)
- G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing

### **3.4 INSTALLATION**

- A. Transition Detailing
  - 1. Detail transition areas with Sto RapidGuard or StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, refer to Sto guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide ([www.stocorp.com](http://www.stocorp.com))
- B. Sheathing Joint Treatment

1. Sto Gold Fill with StoGuard Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread with a trowel to create a smooth surface that completely covers the mesh.
  2. Sto Gold Coat or Sto AirSeal with StoGuard Fabric: apply coating liberally by spray or roller along sheathing joints and immediately place 4 inch (102 mm) wide fabric centered over the joints into the wet coating, and 6 inch (152 mm) wide fabric centered and folded at inside and outside corners into the wet coating. Smooth any wrinkles with a brush or roller and apply additional coating to completely embed the fabric. Overlap seams minimum 2 inches (51 mm).
  3. Sto RapidGuard: apply to properly installed sheathing - joints butted for gypsum sheathing, and joints gapped for plywood and OSB sheathings (wood-based sheathing typically requires 1/8 inch [3 mm] spacing at edge and end joints). Apply a thick bead of Sto RapidGuard with a caulking gun along sheathing joints, or apply in a zig-zag pattern across and down the joints. Spread to a uniform thickness of 20-30 mils (0.5-0.6 mm) before the material skins. Spread 1 inch (25mm) beyond the sheathing joint on each side. Follow the same procedure for inside and outside corners.
- c. Air/Moisture Barrier Coating Installation
1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat (Sto Gold Coat) or 20 mils in one coat (Sto AirSeal). Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
- d. Air /Moisture Barrier Connections and Shingle Laps
1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
  2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
  3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

### 3.4.2 EIFS Installation

#### A. Starter Track

1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.



2. Attach the starter track even with the line into structural supports with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) and three thread penetration, galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration, and corrosion resistant concrete or masonry screws with minimum 1 inch (25 mm) penetration for concrete or CMU. Attach between studs into blocking as needed to secure the track flat against the wall surface. Attach at maximum 16 inches (406 mm) on center into framing. For solid wood sheathing or concrete/masonry surfaces, attach directly at 12 inches (305 mm) on center maximum.
  3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS insulation board to be seated inside of track) and abut.
  4. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing (refer to Sto Details).
- B. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors
1. Starter Track, Window/Door Head Flashing, Floor Line Flashing, and Roof/Side Wall Step Flashing: Install minimum 4 inch (100 mm) wide detail component over back flange of starter track, floor line flashing, head flashing, and roof/side wall step flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.
- C. Backwrapping
1. Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed (paragraph 3.04 G1). Alternatively, pre-wrap terminating edges of insulation board.
- D. Adhesive Application and Installation of Insulation Board
1. Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.
  2. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. (*Note: rasping prevents an outward bow at the Starter Track*).

3. Use either polyurethane spray foam adhesive (Sto TurboStick) or cementitious adhesive (Sto BTS Plus or Sto BTS Xtra):
  - a. Polyurethane Spray Foam Adhesive (Sto TurboStick): apply adhesive to the back of the insulation board with the dispensing pistol approximately  $\frac{3}{4}$  inch (19 mm) from ends. Apply 5 additional ribbons spaced equally at no greater than 7 inches (177 mm) apart between the end ribbons. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive ribbons approximately  $\frac{1}{2}$  inch (51 mm) in diameter which will expand to  $\frac{3}{4}$  – 1 inch (19 – 25 mm). Keep adhesive  $\frac{1}{2}$  inch (51 mm) short of board edges. Apply adhesive uniformly so ribbons of adhesive do not converge. Allow adhesive to “dwell” and become “tacky” before placing boards on wall. Adhesive will look smooth, not jagged, when ready to apply to wall surface. Place boards while adhesive is “tacky” and before adhesive “skins”.

Place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply light pressure when placing the boards. After boards have been in place for 5-10 minutes use a straight edge to lightly press the boards inward and to keep board joints flush, as post expansion of the adhesive may force boards slightly outward.

4. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.
  5. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
  6. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
  7. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the spray foam adhesive dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.
- E. Slivering and Rasping of Insulation Board Surface
1. Make sure insulation boards are fully adhered to the substrate before proceeding to steps 3.04 E2 and 3.04 E3 below.
  2. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
  3. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.

F. Trim, Reveals and Projecting Aesthetic Features

1. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
4. Do not locate reveals/aesthetic grooves at high stress areas.
5. Ensure minimum ¾ inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.
6. Semi-custom EIFS cornice profiles to be factory cut EPS board with field applied mesh, base coat and finish coat.

G. Completion of Backwrapping

1. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.

H. Accessory Installation

1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh "tail" from one piece onto the next piece. Fully embed the accessory and mesh "tail" in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner.
2. Drip Edge: install the drip edge accessory prior to application of field mesh (paragraph 3.4.2 IS below). Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the

accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

I. Base Coat and Reinforcing Mesh Application

1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
4. Ultra-High impact mesh application (recommended to a minimum height of 6'-0" [1.8 m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-1/2 inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used – see NOTE to paragraph 3.4.2 H1 above). Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.
6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-1/2 inches (65 mm).

7. Allow base coat to thoroughly dry before applying primer or finish.

J. Primer Application

1. Ensure the base coat surface is free of surface contamination before commencing the primer application.
2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.

K. Finish Coat Application

1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.
2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
  - a. Avoid application in direct sunlight.
  - b. Apply finish in a continuous application, and work to an architectural break in the wall.
  - c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
  - d. Do not install separate batches of finish side-by-side.
  - e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
  - f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

### 3.5 PROTECTION

- A. Provide protection of installed materials from water infiltration into or behind them
- B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry

### 3.6 CLEANING, REPAIR AND MAINTENANCE

- A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.
- B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly

- c. Refer to Sto reStore Repair and Maintenance Guide ([reStore Program](#)) for detailed information on restoration – cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding

## SECTION 07 25 00 – WEATHER BARRIERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Commercial weather barrier assemblies.
- 2. Flexible flashing.
- 3. Weather barrier flashing.
- 4. Weather barrier accessories.

- B. Related Requirements:

- 1. Section 042000 "Unit Masonry" for masonry ties and flashing installation.
- 2. Section 061600 "Sheathing" for exterior wall sheathing
- 3. Section 072100 "Thermal Insulation" for installation of exterior insulation.

#### 1.3 DEFINITIONS

- A. Weather Barrier: A combination of materials and accessories that do the following:

- 1. Prevent the accumulation of water as a water-resistive barrier.
- 2. Minimize the air leakage into or out of the building envelope as a continuous air barrier.
- 3. Provide sufficient water vapor transmission to enable drying as a vapor-permeable membrane.

- B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly per International Building Code Section 1403.2.

- C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 section 5.4.3.1.

- D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).

- E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of **10 perms** (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96 per definition in International Building Code. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.
- B. Sustainable Design Submittals:
  - 1. Product Data: Including the following information:
    - a. Provide Environmental Product Declarations (EPDs)
    - b. Provide SDS (formerly MSDS), third-party certifications, or product technical data confirming that systems meet or exceed emissions guidelines for volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), as follows:
      - 1) Commercial weather barrier complies with California Department of Public Health (CDPH) Standard.
      - 2) Adhesives and sealants wet-applied on-site are to meet/exceed VOC content requirements for wet-applied products and comply with SCAQMD Rule 1168.
      - 3) Flashing systems comply with SCAQMD Rule 1168 on VOC limits.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For **[weather barrier]** **[and]** **[flexible flashing]**, from ICC-ES.
- B. Manufacturer's Instructions: For installation of each product specified.
- C. Qualification Data: For Installer
- D. Sample Warranty: For manufacturer's warranty.
- E. Reports: Field test and inspection reports.
- F. Installer's weather barrier manufacturer-training certificate.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.



- B. Manufacturer's Field Service: Register Project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project registration and observation process.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store near heat source or open flame.

#### 1.8 WARRANTY

- A. Manufacturer's Product Warranty: To repair or replace weather barrier product that fails in materials within specified warranty period.
  - 1. Warranty Period: 10 years from date of purchase.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain weather barrier assembly components, including [**weather barrier flashing**] from [**manufacturer approved by weather barrier manufacturer**].

#### 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures without failure due to defective manufacture of products.

#### 2.3 WEATHER BARRIER

- A. Commercial Building Wrap: ASTM E2357 passed, ABAA (Air Barrier Association of America) evaluated air barrier assembly, and assembly water resistance per ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; [**Tyvek CommercialWrap**] or comparable product by one of the following:
    - a. <Dpont Tyvek >.
    - b. Or equal as approved by architect

2. System Description, Single-Layer Weather Barrier: Single-layer weather barrier, including flashing and sealing of penetrations and seams.
3. System Description, Single-Layer Drainable: Single-layer weather barrier with integral drainage, including flashing and sealing of penetrations and seams.
4. Drainability:
  - a. **[90 percent or greater when tested in accordance with ASTM E2273]**
5. Air Permeance, Product: Not more than **[0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.005 L/s x sq. m at 75 Pa)] [0.004 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.02 L/s x sq. m at 75 Pa)]** when tested in accordance with ASTM E2178.
6. Air Permeance, Assembly: Not more than **0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 PA)** when tested in accordance with ASTM E 2357 and evaluated by ABAA.
7. Water Penetration Resistance, Product: Hydrostatic head resistance greater than **22 inches (55 cm)** in accordance with AATCC 127.
8. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E2357 to water resistance in accordance with ASTM E331 to **[2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)]** Select one of two "Water-Vapor Permeance" subparagraphs below based on product used in single-layer system or as the primary layer used in double-layer system.
10. Water-Vapor Permeance: Not less than **23 perms (1300 ng/Pa x s x sq. m)** per ASTM E96/E96M, Desiccant Method (Procedure A) or not less than **28 perms (1600 ng/Pa x s x sq. m)** per ASTM E96/E96M, Water Method (Procedure B).
11. Allowable UV Exposure Time: Not less than 9 months (270 days) when tested in accordance with ASTM G155 (Accelerated Weathering).
12. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.
13. Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
  - a. Peak Heat Release: **13,217 Btu/sq. ft. (150 kW/sq. m).**
  - b. Total Heat Release: **1762 Btu/sq. ft. (20 MJ/sq. m)**
  - c. Effective Heat of Combustion: **7744 Btu/lb (18 MJ/kg)**
14. Weather barrier system to have a VOC content of 30 g/L or less.

## 2.4 WEATHER BARRIER FLASHING

- A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, **176 deg F (80 deg C)** for seven days.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; **DuPont™ FlexWrap™** or comparable product by one of the following:
    - a. Or equal as approved by building wrap manufacturer.

2. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
  3. Water Penetration: No leakage at **15 psf (720 Pa)** per ASTM E331.
  4. Low Temperature Adhesion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)** at **25 deg F (minus 4 deg C)** as Class A (without primer use).
  5. Adhesion After Water Immersion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)**, after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- B. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, **176 deg F (80 deg C)** for seven days.
1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; [**DuPont™ StraightFlash™**] or comparable product by one of the following:
    - a. Or equal as approved by building wrap manufacturer.
  2. Water Penetration: No leakage at **15 psf (720 Pa)** per ASTM E331.
  3. Low Temperature Adhesion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)** at **25 deg F (minus 4 deg C)** as Class A without primer use.
  4. Adhesion After Water Immersion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)**, after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

## 2.5 WEATHER BARRIER ACCESSORIES

- A. Building Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.
1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek® Tape or comparable product.
- B. Closed-Cell Polyurethane Foam Insulation: See section 072110 “ Spray Foam Insulation”
- C. Fasteners with Self-Gasketing Washers: Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with [**1-inch- (25-mm)**] diameter, high-density polyethylene cap washers with UV inhibitors.
1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek® Wrap Caps or comparable product.
  2. Or equal as approved by building wrap manufacturer.

- D. Primer for Flashings: Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.
  - 1. Peel Adhesion Test: Passes in accordance with ASTM D3330, Test Method F, for the following.
    - a. Peel Angles: 0, 25, 72, and 180 degrees.
    - b. Substrates: Concrete masonry units (CMUs), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
  - 2. Chemical Compatibility: Pass; AAMA 713.
  - 3. Flame Spread Index: 5; ASTM E84.
  - 4. Smoke Development Index: 0; ASTM E84.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
  - 1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
  - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

#### 3.3 COMMERCIAL BUILDING WRAP INSTALLATION

- A. General: Comply with weather barrier manufacturer's written installation guidelines and warranty requirements.

- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed.
  - 1. Maintain continuity of air and water barrier assemblies.
  - 2. Start weather barrier installation at a building corner, leaving **12 inches (300 mm)** of weather barrier extended beyond corner to overlap.
  - 3. Install weather barrier horizontally starting at lower portion of wall surface.
  - 4. Provide minimum **6 inches (150 mm)** overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.
  
- C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.
  - 1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
  
- D. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according to weather barrier manufacturer's installation guidelines.
  - 1. Do not use temporary fasteners to permanently attach weather barrier.
  - 2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
  - 3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
  
- E. Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings in accordance with weather barrier manufacturer's installation guidelines.
  - 1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
  - 2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
  - 3. Install flashing in accordance with weather barrier manufacturer's installation guidelines.

### 3.4 WEATHER BARRIER FLASHING INSTALLATION

- A. Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
  - 1. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
  - 2. Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
  - 3. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
  - 4. Lap weather barrier flashing a minimum of **2 inches (50 mm)** onto weather barrier.

5. Apply pressure over entire surface using roller or firm hand pressure
- B. Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
1. Apply [~~6-inch-~~ (150-mm-)] [~~9-inch-~~ (230-mm-)] wide conformable weather barrier flashing at door and window sills.
  2. Ensure that sill flashing does not slope to the interior.
  3. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
  4. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
  5. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
  6. Use strip flashing with wrap cap screws to secure head flap of the windows.
- C. Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.
1. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.
- D. Terminations: Provide minimum **2 inches (50 mm)** overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.
1. Secure weather barrier with fasteners and weather barrier flashing.
- 3.5 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to train installers and observe subject test-wall areas and installations.
- 3.6 CLEANING
- A. Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of [**Section 017300 "Execution."**]
- 3.7 PROTECTION
- A. Protect installed weather barrier from the following:

1. Damage from cladding, structure, or a component of the structure (for example, window, door, or wall system).
2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
4. UV exposure in excess of products' stated limits.

END OF SECTION 072500

## SECTION 072600 - VAPOR RETARDERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Polyethylene vapor retarders to be installed in all exterior wall assemblies.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for under-slab vapor retarders.
2. Section 072100 "Thermal Insulation" for vapor retarders integral with insulation products.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

### PART 2 - PRODUCTS

#### 2.1 POLYETHYLENE VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D4397, [~~6-mil-~~ (0.15-mm-)]thick sheet, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

#### 2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.



PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION 072600

## SECTION 074213.23 - METAL COMPOSITE MATERIAL WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Metal composite material (MCM) panels.
  - 2. Metal composite material (MCM) systems.

#### 1.2 DEFINITIONS

- A. DBVC: Drained and back-ventilated cavity rainscreen system designed to drain and dry water entering cavity through drainage channels, weeps, and air ventilation.
- B. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.
- C. PER: Pressure-equalized rainscreen system designed for no water intrusion, with equal pressure within air cavity and outside cladding barrier.

#### 1.3 ACTION SUBMITTALS

- A. Product data.
- B. Shop Drawings:
  - 1. Include fabrication and installation layouts of MCM system; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, accessories, and special details.
  - 2. Accessories: Include details of flashing, trim, and anchorage, at a scale of not less than **1-1/2 inches per 12 inches (1:10)**.
- C. Samples: Provide (2) samples For each type of MCM panel and system indicated, with factory-applied color finishes.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports:
  - 1. Product Test Reports: For each [MCM system], for tests performed by [qualified testing agency]

- a. MCM panel manufacturer's material test reports.
- b. Fabricator's MCM system test reports.

1) [Dry] Seal System: Tested to AAMA 501.1.

B. Sample warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Warranty documentation.

#### 1.6 QUALITY ASSURANCE

A. Qualifications:

- 1. Composite Panel Manufacturer shall have a minimum of 20 years experience in the manufacturing of this product.
- 2. Composite Panel Manufacturer shall be solely responsible for panel manufacture and application of the finish.
- 3. Fabricator/installer shall be approved by the composite panel manufacturer.
- 4. Fabricator/Installer shall have a minimum ten (10) years experience of metal panel work similar in scope and size to this project.
- 5. Field measurements should be taken prior to the completion of shop fabrication whenever possible. However, coordinate fabrication schedule with construction progress as directed by the Contractor to avoid delay of work. Field fabrication may be allowed to ensure proper fit. However, field fabrication shall be kept to an absolute minimum with the majority of the fabrication being done under controlled shop conditions.
- 6. Shop drawings shall show the preferred joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on the inside face of the panel system as determined by ASTM E 331. Systems not utilizing a construction sealant at the panel joints (i.e. Rout and Return Dry and Rear Ventilated System) shall provide a means of concealed drainage with baffles and weeps for water which may accumulate in members of the system.
- 7. Maximum deviation from vertical and horizontal alignment of erected panels: 6mm (1/4") in 6m (20') non-accumulative.
- 8. Panel fabricator/installer shall assume undivided responsibility for all components of the exterior panel system including, but not limited to attachment to sub-construction, panel to panel joinery, panel to dissimilar material joinery, and joint seal associated with the panel system.
- 9. Composite panel manufacturer shall have established a Certification Program acceptable to the local Code Authorities.

## 1.7 WARRANTY

- A. Panel Integrity Warranty: Manufacturer agrees to repair or replace components of MCM panels that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 2 years from date of Substantial Completion.
- B. Panel Finish Warranty: Manufacturer agrees to repair finish or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: [20] years from date of Substantial Completion.
- C. MCM System Warranty: [Fabricator's] standard form in which manufacturer agrees to repair or replace components of MCM systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: [Two] years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: No failure or deterioration of the system when laterally racked to **3/4 inch (19 mm)** in both directions and repeated for three cycles in accordance with AAMA 501.4. System must pass the static water test as described in ASTM E331 following the seismic racking.
- B. Structural Performance: MCM systems to withstand the effects of the following loads, based on testing in accordance with ASTM E330/E330M:
  - 1. Wind Loads: Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 20 pounds per square foot (psf) and 30 psf on parapet and corner panels. Wind load testing shall be conducted in accordance with ASTM E330 to obtain the following results.
  - 2. Deflection Limits: For wind loads, no greater than [1/180]
- C. Air Infiltration: Air leakage of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** when tested in accordance with ASTM E283/E283M at the following test-pressure difference:
  - 1. Test-Pressure Difference: [**1.57 lbf/sq. ft. (75 Pa)**]
- D. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: [**2.86 lbf/sq. ft. (137 Pa)**]

- E. Water Penetration under Dynamic Pressure: No water penetration when tested in accordance with AAMA 501.1 at the following test pressure:
  - 1. Test Pressure: [6.24 psf (300 Pa)]
- F. Pressure Cycling: Provide PER system with a pass rating in accordance with AAMA 508.
  - 1. Lag between the cavity and the cyclic wind pressure to not exceed 0.08 seconds.
  - 2. Maximum differential between the cavity and the cyclic wind pressure to not exceed 50 percent of the maximum test pressure.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. FTemperature Change: [120 deg F (67 deg C), ambient; 180 deg F (100 deg C),
- H. Fire Propagation Characteristics: MCM system passes NFPA 285 testing.

## 2.2 METAL COMPOSITE MATERIAL (MCM) WALL PANELS

- A. Metal Composite Material (MCM) Wall Panels: Provide MCM panels fabricated from two metal facings bonded to a solid, extruded thermoplastic core.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide 3A Composites USA Inc.; ALUCOBOND PLUS or comparable product by one of the following:
    - a. [Arconic Architectural Products \(USA\)](#).
    - b. [Mitsubishi Chemical Composites](#).
    - c. [Or equal as approved by architect](#)
  - 2. Core: [PE].
  - 3. Panel Thickness: [0.157 inch (4 mm)]
  - 4. Bond Strength: 22.5 in-lb/in. (100 N x mm/mm) when tested for bond integrity in accordance with ASTM D1781.
  - 5. Fire Performance: Flame-spread index less than [25] [and smoke-developed index less than 450, in accordance with ASTM E84 or UL 723.
- B. MCM Panel Materials:
  - 1. Aluminum-Faced Panels: ASTM B209 [alloy as standard with manufacturer, temper as required to suit finish and forming operations] [3003, H14] with [0.020-inch- (0.50-mm-)] thick, aluminum sheet facings.
    - a. Exterior Finish: [Two-coat fluoropolymer] [FEVE fluoropolymer]
      - 1) Color: The project shall include (1) colors of MCM panel as indicated on drawings.

### 2.3 METAL COMPOSITE MATERIAL (MCM) SYSTEM

- A. Dry-Seal Barrier MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for dry-seal barrier system installation. Include attachment assembly components[, panel stiffeners], and accessories required for weathertight system.
  - 1. Basis of Design:
    - a. TFC Series 2200 Aluminum composite rainscreen system with ½" dry joints
    - b. Sobotec SL-200 Dry Joint Gasketed Rainscreen system.
- B. System Panel Depth: [2 inches (51 mm)] [As indicated by manufacturer's designations]
- C. Attachment Assembly Components: [Manufacturer's standard] [Clips] [Tracks] [Channels] formed from [material compatible with panel facing].
- D. Labeling: Comply with labeling requirement of applicable building code.

### 2.4 ACCESSORIES

- A. Metal Subframing and Furring: ASTM C955 cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of MCM system.
- B. System Accessories: Provide components required for a complete, weathertight wall system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae,[ parapet caps,] soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent MCM panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Use gasketed or approved coated fasteners between dissimilar metals.
  - 1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
  - 2. Steel Panels: Use stainless steel fasteners.
  - 3. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM system manufacturer.

## 2.5 FABRICATION

- A. Fabricate and finish MCM panels at the factory, by panel manufacturer's standard procedures and processes, as necessary to fulfill indicated panel performance requirements demonstrated by laboratory testing.
- B. Shop-fabricate MCM systems and accessories by fabricator's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with requirements of MCM panel manufacturer, of indicated system profiles, and with dimensional and structural requirements.
  - 1. Fabricate panels to dimensions indicated on Drawings based on an assumed design temperature of 70 deg F (21 deg C). Allow for ambient temperature range at time of fabrication.
  - 2. Formed MCM panel lines, breaks, and angles to be sharp and straight, with surfaces free from warp or buckle.
  - 3. Fabricate panels with sharply cut edges and no displacement of face sheet or protrusion of core.
  - 4. Fabricate MCM panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
  - 5. Attach routed-and-turned panel flanges to [perimeter extrusions] [panel clips] with manufacturer's standard [fasteners] [structural silicone adhesive].
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.6 FINISHES

- A. Coil-Coated [Aluminum] Finish:
  - 1. PVDF Fluoropolymer: AAMA 2605, [two-coat] fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat[ and clear topcoat]. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. FEVE Fluoropolymer: AAMA 2605, [two-coat] fluoropolymer finish containing 100 percent FEVE resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF MCM SYSTEM

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM system supports, and other conditions affecting performance of the Work.
- B. General: Install MCM system in accordance with system manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM system securely in place, with provisions for thermal and structural movement.
- C. Attachment Assembly, General: Install attachment assembly required to support MCM panels and to provide a complete weathertight wall system, including tracks, drainage channels, anchor channels, perimeter extrusions[, and panel clips].
  - 1. Install subframing, furring, and other panel support members and anchorages in accordance with ASTM C955.
  - 2. Install support system at locations, at spacings, and with fasteners recommended by MCM system manufacturer to meet listed performance requirements.
- D. Dry-Seal MCM System: Attach MCM panels by interlocking panel [clips] [perimeter extrusion] into [tracks] [channels] [ in a sequential series].
  - 1. Seal horizontal and vertical joints between adjacent MCM panels with manufacturer's standard gaskets.
- E. Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install accessory components required for a complete MCM system assembly including trim, copings, corners, seam covers, flashings, [sealants][gaskets], fillers, closure strips, and similar items. Provide types indicated by MCM system manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
- G. Remove temporary protective coverings and strippable films as MCM panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.

**END OF SECTION 074213.23**



## SECTION 074646 - FIBER-CEMENT SIDING

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Fiber cement panel siding & trim
- B. Extruded aluminum wall panel trim accessories (Easy trim reveals)

#### 1.2 RELATED SECTIONS

- A. Section 05400 - Light Gage Metal Framing: Wall framing and bracing.
- B. Section 06100 - Rough Carpentry: Wood framing and bracing.
- C. Section 06100 - Rough Carpentry: Sheathing.
- D. Section 07210 - Insulation: Exterior wall insulation.
- E. Section 099113 – Exterior Painting for field finishing of panels and reveals.

#### 1.3 REFERENCES

- A. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets
- B. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- E. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and

specifications provided by the manufacturer.

- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect and shown on mock up elevations on drawings.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.7 PROJECT CONDITIONS

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

#### 1.8 WARRANTY

- A. Product Warranty: Limited, non-pro-rated product warranty.
  - 1. HardiPanel HZ5 vertical siding for 30 years.
- B. Product Warranty: Limited, product warranty.
  - 1. HardieTrim HZ and HZ5 boards for 15 years.
- C. Product Warranty: Limited, product warranty.
  - 1. Easy Trim revelas for 15 years.
- D. Finish Warranty: See exterior Painting section 099113.
- G. Workmanship Warranty: Application limited warranty for 2 years.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

#### A. Siding & trims

1. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Fax: 949-367-4981; Email: [request info \(info@jameshardie.com\)](mailto:info@jameshardie.com); Web: [www.jameshardiepros.com](http://www.jameshardiepros.com).

2. Substitutions: As approved by architect

#### B. Extruded Aluminum reveals

1) Acceptable Manufacturer: EasyTrim® Reveals Basis of Design: 7/16" Trim System [www.easytrimreveals.com](http://www.easytrimreveals.com) [info@easytrimreveals.com](mailto:info@easytrimreveals.com) 1-877-973-8746

2) Substitutions: As approved by architect

### 2.2 SIDING

#### A. HardiPanel HZ5 vertical siding, requirement for Materials:

1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
4. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI, IBC, IRC).

#### B. Vertical Siding: HardiePanel HZ5 siding as manufactured by James Hardie Building Products, Inc.

1. Type: Smooth Vertical siding panel 4 feet by 8 feet (1219 mm by 2438 mm).
2. Type: Smooth Vertical siding panel 4 feet by 9 feet (1219 mm by 2743 mm).
3. Type: Smooth Vertical siding panel 4 feet by 10 feet (1219 mm by 3048 mm).

#### D. Trim:

1. HardieTrim HZ5 boards and HardieTrim HZ boards as manufactured by James Hardie Building Products, Inc.
2. Size and thickness as indicated on drawings

### 2.3 Extruded aluminum Reveals

- A. Extruded Aluminum Shapes: ASTM B 221, 6063-T6 .050" +/- .005 "
- B. Mechanical Fasteners: Aluminum, stainless steel or other non-corrosive material compatible with aluminum trim.
- C. All profiles are 10 foot long unless otherwise indicated
- E. Finish:
  1. Base Bid: Factory Finish with James Hardie Panel Siding standard colors to match panel colors as indicated on drawings.
  2. Alternate : Factory primed for field painting
    - a. Primer – Oven baked, PPG Duracon 100 Beige Primer.

- b. For site paint application with high-quality acrylic latex paint see section 099113 exterior painting
- D. See drawings for profiles, sizes and locations

## 2.4 FASTENERS

### A. Wood Framing Fasteners:

1. Wood Framing: corrosion resistant siding nails, size and quantity determined by manufactures recommended fastening tables and fastening patterns. .
- 2.

### B. Metal Framing:

1. Metal Framing: S-12 ribbed bugle head screws, size and quantity determined by manufactures recommended fastening tables and fastening patterns. .
- 2.

### C. FINISHES

#### A. Base Bid: Factory Finish: Refer to Exterior Finish Schedule.

- (1) Product: ColorPlus Technology by James Hardie.
- 2) Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
  - (a) Process:
    - (i) Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
    - (ii) Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photo spectrometer and verified by third party.
  - 3) Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed.
  - 4) Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by Manufacturer.
  - 5) Colors: Provide colors as indicated on Exterior elevation legend project includes (4) panels colors

#### B. Alternate Factory Primer: Provide factory applied universal primer.

1. Primer: Factory primed by James Hardie.
2. Topcoat: Refer to Section 099113 and Exterior Painting.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Nominal 2 inch by 4 inch (51 mm by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
  - 1. Install water-resistive barriers and claddings to dry surfaces.
  - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
  - 3. Protect siding from other trades.
- D. Minimum 20 gauge 3-5/8 inch (92 mm) C-Stud 16 inches maximum on center or 16 gauge 3-5/8 inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
  - 1. Install water-resistive barriers and claddings to dry surfaces.
  - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
  - 3. Protect siding from other trades.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier is required in accordance with local building code requirements.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.
- E. Install Building wrap as specified in section 072500 Weather Barriers, with minimum drainage plane efficiency of 90% with all manufacture recommended flashings and tapes.

### 3.3 INSTALLATION - HARDIEPANEL HZ5 VERTICAL SIDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Block framing between studs where HardiePanel siding horizontal joints occur.
- C. Install metal Z flashing and provide a 1/4 inch (6 mm) gap at horizontal panel joints.
- D. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.

- E. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- F. Maintain clearance between siding and adjacent finished grade.
- G. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.

### 3.4 INSTALLATION - HARDIETRIM HZ5 BOARDS

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
- G. Allow 1/8 inch gap between trim and siding.
- H. Seal gap with high quality, paint-able caulk.
- I. Shim frieze board as required to align with corner trim..
- J. Fasten through overlapping boards. Do not nail between lap joints.
- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
- L. Shim frieze board as required to align with corner trim.

### 3.5 Installation of Easy trim reveals

- A. Install in accordance with the Installation Guide Aluminum Trim System for Panel & Lap Siding.
- B. Never install the General J trim horizontally in a manner that may allow the J trim to collect water
- C. Never install any vertical trims horizontally in a manner that may allow them to collect water

- D. EasyTrim® Reveals are not to be used as a primary form of through wall or wall penetration flashings and are not designed to replace flashings that are required by local building codes or the buildings envelope engineers, consultants, or architects.
- E. Install cut edges of panels at door and window openings, and at intersections with other material. Seal cut edges of plank siding and panels according to manufacturer's recommendations.

### 3.6 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

### 3.7 PROTECTION

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

END OF SECTION

## SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

### 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. Section Includes:
  - 1. Mechanically Fastened ( Induction welded) TPO membrane roofing system.
  - 2. Tapered roof insulation
  - 3. Non tapered roof insulation.
- B. Related Sections:
  - 1. Division 6 Section "Rough Carpentry Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
  - 2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counter flashings.

#### 1.3 DEFINITIONS

- A. TPO: Thermoplastic polyolefin.
- B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.



## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Base flashings and membrane terminations.
  - 2. Roof plan showing fastening spacings and patterns for mechanically fastened membrane roofing.
  - 3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Qualification Data: For qualified Installer and manufacturer.
- D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of compliance with performance requirements.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- F. Maintenance Data: For roofing system to include in maintenance manuals.
- G. Warranties: Sample of special warranties.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed and FM Approvals approved for membrane roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- C. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.
- D. Source Limitations: Obtain components including membrane, fasteners, recovery board etc. for membrane roofing system from same manufacturer as membrane roofing or from a MFG approved by membrane roofing manufacturer for use in warranted assemblies.

- E. Exterior Fire-Test Exposure: ASTM E 108, Class A for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- F. Pre-installation Roofing Conference: Conduct conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
  - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
  - 5. Review structural loading limitations of roof deck during and after roofing.
  - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
  - 7. Review governing regulations and requirements for insurance and certificates if applicable.
  - 8. Review temporary protection requirements for roofing system during and after installation.
  - 9. Review roof observation and repair procedures after roofing installation.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

## 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. Temporary Facilities: The roofing contractors shall coordinate with the G.C. for any power water, sanitary or additional temporary facilities required for the completion of the project.
- C. The Roofing contractor shall coordinate dumpster locations with the G.C.
- D. The roofing contractor shall secure all materials on site during the course of construction.
- E. The roofing contractor shall remove all debris from the job site in a timely and legally acceptable manner so as to not detract from the aesthetics or the functions of the building.
- F. The roofing contractor shall use reasonable care and responsibility to protect the building and site against damages. The contractor shall be responsible for the correction of any damage incurred as a result of the performance of the contract.
- G. The roofing contractor shall adequately protect the building, from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.
- H. Do not overload any portion of the building, either by use of or placement of equipment, storage of debris, or storage of materials.
- I. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.
- J. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.
- K. Store moisture susceptible materials above ground and protect with waterproof coverings.
- L. Remove all traces of piled bulk materials and return the job site to its original condition upon completion of the work.

## 1.9 Temporary Roofing Tie-in Requirements During Installation.

- A. If installation of the roof system is required during unsuitable weather, or before completion of wood blocking, curbs, penetrations, or the erection of walls, a temporary roofing and flashing may need to be installed to keep the building water tight.

- B. If a temporary roof is needed due to construction requirements, installing a modified asphalt base sheet or two fiberglass roofing plies in an appropriate adhesive over an approved substrate, to be used as the temporary roof.
- C. This temporary roof can serve to protect the interior of the building during the early stages of construction. The temporary roof and flashing shall be removed when the new roof and flashings are scheduled to be installed.
- D. If roof insulation is installed under the temporary roof, the insulation shall be inspected for wet or damaged areas, so that such areas may be removed and replaced prior to installation of the Firestone roof system.
- E. The roofing contractor shall submit additional recommendation to the GC for temporary roofing requirements in order to maintain a dry building.

#### 1.10 Moisture Considerations

- A. The roofing contractor is responsible for ensuring that the substrate is suitable to receive the roof system. All damaged and/or wet insulation or substrate must be removed and replaced prior to the application of the roof system.
- B. A moisture survey should be conducted to determine the moisture content of any existing roof system component. All damaged and/or wet components of the existing system that would be detrimental to the new roof system must be removed prior to its installation.
- C. At the completion of the project, the G.C. will have an infrared thermography taken of the new roof areas.

#### 1.11 SAFETY

- A. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. Safety shall be the responsibility of the roofing contractor. All related personnel shall be instructed daily to be mindful of the fulltime requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

#### 1.12 WARRANTY

- A. Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Warranty includes membrane roofing, base flashings, fasteners, recovery boards, roofing accessories, roof pavers and other components of new membrane roofing system.

2. Warranty Period: Provide manufacturer's 20 year Total System Warranty covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 90 mph measured at 10 meters above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
- B. Contractor labor and material warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, recovery board, fasteners, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
- B. The TPO Membrane Roofing System must achieve a UL Class A rating.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
    - a. Carlisle SynTec Incorporated. – Sure-Weld reinforced TPO Membrane
    - b. Firestone Building Products Company.- Ultra Ply TPO
    - c. Johns Manville – JM- TPO- SA
    - d. Mule Hid Products - SA-TPO-C
  2. Thickness: 60 mils nominal.
  3. Exposed Face Color: Gray.
  4. Initial SRI of 78 or higher

### 2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard non-reinforced thermoplastic polyolefin sheet flashing, 60 mils thick, minimum, of same color as sheet membrane.

- C. TPO T-joint covers: Provide MFG's 60 mil thick non-reinforced TPO Flashing cut into 4.5" diameter circles used to seal step-offs at splice intersections
- D. Counter Flashing: Counter flashing shall be 20 gage galvanized sheet steel. Color by architect. Face height of counter flashing shall be 3 ¾" minimum.
  - 1. All metal flashing shall be supplied by the roofing contractor on the project.
- E. Provide manufacturer's standard splicing cement for adhering membrane flashing at tie-ins to TPO membrane.
- F. Provide TPO pressure sensitive RUSS as required by System Manufacturer and roofing contractor/.
- G. Provide manufacturer's standard
  - 1. Water cut-off mastic.
  - 2. Cut edge sealant
  - 3. Bonding adhesives
  - 4. Thermoplastic one-part pourable sealer to fill TPO molded pourable sealant pockets
  - 5. Membrane cleaner as required prior to heat welding.
  - 6. pre-fabricated sealant pockets
- H. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- I. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, pre-punched.
- J. Provide manufacturer's standard pre-molded Pipe Flashings with clamp rings.
- K. Provide manufacturer's standard premolded inside/outside corner flashings. Match membrane color.
- L. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- M. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

## 2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226 or ASTM D 4869, Type II, asphalt-saturated organic felts, nonperforated.
- B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil-thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.

1. Products equal to CertainTeed WinterGuard Sand.
2. Material to be wrapped over the top of the parapet.
3. Roofing contractor to confirm with roofing MFG the sequence of placement of the ice and water shield to maintain warranty. Will it be placed above or below the TPO membrane.

#### 2.4 Insulation Securement Adhesive

- A. A spray (full coverage) or bead-applied, two-component polyurethane, construction grade, low-rise expanding foam adhesive used for attaching approved insulations to compatible roof decks or existing smooth or gravel surfaced BUR, modified bitumen or cap sheets.
  1. Subject to compliance with project requirements, provide the following product :
    - a. Carlisle Flexible FAST Dual Tank, Dual Cartridge and 5-gallon Jug Adhesive: A two component (Part A and B), extrusion applied, low rise adhesive for bonding insulation to various surfaces

#### 2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Attachment requirements:
  1. Contractor to mechanically fasten the layer of insulation and then glue the last layer of insulation prior to membrane placement.
  2. See drawings for area of roof that shall have base layer of insulation glued as well to eliminate penetration of metal deck.
- C. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class I, Grade 3 (25psi) , felt or glass-fiber mat facer on both major surfaces. Provide MFG's required roof insulation as required for the fully adhered roof membrane.
  1. Product equal to Carlisle 'SecurShield Polyiso'
    - a. Composite polyisocyanurate insulation panels.
  2. Tapered insulation:
    - a. Refer to the roof plan for the location of tapered insulation and non tapered insulation.

- b. Provide a minimum of 1" of insulation at the roof drains prior to the start of the taper
  - c. Structure is not sloped.
  - d. Tapered roof slope is ¼" per foot.
3. Non –tapered roof insulation.
- a. At all locations , provide R-20 min. of roof insulation. Insulation must be in a minimum of two layers. Joints in insulation must be staggered when installed.
  - b. See structural framing plans and roof plans for locations of sloped structure.
  - c. Provide tapered rigid insulation crickets to downspout scuppers at ¼" min. as listed on drawings.

## 2.6 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and recovery board to substrate, and acceptable to roofing system manufacturer.
  - 1. Contractor to verify length of fasteners.
- C. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- D. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

## 2.7 Protection Matt/Fabrics

- A. Provide the MFG's standard 12 oz/ square yard protection mat to be located as noted on the roof plan. Hot Air weld walkway rolls to TPO membrane per MFG's recommendations

## 2.8 Walkways

- A. Prior to the installation of the Walkway Roll clean the TPO membrane to prepare the area to be welded or adhered to the walkway material.
- B. TPO walkway pads will also be required as a slip sheet below the duct support and pipe support structures supplied by the mechanical/plumbing contractors.



- C. If the TPO membrane is heavily contaminated by dirt, a primer pad may be used with the weathered membrane cleaner to expose a weldable surface. All residue should be removed by wiping with a clean dry white natural fiber (cotton)rag.
- D. Position the walkway material and cut the Walkway Rolls into maximum 10' lengths and position with a minimum 1 inch gap between adjacent pieces to allow for water drainage. Cut the walkway so a 4" minimum gap is created over any field splices. (Since the attachment of the walkway to the membrane is permanent, this will allow access to the field seams).
- E. Using an Automatic Heat Welder, weld all 4 sides of the walkway material to the membrane. (Typically the same speed and temperature settings will be used for this procedure as for welding membrane to membrane. A test weld is always recommended prior to performing welds to the installed membrane).
- F. Allow the walkway to warm by the sun prior to welding so distortion will not occur due to expansion.
- G. As an alternative, the walkway roll may be adhered to the membrane surface per MFG's recommendations.

## 2.9 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  - 1. Verify existing roof openings and penetrations. Confirm that the required 8" vertical flashing at curbs and equipment is possible. If vertical flashing is less than the recommended height at some of the curbs, notify the manufacturers representative to ensure that there will be not issue with the membrane warranty.
  - 2. Verify that wood blocking, and nailers are securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 2.10 GENERAL

- A. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
  - 1. If the temperature is below 45 degrees, contact roofing MFG for additional procedures that may be required due to outside temperature.
- B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- C. New roofing shall be complete and weathertight at the end of each work day.

- D. Care should be taken when installing fasteners to avoid possible conduits and other piping under the roof deck
- E. When areas of wet or damage insulation is found, contact the general contractor prior to removal. The general contractor will verify conditions, photograph and measure the area.

#### 2.11 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

#### 2.12 INSULATION INSTALLATION

- A. The roof deck is a combination of ¾" apa rated plywood and a 1.5B 22 gage galvanized G60 metal deck. See structural framing plans for locations.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- D. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints horizontally and vertically if multiple layers are provided
- E. Insulation attachment: Two (2) layers of insulation shall be mechanically fastened to the deck.
  - 1. Fasten insulation according to requirements over manufacture.
  - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

#### 2.13 ATTACHMENT OF MEMBRANE ROOFING INSTALLATION:

- A. A minimum of one perimeter sheet shall be installed at edges of each roof level and 12', 10' or 8' wide membrane shall be installed in the field of the roof.
- B. Membrane sheets shall be mechanically fastened using the **Rhino Bond Indication welded attachment** with the appropriate Carlisle Fastener /Fastening Plate spaced 6" to 12" on center de-

pending on project criteria, within the membrane splice. Refer to the Thermoplastic Specification for required number of perimeter of membrane sheets and fastener spacing.

- C. Overlap adjacent membrane sheets approximately 5-1/2" at those locations where Fastening Plates are located (along length of membrane) and a minimum of 2" at end roll sections (width of the membrane).
- D. Hot air weld the membrane sheets a minimum of 1-1/2" with an Automatic Hot Air Welding Machine.
- E. Membrane that has been exposed to the elements for approximately 7 days must be prepared with Weathered Membrane Cleaner
- F. Wipe the surface where Weathered Membrane Cleaner has been applied with a clean, dry HP Splice Wipe or other white rag remove cleaner residue prior to hot air welding.

#### Additional Membrane Securement

- A. The membrane must be secured at the perimeter of each roof level, roof section, expansion joint, curb, skylight, interior wall, penthouse etc., at any angle change which exceeds 2" in one horizontal foot and at all other penetrations in accordance with Carlisle's Details published with Carlisle's Specifications.

#### Membrane Flashing

- a. Flash all walls and curbs with Sure-Weld reinforced membrane. Non-Reinforced membrane shall be limited to inside and outside corners, field fabricated pipe seals, scuppers and Sealant Pockets where the use of pre-molded accessories are not practical.
- b. On vertical surfaces, such as walls, curbs and pipes, Bonding Adhesive is not required when the flashing height is 12" or less and membrane is terminated under a metal counterflashing (nailed). When a coping or termination bar is used for vertical terminations Bonding Adhesive may be eliminated for flashing heights 18" or less.
- c. Terminate the flashing in accordance with an appropriate Carlisle Details above anticipated slush line.
- d. When using the Pressure-Sensitive Cover Strip to overlay metal edging flanges or fasteners/plates, Carlisle Weathered Membrane

#### 2.14 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

#### 2.15 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
  - 1. .
- B. Self-Adhering Sheet Underlayment: Install, wrinkle free, over the top of the roof parapet.. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than **3-1/2 inches**. Lap ends not less than **6 inches** staggered **24 inches** between courses. Roll laps with roller. Cover underlayment within seven days.
  - 1. Parapet. Install over the top of the parapet. Confirm with Roofing MFG' on the placement above or below the TPO membrane.

#### 2.16 WALKWAY INSTALLATION

- A. Walkway pad: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave **3 inches** of space between adjacent roof pavers.
- B. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

#### 2.17 FIELD QUALITY CONTROL

- A. Testing Agency: If there are issues or concerns with the roof, the owner will engage a qualified testing agency to perform tests and inspections.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

2.18 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 075423

## SECTION 076200 - SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Manufactured reglets with counterflashing.
  - 2. Formed low-slope roof sheet metal fabrications.
  - 3. Formed wall sheet metal fabrications.

#### 1.2 PREINSTALLATION MEETINGS

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

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Distinguish between shop- and field-assembled work.
  - 3. Include identification of finish for each item.
  - 4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.
- C. Samples: For each exposed product and for each color and texture specified.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to SMACNA configurations and profiles shown unless more stringent requirements are indicated.

## 1.6 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: Minimum 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim:
  - 1. SMACNA Sheet Metal Manual and The NRCA Roofing Manual
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

### 2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
  - 1. Exposed Coil-Coated Finish:
    - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. Color: As selected by Architect from manufacturer's full range
    - a. The project is assumed to include multiple colors of prefinished metal flashing. See drawings. .
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D finish.

- D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275)]; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed Coil-Coated Finish:

- a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color: As selected by Architect from manufacturer's full range.
- a. The project is assumed to include multiple colors of prefinished metal flashing. See drawings. .

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Underlayment:
1. Slip Sheet: Rosin-sized paper, minimum 3 lb./100 sq. ft. (0.16 kg/sq. m).
2. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Fasteners: Annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
- a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
- b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.



- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

#### 2.4 REGLETS

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory- mitered and welded corners and junctions.
  - 1. Manufacturers:
    - a. Cheney Flashing Company, Inc.
    - b. Fry Reglet Corporation.
    - c. Heckmann Building Products Inc.
    - d. Hickman, W. P. Company.
  - 2. Material: Aluminum, 0.024 inch thick

#### 2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 1. Obtain field measurements for accurate fit before shop fabrication.
  - 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 3. Do not use exposed fasteners on faces exposed to view.
- B. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.
- D. Fabricate attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

- E. Fabricate attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- G. Seams for Other than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

## 2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stops) and Fascia Caps: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with -inch- (150-mm-) wide, joint cover plates.
  - 1. Fabricate from the Following Materials:
    - a. Pre-finished Aluminum: 0.032 inch (1.27 mm) thick.
  - B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners. Seal watertight all corners.
    - a. Joint Style: Butt, with 12-inch- wide concealed backup plate and 6-inch- wide exposed cover plates.
    - b. Provide a continuous 20 gage cleat at the front and back of the coping.
      - 1) No exposed fasteners will be allowed on the front or back side of the coping.**
    - c. Fabricate copings from the following material:
      - d. Aluminum: 0.032 inch **thickness**
  - 2. Below all metal coping, install an ice and water shield over the top of the parapet.
  - 3. Provide shelf applied self adhering flashing at joints per details in drawings.
  - 4. Roof membrane to wrap over the top of the parapet.
  - 5. Coping color selected by architect.
    - a. The project is assumed to include multiple colors of prefinished metal flashing. See drawings. .
- C. Base Flashing: Fabricate from the following materials:
  - 1. Pre-finished Aluminum: 0.032 inch (1.02 mm) thick.

D. Counterflashing and Flashing Receivers: Fabricate from the following materials:

1. Pre-finished Aluminum: 0.032 inch (0.81 mm) thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Copper: 16 oz./sq. ft. (0.55 mm thick).
2. Stainless Steel: 0.019 inch (0.48 mm) thick.
3. Lead: 4.0 lb/sq. ft. (1.6 mm thick) hard tempered.
4. Lead-Coated Copper: 17.2 oz./sq. ft. (0.60 mm thick)

F. Roof-Drain Flashing: Fabricate from the following materials:

1. Copper: 12 oz./sq. ft. (0.41 mm thick).
2. Stainless Steel: 0.016 inch (0.40 mm) thick.
3. Lead: 4.0 lb/sq. ft. (1.6 mm thick) hard tempered.
4. Lead-Coated Copper: 17.2 oz./sq. ft. (0.60 mm thick)

G. Drip Edges: Fabricate from the following materials:

1. Pre-finished Aluminum: 0.032 inch (0.81 mm) thick.

H. Eave, Rake Flashing: Fabricate from the following materials:

1. Pre-finished Aluminum: 0.032 inch (0.81 mm) thick.

## 2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Where applicable, fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Copper: 16 oz./sq. ft. (0.55 mm thick).
2. Stainless Steel: 0.016-inch (0.40 mm) thick.

B. Opening Flashings in Frame Construction: Where applicable, fabricate flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Aluminum: 0.032-inch (0.81 mm) thick.
2. Stainless Steel: 0.016-inch (0.40 mm) thick.

## PART 3 - EXECUTION

### 3.1 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

### 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space clips not more than 12 inches (300 mm) apart. Attach each clip with at least two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
  - 1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

- C. Expansion Provisions: Where applicable, space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.

### 3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Expansion-Joint Covers: Install expansion-joint covers with lapped joints at a minimum of 4 inches (100 mm) in direction of water flow.
- C. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60-inches o.c. in between.

### 3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous clip anchored to substrate.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm).
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal and clamp flashing to pipes that penetrate roof.

### 3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

### 3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in the Manufacturer's written installation instructions.

END OF SECTION 076200

## SECTION 077100 - MANUFACTURED ROOF SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Warranty. A 15-year wind warranty shall be supplied to the owner upon completion of the project.
- B. This Section includes the following:
  - 1. Roof Access hatches.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
- C. Samples: For each exposed finish.

### PART 2 - PRODUCTS

#### 2.1 ROOF SCUTTLE

- A. Furnish and install:
  - 1. Metal roof scuttle Type I, size width: 2'-6" x length: 4'-6"; See Drawings for Basis-of-Design information. Length denotes hinge side. The roof scuttle shall be single leaf. The roof scuttle shall be pre-assembled from the manufacturer.
  - 2. The BILCO Company, phone: 203/934-6363, or equal as approved by owner.
    - a. Furnish and install where indicated on the roof plan
    - b. Exposed metal on the roof hatch shall be painted. Color selected by architect.
- B. Performance characteristics:
  - 1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m<sup>2</sup>) with a maximum deflection of 1/150th of the span or 20 psf wind uplift.
  - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
  - 3. Operation of the cover shall not be affected by temperature.
  - 4. Entire scuttle shall be weathertight with fully welded corner joints on cover and curb.

- C. Cover: Shall be 14-gauge paint bond G-90 galvanized steel with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
  - 1. Roof access hatch shall be mill finish aluminum.
- D. Cover insulation: Shall be fiberglass of 1" (25.4mm) thickness, fully covered and protected by a metal liner panel of 22-gauge paint bond G-90 galvanized steel
- E. Curb: Shall be 12" (305mm) in height and of 14-gauge paint bond G-90 galvanized steel. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal cap flashing of the same gauge and material as the curb, fully welded at the corners, that features the Posi-Flash® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- F. Curb insulation: Shall be rigid, high-density fiberboard of 1" (25.4mm) thickness on outside of curb.
- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe through bolted to the curb assembly.
- H. Hardware
  - 1. Heavy pintle hinges shall be provided
  - 2. Cover shall be equipped with an enclosed two-point spring latch with interior and exterior turn handles
  - 3. Roof scuttle shall be equipped with interior and exterior padlock hasps.
  - 4. The latch strike shall be a stamped component bolted to the curb assembly.
  - 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25.4mm) diameter red vinyl grip handle to permit easy release for closing.
  - 6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed. Springs shall have an electrocoated acrylic finish for corrosion resistance.
  - 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- I. Finishes: Factory finish shall be Mil Finish Aluminum.

## 2.2 ACCESSORIES

- A. Exposed Fasteners: Stainless steel, nonmagnetic, of manufacturer's standard type and size for product and application indicated. Match finish of exposed heads with material being fastened.



- B. Concealed Fasteners: Same metal as item fastened or other non-corrosive metal as recommended by manufacturer.
- C. Prefabricated corner units for both inside and outside corners, welded. Formed fascia extenders of profile and size indicated on the drawings but not less than 6" exposure for the outside face.
- D. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
- E. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- F. Foam-Rubber Seal: Manufacturer's standard foam
- G. Corners, end caps, pier caps, etc. shall be fabricated by the coping manufacturer.
- H. Welded assembly shall be used to maintain watertight integrity.
- I. Provide and install safety railing around perimeter of roof access hatch as indicated on drawings.

### PART 3 - EXECUTION

#### A. INSPECTION

1. Verify that roof scuttle installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

#### B. INSTALLATION

1. Submit product design drawings for review and approval to the architect prior fabrication.
2. Provide wood blocking below curb as required for installation.
3. Unit shall be flashed into the roof membrane per MFG's requirements.
4. The installing contractor shall check as-built roof conditions and verify the manufacturer's roof scuttle details for accuracy to fit the application prior to fabrication. The installer shall comply with the roof scuttle Manufacturer's installation instructions.
5. The installer shall furnish mechanical fasteners consistent with the roof requirements.
6. Upon completion of the work, the exposed metal area shall be finished painted as directed by the architect.
7. Clean unit and adjust hardware for proper working condition.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Roof curbs.
  - 2. Equipment supports.

ACTION SUBMITTALS

- B. Product Data: For each type of roof accessory.
- C. Shop Drawings: For roof accessories.
- D. Samples: For each exposed product and for each color and texture specified.

1.2 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.4 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints and integrally formed deck-mounting flange at perimeter bottom.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

- C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch (1.32 mm), 0.064 inch (1.63 mm) or 0.079 inch (2.01 mm) thick as applicable.
- D. Construction:
  - 1. Curb Profile: Manufacturer's standard, compatible with roofing system.
  - 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
  - 3. Fabricate curbs to minimum height of 12 inches (305 mm) above field-confirmed roofing surfaces.
  - 4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
  - 5. Insulation: Factory insulated with minimum 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
  - 6. Liner: Same material as curb, of manufacturer's standard thickness and finish.
  - 7. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
  - 8. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch (19-mm) thick fire-resistive plywood covered with metal sheet of same type, thickness, and finish as required for curb.
  - 9. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

## 2.2 EQUIPMENT SUPPORTS

- A. Equipment Supports: Internally reinforced perimeter metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed structure-mounting flange at bottom.
- B. Size: Contractor shall coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch (1.32 mm), 0.064 inch (1.63 mm) or 0.079 inch (2.01 mm) thick as applicable.
- D. Construction:
  - 1. Curb Profile: Manufacturer's standard compatible with roofing system.
  - 2. Insulation: Factory insulated with minimum 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
  - 3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
  - 4. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.

## 2.3 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation and mill phosphatized for field painting where applicable.
  - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
  - 2. Factory Prime Coating: Where field painting is required, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
  - 3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
  - 4. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).
  - 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.
- C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
- D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- E. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- F. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- G. Steel Tube: ASTM A 500/A 500M, round tube.
- H. Galvanized-Steel Tube: ASTM A 500/A 500M, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- I. Steel Pipe: ASTM A 53/A 53M, galvanized.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Polyisocyanurate Board Insulation: ASTM C 1289.

- C. Underlayment:
1. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
  2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
  3. Slip Sheet: Building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum, rosin sized.
  4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
  5. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
- D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- G. Asphalt Roofing Cement: ASTM D 4586/D 4586M, asbestos free, of consistency required for application.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.
1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  2. Anchor roof accessories securely in place so they are capable of resisting load requirements.
  3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum or stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.

- C. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

## SECTION 078100 - APPLIED FIRE PROTECTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Sprayed fire-resistive materials.

#### 1.2 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Sprayed fire-resistive material.
  - 2. Substrate primers.
  - 3. Bonding agent.
  - 4. Topcoat.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Evaluation reports.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products in accordance with specified requirements.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

- B. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- C. Asbestos: Provide products containing no detectable asbestos.

## 2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.
  - 1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] :
    - a. Carboline Company; a subsidiary of RPM International.
    - b. GCP Applied Technologies Inc.
    - c. Isolatek International.
    - d. Or Approved Equal
  - 2. Application: Designated for location (interior or exterior as applicable) use by a qualified testing agency acceptable to authorities having jurisdiction.
  - 3. Bond Strength: Minimum **150-lbf/sq. ft. (7.18-kPa)** cohesive and adhesive strength based on field testing in accordance with ASTM E736.
  - 4. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than **0.375 inch (9 mm)**. **See drawings for UL D916 & P573 horizontal assembly details..**
  - 5. Combustion Characteristics: ASTM E136.
  - 6. Surface-Burning Characteristics: Comply with ASTM E84.
    - a. Flame-Spread Index: 10 or less.
    - b. Smoke-Developed Index: 10 or less.
  - 7. Corrosion Resistance: No evidence of corrosion in accordance with ASTM E937.
  - 8. Deflection: No cracking, spalling, or delamination in accordance with ASTM E759.
  - 9. Effect of Impact on Bonding: No cracking, spalling, or delamination in accordance with ASTM E760.
  - 10. Air Erosion: Maximum weight loss of **0.025 g/sq. ft. (0.270 g/sq. m)** in 24 hours in accordance with ASTM E859.
  - 11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21 or rating of 10 in accordance with ASTM D3274 when tested in accordance with ASTM D3273.



### 2.3 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer for the required fire-resistance design.
- C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer.
- D. Topcoat: Suitable for application over sprayed fire-resistive material; of type recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.

### 3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.
- B. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

### 3.3 APPLICATION

- A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.
- B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.

- D. Do not install enclosing or concealing construction until after sprayed fire-resistive material has been applied, inspected, and tested and corrections have been made to deficient applications.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Test and inspect as required by the IBC, Subsection 1705.13, "Sprayed Fire-Resistant Materials."
- B. Fire protection will be considered defective if it does not pass tests and inspections.
  - 1. Remove and replace fire protection that does not pass tests and inspections, and retest.
  - 2. Apply additional fire protection, in accordance with manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- C. Prepare test and inspection reports.

### 3.5 CLEANING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

### 3.6 REPAIRS

- A. Repair fire protection damaged by other work before concealing it with other construction.
- B. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

## SECTION 078413 - PENETRATION FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Typical penetration firestopping systems for the following as applicable :
  - a. Penetrations in fire-resistance-rated walls.
  - b. Penetrations in horizontal assemblies.
2. Fire stopping must be completed by one contractor for all the trades on the site. The general contractor shall coordinate fire stopping responsibilities in the field.
3. The general contractor shall submit to the Architect and Owner a letter stating that all fire stopping work has been completed and reviewed prior to any penetrations being covered up by drywall, ductwork etc.
4. Refer to plans for locations of rated walls and horizontal assemblies.

#### 1.2 PREINSTALLATION MEETINGS

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

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
- C. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data. Submittal should be in compliance with Section 01300.
- D. Material Safety Data Sheets (MSDS): Submit MSDS for each firestop product.
- E. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.
- F. Engineering Judgments: Submit manufacturer's drawings for all non-standard applications where no UL tested system exists. All drawings must indicate the "Tested" UL system upon

which the judgment is based so as to assess the relevance of the judgment to some known performance.

- G. Submit manufacturer's installation procedures for each type of product.
- H. Upon completion, installer shall provide written certification that materials were installed in accordance with the manufacturer's installation instructions and details.

#### 1.4 CLOSEOUT SUBMITTALS

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

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Fire-Test-Response Characteristics: Provide rated systems identical to those tested per ASTM E 814 and with products bearing the classification marking of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestop systems.
- D. Intent of specification is to require that all firestopping work on this Project be performed by a single installer; who is trained, experienced and certified by the materials manufacturer to perform this type of work, and who shall certify to the Owner that the building is firestopped in accordance with the Building Code of the State of Indiana
- E. Firestopping materials & systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical & mechanical duct work).
- F. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.
- G. Firestopping sealants must be flexible, allowing for normal pipe movement.
- H. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
- I. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- J. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

- K. Material used shall be in accordance with the manufacturer's written installation instructions.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
  - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
    - 1) UL in its "Fire Resistance Directory."

### 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Product assemblies that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
1. Basis-of-Design : HILTI , Plano, TX 76024 ; ( 800 / 879-8000 ) ; [www.HILTI.com](http://www.HILTI.com)  
NOTE : See Part 3 - Firestopping Schedule for typical assemblies and requirements .
  2. Specified Technologies Inc. , Somerville, NJ 08876 ; ( 800 / 992-1180 ) ;  
[www.stifirestop.com](http://www.stifirestop.com)
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated. Accessories include, but are not limited to, the following:
  - 1. Permanent forming / damming / backing materials.
    - 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.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Clean openings immediately before installing firestop systems.
- C. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- D. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- E. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
  1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Designation of applicable testing and inspecting agency.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### 3.3 FIELD QUALITY CONTROL

- A. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- B. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.4 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Provide firestopping products 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 firestopping products manufacturer based on testing and field experience.

- B. Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Use only firestop products that have been UL 1479 or ASTM E 814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- D. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:
  - 1. Hilti CP 680-P Cast-In Place Firestop Device
    - a. Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
  - 2. **Hilti CP 681 Tub Box Kit for use with tub installations at second floor slab.**
  - 3. Hilti CP 680-M Cast-In Place Firestop Device for use with noncombustible penetrants.
  - 4. **Hilti CP 653 Speed Sleeve for use with cable penetrations.**
- E. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
  - 2. Hilti CP 604 Self-leveling Firestop Sealant
  - 3. Hilti CP 620 Fire Foam
  - 4. Hilti CP606 Flexible Firestop Sealant
  - 5. Hilti CP 601s Elastomeric Firestop Sealant
- F. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
  - 1. Hilti CP 601s Elastomeric Firestop Sealant
  - 2. Hilti CP 606 Flexible Firestop Sealant
  - 3. Hilti FS-ONE Intumescent Firestop Sealant
- G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
- H. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
  - 2. Hilti CP 620 Fire Foam



3. Hilti CP 601s Elastomeric Firestop Sealant
  4. Hilti CP 606 Flexible Firestop Sealant
- I. Non curing, re-penetrable, intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Firestop Putty Stick
  2. Hilti CP 658T Firestop Plug
- J. Wall opening protective materials for use with U.L. listed metallic and specified non-metallic outletboxes, the following products are acceptable:
1. **Hilti CP 617 Firestop Putty Pad**
  2. Hilti Firestop Box Insert
- K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 643N Firestop Collar
  2. Hilti CP 644 Firestop Collar
  3. Hilti CP 648E/648S Wrap Strips
- L. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti CP 637 Firestop Mortar
  2. Hilti FS 657 FIRE BLOCK
  3. Hilti CP 620 Fire Foam
  4. Hilti CP 675T Firestop Board
- M. Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
  2. Hilti CP 675T Firestop Board
- N. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
  2. Hilti CP 658T Firestop Plug
- O. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E 814 which is equal to the time rating of construction being penetrated.

## PART 4 – ADJUSTING AND CLEANING

### 4.1 ADJUSTING AND CLEANING

- A. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
- B. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
- C. Protect materials from damage on surfaces subjected to traffic.
- D. Examine sealed areas to ensure proper installation before concealing or enclosing areas.
- E. Keep areas of work accessible until inspection by applicable code authorities.
- F. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- G. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

1.0 GENERAL

A. Type:

- S - Single Component
- M - Multi-Component

Grade:

- P - Pourable
- NS - Non-sag

Movement Capability Class :

- Class 100/50 - 100% expansion -50% compression
- Class 50 - 50%
- Class 35 - 35%
- Class 25 - 25%
- Class 12.5 - 12.5%

Use:

- T - Traffic
- NT - Non-traffic
- I - Immersed
- M - Mortar
- G - Glass
- A- Aluminum
- O - Other

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:
  1. Each kind of sealant and joint substrate indicated.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
  1. 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.

4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
5. 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.

## 1.1 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in **1/2-inch-** wide joints formed between two **6-inch-** long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Qualification Data: For qualified Installer.
- E. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- G. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- H. Warranties: Sample of special warranties.

## 1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
  1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- E. Preinstallation Conference: Conduct conference at Project site as required for each type of sealant required.

### 1.3 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

### 1.4 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: One year from date of Substantial Completion.

### 2.0 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  1. Architectural Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.

- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.1 PRODUCTS

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions, as demonstrated by testing and field experience.
- B. Colors: As selected by Architect from manufacturer's standard colors.
- C. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated complying with ASTM C 920 requirements.
  - 1. Multi-Part, Nonsag Urethane Sealant for Use NT: Type M, Grade NS, Class 25, and Uses T, NT, M, G, A, and O.
    - 1. Products: Subject to compliance with requirements, provide one of the following manufacturers products
      - 1. BASF Building Systems.
      - 2. May National Associates, Inc..
      - 3. Pacific Polymers International, Inc.
      - 4. Tremco Incorporated
    - 2. One-Part, Nonsag Urethane Sealant for Use NT: Type S; Grade NS; Class 25; and Uses NT, M, A, and O.
      - 1. Products: Subject to compliance with requirements, provide one of the following manufacturers products
        - 1. BASF Building Systems.
        - 2. May National Associates, Inc.
        - 3. Pacific Polymers International, Inc.
        - 4. Tremco Incorporated
    - 3. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type S, Grade NS, Class 100/50, for Use T. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand changes in

joint width as measured at time of application, of 100% in extension and 50% in compression for a total of 150% and remain in compliance with other requirements of ASTM C 920 for uses indicated.

1. Products: Subject to compliance with requirements, provide one of the following manufacturers products

1. Dow Corning Corporation
2. May National Associates, Inc..
3. Pecora Corporation
4. Tremco Incorporated

5. Specialty Sealants: All sealant required around the bulk oxygen enclosure and the emergency generator enclosure shall be NR-201 Urexpam by Pecora Corporation or equal.

6. One-part , mildew -resistant silicone sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and O. Formulated with fungicide; intended for sealing interior joints with nonporous substrates exposed to high humidity and temperature extremes.

1) Products: Subject to compliance with requirements, provide the following

a) Pecora Corporation

D. Acoustical Joint Sealants: 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. Pecora Corporation; AC-20 FTR.
- b. USG Corporation; SHEETROCK Acoustical Sealant.
- c. Tremco

E. Tape Sealant: Solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with release paper on one side.

F. Preformed Foam Sealant: Preformed, precompressed, open-cell, high-density urethane foam sealant impregnated with a nondrying, water-repellent agent; in precompressed sizes and in roll or stick form to fit joint widths indicated; permanently elastic, mildew-resistant, nonmigratory, nonstaining, compatible with joint substrates and other joint sealants; and as follows:

1. Impregnating Agent: Manufacturer's standard.
2. Density: Manufacturer's standard.
3. Backing: Pressure-sensitive adhesive factory applied to one side, with protective wrapping.

- G. Sealant Backings, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 1. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of plastic foam of material indicated below, and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
    - a. Type O - Open-cell polyurethane foam. (Do not use on Horizontal Surfaces).
    - b. Type C - closed-cell material with a surface skin.
  - 2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.
- H. Primer: As recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated.
- I. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- J. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## 2.2 EXECUTION

### G. PREPARATION

- 1. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
  - 1. Remove laitance and form-release agents from concrete.
  - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- 2. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- 3. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

## 2.3 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Applicator shall examine the areas and conditions under which work of this Section will be performed.



- a. Verify conformance with manufacturer's requirements;
  - b. Report unsatisfactory conditions in writing to the Architect;
  - c. Do not proceed until unsatisfactory conditions are corrected.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
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.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
  4. Do not allow excess sealant to touch adjoining materials. Contractor will be responsible for cleaning adjacent materials that are damage due to sealant installation.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
  2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.
1. Acoustical sealants shall also be used to seal joints around thru wall non fire rated penetrations that are located above the ceiling. These shall include, conduits, wire, cables, copper piping, HVAC ductwork etc.
- G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

- H. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.
- I. Tool sealants in manner that forces sealant against back of joint, ensures firm, full contact at joint interfaces and leaves a finish that is smooth, uniform and free of ridges, wrinkles, sags, air pockets and embedded impurities.
  - 1. Dry tooling is preferred; tooling liquids that are non-staining, non-damaging to adjacent surfaces and approved by sealant manufacturer may be used if necessary when care is taken to ensure that the liquid does not contact joint surfaces before the sealant.
  - 2. Provide concave tooled joints unless otherwise indicated to provide flush tooling or recessed tooling.
  - 3. Provide recessed tooled joints where the outer face of substrate is irregular.

### 3.0 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: If sealants show signs of failure in the field, a joint-sealant adhesion test may be required by the architect and owner. The architect will identify certain areas to be tested per the following test method noted in item #1 below. Cost associated with sealant testing will be paid by the contractor if joint sealants fail. If joint sealants are satisfactory, the owner will pay for the joint sealant test.
  - 1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
- C. Types of applications for joint sealers as work of this section include, but not limited to, the following:
  - 1. Perimeter of interior door and window frames.
  - 2. Perimeter of all casework cabinets and backsplashes as required.
  - 3. Perimeter of all plumbing fixtures.
  - 4. Acoustical joints at top of wall, base of wall and around all penetrations thru the wall.
  - 5. Elsewhere on the project as noted or required.
  - 6. Behind window flanges
  - 7. At joints of exterior trims and moldings
  - 8. At door thresholds
  - 9. Other locations as noted on drawings.

END OF SECTION 079200

## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Interior standard steel doors and frames.
  - 2. Exterior standard steel doors and frames.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality-control reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

#### 1.5 QUALITY ASSURANCE

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Republic Builders Products Company.
5. Steelcraft; an Ingersoll-Rand company.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
  1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.
- C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than **[0.50 deg Btu/F x h x sq. ft. (2.84 W/K x sq. m)]** [when tested in accordance with ASTM C1363 or ASTM E1423.

### 2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.
  1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule on Drawings.
    - b. Thickness: **1-3/4 inches (44.5 mm)**.
    - c. Face: **[Uncoated]** [steel sheet, minimum thickness of **0.042 inch (1.0 mm)**].
    - d. Edge Construction: **[Model 1, Full Flush]**
    - e. Core: **[Manufacturer's standard]**

- f. Fire-Rated Core: Manufacturer's standard [**laminated mineral board**] core for fire-rated doors.

2. Frames:

- a. Materials: [**Uncoated**] steel sheet, minimum thickness of **0.053 inch (1.3 mm)**.
- b. [**Sidelite**] [**and**] [**Transom**] Frames: Fabricated from same thickness material as adjacent door frame.
- c. Construction: [**Face welded**]

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.

1. Doors:

- a. Type: As indicated in the Door and Frame Schedule on Drawings.
- b. Thickness: **1-3/4 inches (44.5 mm)**.
- c. Edge Bevel: [**Bevel lock and hinge edges 1/8 inch in 2 inches (3.2 mm in 51 mm)**]
- d. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- e. Bottom Edges: Close bottom edges of doors [**where required for attachment of weather stripping**] with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- f. Core: [**Polyurethane**]
- g. Fire-Rated Core: Manufacturer's standard [**vertical steel stiffener with insulation**] core for fire-rated doors.

2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of **0.053 inch (1.3 mm)**, with minimum [**A40 (ZF120)**] coating.
- b. Construction: [**Face welded**]

2.5 BORROWED LITES

- A. Fabricate of [**uncoated**] [**metallic-coated**] steel sheet, minimum thickness of [**0.053 inch (1.3 mm)**]
- B. Construction [**Face welded**]

- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

## 2.6 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
  - 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

## 2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

## 2.8 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum **3/4 inch (19 mm)** beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. **[Sidelite] [and] [Transom Bar]** Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding[, **or by rigid mechanical anchors**].
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.
  - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with **[mitered]** hairline joints.
  - 1. Provide stops and moldings flush with face of door, and with **[square]** stops unless otherwise indicated.



2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than **9 inches (230 mm)** o.c. and not more than **2 inches (51 mm)** o.c. from each corner.

## 2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.2 INSTALLATION

- A. Hollow-Metal Frames: Comply with **[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 without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
  3. Floor Anchors: Secure with postinstalled expansion anchors.

- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  4. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
  5. Smoke-Control Doors: Install doors in accordance with NFPA 105.
- B. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

### 3.3 FIELD QUALITY CONTROL

- A. Inspections:
1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
  2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- D. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in **[NFPA 80]**

### 3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint in accordance with manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

## SECTION 081214 - TIMELY METAL FRAMES (Basis of Design)

### Part 1 - GENERAL

#### 1.01 Work Included

- A. The work under this section shall include the furnishing of all items shown on the drawings and as specified, including but not limited to, the following:
  - 1. Knocked down, site assembled prefinished steel door frames

#### 1.02 Related Sections

- B. Section 08 11 13 – Hollow Metal Doors And frames
- C. Section 08 14 16 – Flush Wood Doors
- D. Section 081600 - Molded Composite Doors
- E. Section 08 71 00 – Door Hardware
- F. Section 08 80 00 - Glazing

#### 1.03 References

- A. ASTM A653 – Standard for hot dipped galvanized steel material
- B. UBC 7-2-97, UBC 7-4-97 Positive Pressure Fire Test Certification
- C. UL 10B Fire test of Door Assemblies and UL10C Standard for Positive Pressure Fire Tests of Door Assemblies
- D. NFPA 80 - Fire Doors and Windows (Latest Edition)
- E. NFPA-101 - Life Safety Codes (Latest Edition)
- F. ASTM D2197 - Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.
- G. ASTM D2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- H. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- I. ASTM D3361 - Standard Practice for Unfiltered Open-Flame Carbon-Arc exposures of Paint and Related Coatings.
- J. ASTM B117 – Standard test for salt spray testing

#### 1.04 Submittals

- A. Section 01 33 00: Submittal procedures.

- B. Product Data: Indicate frame material, Gauge, configuration and finishes.
- C. Shop Drawings: Indicate frame elevations, details of frame anchorage, reinforcements required, rough opening requirements, location of hardware embosses, and finishes. Detail each floor of the building separately.
- D. Samples: Submit 2 standard frame samples, illustrating factory finished frame colors.
- E. Manufacturer's Installation Instructions: Provide installation instructions for all products under this section.
- F. Manufacturer's Certificate of Warranty: Provide manufacturer's standard warranty certificate stating material is warranted for a period of one year from date of building occupancy

#### 1.05 Quality Assurance

- A. Quality Standards
  - 1. Material free from defects in material and according to project specifications for pre-engineered opening systems
  - 2. Proven durability of factory finishes allowing for bending and shaping of material after finish is applied
- B. Fire Rated Frame Construction
  - 1. Conform to ASTM E152, NFPA 252, UL 10B and 10C.
- C. Installed Frame Assembly: Conform to NFPA 80
  - 1. Use only installers familiar with installation of prefinished opening systems and applied casing frame installation

#### 1.06 Delivery, Storage and Handling

- A. Transport, handle, store, and protect products in a dry area off the ground.
- B. Accept frames on site in manufacturer's box packaging with identification labels intact. Inspect for damage.
- C. Do not open individual boxes until installation is to begin.

### Part 2 - PRODUCTS

#### 2.01 Acceptable Manufacturers (Basis of Design)

- A. Timely Industries, A Division of SDS Industries, Inc., 10241 Norris Avenue, Pacoima, CA, 91331-2292; Phone toll free: 800-247-6242; Fax: 818-492-3530. Web site: [www.timelyframes.com](http://www.timelyframes.com).
- B. Frames: Provide all interior frames for project from same manufacturer. Provide exterior frames by Aluminum storefront or Welded HM frames as shown on plans

#### 2.02 Frames

- A. Frame Material: Hot dipped galvanized steel, for interior frames in normal atmospheric exposures.

- C. Frame Throat Opening: As shown on plan details to suit finished wall thickness.
- D. Frame Profile - Unequal Rabbet profile, standard with manufacturer
  - 1. "CK" Series Kerferd frame, 1.2 mm (18 Gauge) thick, Kerferd frame with factory applied seal to provide smoke rating required of 20 min fire rated doors where scheduled.
- G. Casings
  - 1. Field applied wood casings by others see drawings for more info.

#### 2.03 Frame Reinforcement and Accessories

- A. Provide reinforcements shipped loose to project site for hardware application
  - 1. TA-10 - Regular arm closers, casing mounted coordinators
  - 2. TA-12 - Parallel arm closers, Rim Exit device strikes, other stop mounted surface hardware
  - 3. TA-47 – For CK frame, Parallel arm closers, Rim Exit device strikes, other stop mounted surface hardware
  - 4. TA-25 - Double acting spring hinges, continuous hinges, other surface mounted hardware on door rabbet or cased opening frame
  - 5. Provide hinge reinforcement (TA-11) of 14 Gauge steel pierced to create depth of thread for hinge screws equal to or exceeding 7 Gauge steel.
- B. Weatherstrip/Smoke Gasket: TA-46 (QDS500) 90 minute rated gasket for kerfed frames. All pieces factory mitered to assure perfect corner alignment. Select color: Black.
- C. Silencers: TA-5 vinyl, 2 per frame, clear stick-on type. Silencers not required on Kerfed frames or frames scheduled to receive stop mounted gasket or weatherstrip
- F. Prepare frames for strikes as supplied by door hardware package. See door hardware.
- G. Installation fasteners (Provided by others)
  - 1. Interior Frames: #6 Drywall type length sufficient to penetrate studs or structure at least ½".

#### 2.04 Fabrication

- A. Openings for single swing, pair, borrowed light and sidelight frames to be pre-cut, notched and fabricated at the manufacturer's facility. For fire rated and exterior openings, provide kerf at stop for installation of smoke gasket or weatherstrip
- B. Provide minimum 14 Gauge hinge reinforcement plate tapped for machine screws supplied with hinges. Hinge plate to be mechanically attached to hinge emboss on frame

- C. Casing Clips (if required): Fabricate frames with factory applied, heat treated clips to ensure no deflection in the clip upon application or removal of casing. Attachment clips may not be of same material as frame.
- D. Provide notches, tabs and/or stops for positive alignment of frame parts at all corners
- E. Attach approved mylar label to each fire-rated frame indicating fire rating details
- L. Factory install TA-46 smoke gasket on all prefinished, CK series frames. Install with factory mitered corners to ensure adequate seal and pleasing appearance

#### 2.05 Finishing

- A. Frame Units: Prefinished with factory applied impact resistant, polyurethane baked enamel finish or optional electrostatic applied water based paint system
- B. Frames for high humidity areas to be hot dipped galvanized. See 2.02.B for specific locations
- C. Colors:
  - 1. Factory Primed for field paint

### Part 3 – EXECUTION

#### 3.01 Examination

- A. Verify acceptability of existing conditions before starting work.
- B. Verify that opening sizes and wall thicknesses are within specified tolerances. Verify that all finished walls are in plane to ensure proper door alignment.

#### 3.02 Installation

- A. Install frames in accordance with manufacturer's requirements.
- B. Anchor frames with screws located at every casing clip or every 11" as shown on manufacturer's instructions. Field verify quantity and location of fasteners prior to installing casing.
- C. Install prefinished frames near end of the project after wall painting and wall coverings are applied.
- D. Install frames using qualified installers familiar with installation of prefinished drywall frames.
- E. Coordinate installation of glass and glazing in glazed units.
- F. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 21 00.
- G. Touch-up blemishes on finished frames with factory prepared touch up paint.

END OF SECTION 081214

TIMELY METAL FRAMES

081214 - 4

## SECTION 081600 – Molded Composite Doors

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes the following (See also Drawings / Door Schedule) :
  1. Solid Core & Hollow core MDF interior doors.
  2. Split Jamb Pre-hung interior Door frames and casings.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
  1. Include details of construction and glazing.
  2. Include factory finishing specifications.
- B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:
  1. Dimensions of doors for factory fitting.
  2. Locations and dimensions of mortises and holes for hardware.
  3. Requirements for veneer matching.
  4. Doors to be factory finished, and finish requirements.
  5. Fire ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Product Certificates: For each type of door, from manufacturer.
- E. Warranty: Sample of special warranty.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer : All stile and rail doors specified in this section doors shall be supplied and manufactured by one company. All details including panels, sticking and profiles shall match.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure
- C. NFPA 252 – Standard Methods of Fire Tests for fire Door Assemblies

- D. ASTM E 152-81a – Standard Methods of Fire Tests of Door Assemblies. WDMA I.S.6-A-07 - Window and Door Manufacturers Association.
- E. AWI – Quality Standards of the Architectural Woodwork Institute (AWI), Section 1400, Stile and Rail doors.
- F. ASTM D-1037 –91 American Society for Testing and Materials: Standard Methods for Evaluating the Properties of Wood-Based Fiber and Particle Board Panel Materials.
- G. ANSI A208.1 – Urea-formaldehyde Emissions
- D. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - a. Warranty Period for Interior Doors: Life of installation.
  - b. Failures include, but are not limited to, the following:
    - i. Warping (bow, cup, or twist) more than **1/4 inch** in a **42-by-84-inch** section.
    - ii. Telegraphing of core construction in face veneers exceeding **0.01 inch in a 3-inch** span.
- H.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Use only materials that comply with referenced standards and other requirements specified. Assemble exterior doors and sidelites with wet-use adhesives.

### 2.2 Split Jamb Wood Door Frames & Casings

- A. Interior Split Jamb Wood Door Frames & Casings (see door schedule for locations, sizes, swings): Interior doors frames complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or pre-approved equal :
    - a. Milikin
    - b. Masonite
    - c. Jeld-Wen
    - d. Or equal
      - i. Species and Grade: Pine, FAS grade.
      - i. Maximum Moisture Content: 15 percent.
      - ii. Finish: Factory Primed for field painting.



- iii. Split Jamb
- iv. Pre-hung Doors
- v. Wall thickness : Varies See drawings and field verify.
- vi. Casing: 3 ½" FG Pine, (see section 062023 interior architectural woodwork)
- vii. Finish: Factory Primed **ready for field paint Color to be selected by owner.**
- viii. Prepped for hardware as specified.

2.3 Hollow Core Molded Composite doors (As indicated on drawings as HCWD)

A. Interior Molder Composite Doors for swinging, sliding, folding interior doors locations (see door schedule for locations, sizes, swings): Interior doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or pre-approved equal :
  - a. Milikin
  - b. Masonite
  - c. Jeld-Wen
2. Basis of Design: Interior Molded Composite Doors as (HCWD) on drawings
  - a. Masonite, Lincon Park
  - b. Door Style: Single Panel
  - c. Stippling Profile: Square
  - d. Material: Molded **Hollow Core** MDF
  - e. Thickness 1- 3/8"
  - f. Finish: Textured - Factory Primed **ready for field paint Color as indicated on drawings**
  - g. .Pre-hung when in split jamb frame.
  - h. Prepped for hardware as specified.

2.4 Solid Core Molded Composite doors with less than 2-hr fire rating As indicated on drawings as (WD)

A. Interior Molder Composite Doors for swinging, sliding, folding interior doors locations (see door schedule for locations, sizes, swings): Interior doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or pre-approved equal :
  - a. Milikin
  - b. Masonite
  - c. Jeld-Wen
2. Basis of Design: Masonite, Lincon Park

3. Door Style: Single Panel
4. Stippling Profile: Square
5. Material: Molded **Solid Core** MDF
6. Thickness 1- 3/8"
7. Finish: Textured - Factory Primed **ready for field paint Color as indicated on drawings**  
Pre-hung when in split jamb frame.
8. Fire Ratings up to 60min. as specified on drawings.
9. Glass lights: Locations and fire ratings as specified on drawings.
10. Prepped for hardware as specified

2.5 Solid wood style & rail doors with 2-hr fire rating As indicated on drawings as (WD)

A. Interior Molder Composite Doors for swinging, sliding, folding interior doors locations (see door schedule for locations, sizes, swings): Interior doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or pre-approved equal :
  - a. Milikin
  - b. Masonite
  - c. Jeld-Wen
2. Basis of Design: Masonite, Le Chateau Door
3. Door Style: Single Panel
4. Stippling Profile: Square
5. Material: Molded **Solid Core** MDF
6. Thickness 1- 3/8"
7. Finish: Textured - Factory Primed **ready for field paint Color as indicated on drawings**  
Pre-hung when in split jamb frame.
8. Fire Ratings (90 min) as specified on drawings.
9. Glass lights: Locations and fire ratings as specified on drawings.
10. Prepped for hardware as specified

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Openings: Cut and trim openings through doors in factory.
2. Light Openings: Trim openings with moldings of material and profile indicated.

3. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
- C. 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 with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at Project site.
- F. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

#### 1.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081433

## SECTION 083113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Non-rated access doors and frames.
  2. Contractors shall coordinate access door locations and placement so that when the doors are installed to access any valve, cleanouts or dampers that must be concealed above drywall ceilings or in walls.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Coordination Drawings: Drawn to scale and coordinating access door and frame installation with ceiling support, ceiling-mounted items, and concealed Work above ceiling.

### PART 2 - PRODUCTS

#### 2.1 ACCESS DOORS AND FRAMES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: This access door is for use drywall wall locations and drywall ceiling locations as noted on the plans
- a. Acudor Products Inc.  
80 Little Falls Road  
Fairfield, New Jersey 07004  
973-575-5120 fax 973-575-5160
  - c. Specified product AS-9000 18" x 18" SCPC access door.  
**The G.C. shall coordinate access door locations and placement so that when the doors are installed to access any valve, cleanouts or dampers that must be concealed above drywall ceilings or in walls.**
- B. Material: Sheet steel 16 gage door and 16 gage mounting frame.
1. Material: Prime-painted steel sheet. Finish paint to match Operating room ceiling color.

2. Locations: Walls or Ceiling
3. Door: Minimum 16 gage. Flush to frame with reinforced edges.
4. Frame: Minimum 16 gage. Provide a 1" flange width.
5. Hinges: Concealed pin type.
6. Gasketing: 1/8" x 3/8" closed cell neoprene gasket.
7. Lock: Screwdriver operated cam latch
8. Finish – Contractor to finish paint access panel to match wall or ceiling color
9. Contactor to caulk around the perimeter to the access panel and the ceiling prior to painting.

C. INSTALLATION

1. Provide stud framing as required to frame out the access door opening. All four side of the opening shall have metal stud framing.
2. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.
3. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
4. Install access doors flush with adjacent finish surfaces or recessed to receive finish material.
5. Adjust doors and hardware after installation for proper operation.
6. Prior to painting the access hatch and drywall ceiling, provide a caulk joint between the drywall and metal flange.

END OF SECTION 083113

## SECTION 084113 - ALUMINUM STOREFRONT SYSTEMS

### 1.1 GENERAL

- A. Section Includes:
1. Exterior storefront framing.
- B. System Description: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes air infiltration and water penetration exceeding specified limits; and framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- C. Glazing: Physically and thermally isolate glazing from framing members.
- D. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- E. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
- F. Structural Loads - Wind Loads: 20 psf. The design pressures are based on the 2008 Indiana Building Code with amendments.
- G. Deflection of framing members
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
- H. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
1. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
    - a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
- I. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount

which will reduce glazing bite below 75 percent of design dimension when carrying full dead load. Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below. Provide a minimum 1/16-inch (1.59-mm) clearance between members and operable windows and doors.

- J. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft..
- K. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 9 lbf/sq. ft..
- L. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- M. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 57 when tested according to AAMA 1503.1.
- N. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.60 Btu/sq. ft. x h x deg F (3.57 W/sq. m x K) when tested according to AAMA 1503.1.

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
- B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
  - 2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
  - 3. Include structural analysis data and details signed and sealed by a qualified professional engineer responsible for their preparation. Engineer must be licensed to practice in the State of Indiana
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's

- P. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.
- Q. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- R. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code-- Aluminum."

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Section 01600.
- B. Protect finished surfaces to prevent damage.
- C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.
  - a. Do not leave coating residue on surfaces.

### 1.4 WARRANTY

- A. Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
  - 1. Warranty Period: 20 years from date of Substantial Completion.
- B. Provide written warranty signed by MFG, Installer and Contractor warranting the work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design and agreeing to replace components which fail within 1 year from date of substantial completions.
- C. Warranty shall cover complete watertight and airtight system installation.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

### 1.5 PRODUCTS

- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (Exterior Storefronts)
  - 1. Basis of Design:
    - a. Kawneer Company, Inc (Trifab Versaglaze 601T [Thermal]– Center Glazed (2"x6" profile)



- b. Tubelite, T24650 Series Storefront - Center Glazed (2"x6 1/2" profile)
- c. EFO , Series 406T storefront. - Center Glazed (2"x6 1/2" profile)

**NOTE : Thermally broken window framing system.**

- A. Glazing will be 1" insulated units.
  - B. Glazing to be set from the inside of the window.
  - C. Provide Screw Spline Framing system
- B. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- 1. Construction: Thermally broken.
  - 2. Glazing System: Retained mechanically with gaskets on four sides
  - 3. Glazing Plane: **Rear/ Interior Set.**
  - 4. Sill, jamb and head receivers shall also be thermally broken when utilized on the project.
- a. Thermal Flashing and head/jamb receptors will be required on this project.
- C. High Performance Sub Sill Flashing: Provide MFG's High performance sub sill thermal flashing at all storefront locations.
- D. End Dam Framing Members: Provide MFG's standard end dam to sub-sill. Install per MFG's requirements.
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- G. Reinforce members as required to receive fastener threads.
- H. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- I. Materials: As follows:
- 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
    - a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
    - b. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).
    - c. Extruded Structural Pipe and Tubes: ASTM B 429.
    - d. Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
    - e. Welding Rods and Bare Electrodes: AWS A5.10.
  - 2. Steel Reinforcement: Complying with ASTM A 36 (ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 (ASTM A 570M) for hot-rolled sheet and strip.

- a. Steel components to be factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.
  - a. Provide shapes and sizes to suite installation.
  3. Glazing as specified in Division 8 Section "Glazing."
  4. Anchorage Devices. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars and tubes.
    - a. Hot Dip galvanize steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce medium coating.
  5. Fasteners: aluminum, nonmagnetic stainless steel or other non-corrosive materials compatible with items being fastened. Provide concealed fasteners whenever possible.
    - a. For exposed locations, provide Phillips flathead screws with finish matching item fastened. Notify architect and owner of locations where fasteners will be exposed to view.
    - b. For concealed locations, provide Manufacturer's standard fasteners.
    - c. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  6. Expansion anchor devices: Lead shield or toothed-steel, drilled-in expansion bolt anchors.
  7. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.
  8. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
  9. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."
  10. 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.
  11. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  12. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.
- J. Thermal Entrances at Exterior doors:
- a. Provide manufacturer's 2 ¼" -inch- thick glazed doors with minimum 0.125-inch thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods. Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
  - b. Thermal Door Requirements:
    - a. Equal to Kawneer AA 425
    - b. 4 ¼" wide vertical stiles and top rail with a 6 ½" bottom rail.
    - c. Provide optional 8 ¼" cross rail at the doors. Locate rail so door panic hardware is centered on cross rail.

- d. Door finish shall match aluminum frame finish.
  - e. Coordinate door hardware prep with door hardware supplier.
  - f. Door to accept 1" insulated glass.
- c. Thermal and Non thermal entrance Requirements:
- a. Reinforce door components as required for specified door hardware.
  - b. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
  - c. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
    - a. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
  - d. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
  - e. Weather Stripping: Manufacturer's standard replaceable weather stripping.
  - f. Hardware: Refer to division 8 for Door Hardware. The Door hardware supplier will supply templates for hardware cutouts.
- H. Finishes.
- 1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  - 3. Finish: 70% FLUOROPOLYMER (PVDF), Meets superior performance level of AAMA 2605
    - a. Color: As indicated on drawings.

## 1.6 EXECUTION

- A. Installation, General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight

construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.
- G. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.
- H. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
  - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
  - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
  - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).
- I. Remove excess sealant and glazing compounds, and dirt from surfaces.
  - 1. Clean glass and metal surfaces.

**END OF SECTION 084113**

## SECTION 085113: ALUMINUM WINDOWS

### 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 covers Kawneer Architectural Aluminum Windows, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.
- B. Architectural Aluminum Windows include:
- C. Related Sections:
  - 1. 072600: Weather Barriers
  - 2. 079200: Joint Sealants

#### 1.3 DEFINITIONS

- A. For fenestration industry standard terminology and definitions, refer to the Fenestration & Glazing Industry Alliance (FGIA) Glossary (AAMA AG-13).

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance:
  - 1. Product to comply with the specified performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction, as determined by testing of aluminum-framed window system representing those indicated for this project.
- B. Performance Class and Grade:
  - 1. AW-PG40 - 60" X 90" (1524 mm X 2515 mm) -H without reinforcement
- C. Structural Loads - Wind Loads: 20 psf. The design pressures are based on the 2008 Indiana Building Code with amendments.
- D. Air Leakage:
  - 1. The test specimen shall be tested in accordance with ASTM E 283.
  - 2. Air infiltration rate shall not exceed 0.30 cfm/ft<sup>2</sup> at a static air pressure differential of 6.2 psf (300 Pa).

- E. Water Resistance:
  - 1. The test specimen shall be tested in accordance with ASTM E 331.
  
- F. Uniform Load Deflection:
  - 1. There shall be no deflection more than L/175 when tested per ASTM E 330.
  - 2. AW-PG40-H without reinforcement; When tested at a static air pressure difference of 40 psf (1920 Pa).
  
- G. Uniform Load:
  - 1. No glass breakage or permanent damage to fasteners, and maximum .2% permanent deformation of the span of any frame member when tested per ASTM E 330.
  - 2. AW-PG40-H without reinforcement; When tested at a static air pressure difference of 60 psf (2880 Pa).
  
- H. Component Testing:
  - 1. Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S./AA440 (NAFS).
  
- I. Thermal Test:
  - 1. Per AAMA 1503, at the prescribed 48" x 72" (1219 mm x 1829 mm) test size glazed with 1" insulating glass made with 1/8", argon gas, and 1/8" glass with low E coating (Hard Coat):
    - a. Condensation Resistance factor: Minimum (56 frame) and (62 glass) CRF.
    - b. Thermal Transmittance: Maximum 0.51 Btu/hr/ft<sup>2</sup>/°F.
  
- J. U-factor Simulation:
  - 1. Per NFRC 100 at the prescribed 48" x 72" (1219 mm x 1829 mm) Non-Residential Size, glazed with 1" (25.4 mm) insulating glass made with 1/8", argon gas, 1/8" low E coating (Soft Coat).
  - 2. Thermal transmittance (U-factor) shall not be more than 0.47 Btu/hr/ft<sup>2</sup>/°F.
  
- K. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC):
  - 1. Offset Glazing for added STC performance shall be provided as part of alternate pricing on North Façade only.
    - a. When tested to ASTM E90, the sound transmission shall not be less than STC 36 and OITC 31 with 1" insulating glass made with exterior 1/4" laminated glass - 1/8" glass x 0.060 PVB interlayer x 1/8" glass - and interior 3/16" clear glass.
  
- L. Impact Resistance Performance:
  - 1. Not Required.
  
- M. Blast Mitigation Performance:
  - 1. Not Required.
  
- N. Forced Entry:

1. Not Required.

O. Thermal Barrier Test:

1. Not Required.

1.5 SUBMITTALS

A. Product Data:

1. For each type of aluminum window indicated, include:
  - a. Construction details
  - b. Material descriptions
  - c. Fabrication methods
  - d. Dimensions of individual components and profiles
  - e. Hardware
  - f. Finishes
  - g. Operating instructions

B. Shop Drawings:

1. Plans
2. Elevations
3. Sections
4. Details
5. Hardware
6. Attachments to other work
7. Operational clearances
8. Installation details

C. Samples for Initial Selection:

1. Provide samples for units with factory-applied color finishes.
2. Provide samples of hardware and accessories involving color selection.

D. Product Schedule:

1. Provide a product schedule for aluminum windows. Use the same designations indicated on Drawings.

E. Product Test Reports:

1. Provide test reports for each type, class, grade, and size of aluminum window used in the project. Test results based on use of downsized test units will not be accepted.
2. Test reports must be based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency.
3. Test reports must indicate compliance with performance requirements.

## 1.6 QUALITY ASSURANCE

### A. Installer Qualifications:

1. Installer must have successfully installed the same or similar units required for the project and other projects of similar size and scope.

### B. Manufacturer Qualifications:

1. Manufacturer must be capable of fabricating aluminum windows that meet or exceed the stated performance requirements.
2. Manufacturer must document this performance by the inclusion of test reports and calculations.

### C. Source Limitations:

1. Obtain aluminum windows through one source from a single manufacturer.

### D. Product Options:

1. Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Product Requirements Section. Do not modify size and dimensional requirements.
2. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

### E. Mockups:

1. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution ( See mock up elevation on drawings.)

### F. Pre-installation Conference:

1. Conduct conference at project site to comply with requirements in Division 01 Project Management and Coordination Section.

## 1.7 PROJECT CONDITIONS

### A. Field Measurements:

1. Verify aluminum window openings by field measurements before fabrication.
2. Indicate measurements on shop drawings.

## 1.8 WARRANTY

### A. Submit manufacturer's standard warranty for owner's acceptance.

### B. Warranty Period:



1. Windows: Warrant for two years against defects in material or workmanship under normal use.
2. Insulating glass units: Warrant seal for five years against visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.
3. Paint finish: PPG...
  - a. Permafluor™ organic finish conforming to AAMA 2605: Warrant for ten years against chipping, peeling, cracking, chalking, or fading.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis-of-Design Product:
1. Kawneer Company, Inc.
    - a. TR-9100 Single Hung Windows:
  2. EFCO
    - a. HX32 Single Hung windows
  3. Or others as approved by owner/ architect

### **2.2 MATERIALS**

- A. Aluminum Extrusions:
1. Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish.
  2. Not less than 0.062" (1.57 mm) wall thickness at any location for the main frame and sash members.
- B. Fasteners:
1. Nonmagnetic stainless steel or other materials must be non-corrosive and compatible with aluminum members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories:
1. Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.
  2. Anchors, clips, and accessories shall provide sufficient strength to withstand the design pressure indicated.
- D. Reinforcing Members:
1. Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.

2. Reinforcing members must provide sufficient strength to withstand the design pressure indicated.

E. Thermal Barrier:

1. The thermal barrier shall consist of integral structural polyurethane thermal break installed by the window manufacturer in the frame members.

## 2.3 GLAZING

A. Windows shall be provided pre-glazed when arriving on site.

1. Glass type #2 (See Section 08800 Glazing )
2. See alternate for locations to receive alternate cost for offset glazing (Glazing type #3 (See Section 08800 Glazing )) location for improved STC ratings.

B. Glazing System:

1. Glazing method shall be a wet/dry type in accordance with manufacturer's standards.
2. Exterior glazing shall be silicone back bedding sealant.
3. Interior glazing shall be snap-in type glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C 864.

## 2.4 HARDWARE

A. General Hardware Requirements:

1. Provide manufacturer's standard hardware.
2. Hardware shall be fabricated from aluminum, stainless steel, or other corrosion-resistant material that is compatible with aluminum.
3. Hardware shall be designed to smoothly operate, tightly close, and securely lock sliding aluminum-framed glass doors.

B. Standard Operating Hardware:

1. Aluminum Automatic Sill Locks.
2. White Bronze Automatic Sill Locks.
3. White Bronze Pole Ring on meeting rail.
4. Keyed plunger Limit Lock per ASTM F2090

## 2.5 ACCESSORY MATERIALS

A. Spacers, Setting Blocks, Gaskets, and Bond Breakers:

1. Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer,
2. Shall be compatible with sealants, and suitable for system performance requirements.

- B. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint types.
- C. Sealants and joint fillers for joints at perimeter of window system as specified in Division 7 Section "Joint Sealants."
- D. Perimeter Anchors:
  - 1. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- E. Optional Muntin Grids:
  - 1. Not required
- F. Optional Exterior Panning and Interior Trims:
  - 1. Extruded aluminum, 6063-T6 alloy and temper, extruded to profiles and details indicated. Seal exterior joints with manufacturer's standard sealant to assure water-tight joints.
    - a. Exterior Panning and Trims: All panning profiles shall be a minimum thickness of 0.062" (1.57 mm) to match the profiles as shown the drawings. Any profile variations shall be submitted to the architect and/or owner for approval 10 days prior to bid date. All panning shall be factory fabricated for field assembly. All corner joinery shall be factory cut. Joinery at the sill shall be coped and butt-type construction. All preparations for assembly shall be completed by the window manufacturer. Upon assembly, panning frame joints shall be back-sealed to prevent moisture penetration.
- G. Coupling Mullions:
  - 1. Shall be extruded aluminum of 6063-T6 alloy and temper of profile and dimensions indicated on drawings.
  - 2. Mullions shall provide structural properties to resist wind pressure required by performance criteria and standards.
- H. Insect Screens:
  - 1. (Half Screen) Held in exterior applied PVC rigid tracks with two stainless steel leaf springs.
  - 2. 7/16" x 1-1/4" x .045 extruded tubular aluminum frame with window finish.
  - 3. Corners mitered, gusset reinforced, and crimped.
  - 4. 18 x 16 dark fiberglass mesh secured to frame with PVC spline.

## 2.6 FABRICATION

- A. Extrude or form aluminum shapes before finishing.
- B. 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 that are flush, hairline, and weatherproof

3. Physical and thermal isolation of glazing from framing members
  4. Accommodations for thermal and mechanical movements of glazing and framing that maintain required glazing edge clearances
  5. Fasteners, anchors, and connection devices that are concealed from view to the greatest extent possible
- C. Window Frame Joinery:
1. Mitered and Mechanically clipped and/or staked.
  2. Factory sealed frame and corner joints.
- D. Fabricate aluminum windows in sizes indicated.
1. Include a complete system for assembling components and anchoring windows.
- E. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.
- F. Thermally Broken Construction:
1. Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; in a manner that eliminates direct metal-to-metal contact.
  2. Thermal barriers shall be designed in accordance with AAMA TIR A8.
  3. Thermal Barrier:
    - a. The thermal barrier shall consist of integral structural polyurethane thermal break installed by the window manufacturer in the frame members.
- G. Mullions:
1. Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units.
  2. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated.
  3. Provide mullions and cover plates capable of withstanding design loads of window units.
- H. Sub Frames:
1. Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093" (2.4 mm) thick extruded aluminum.
  2. Miter or cope corners, and join with concealed mechanical joint fasteners.
  3. Finish to match window units.
  4. Provide sub frames capable of withstanding design loads of window units.
- I. Factory-Glazed Fabrication:
1. Glaze aluminum windows in the factory where practical and possible for applications indicated.
  2. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

J. Glazing Stops:

1. Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated.
2. Provide glazing stops to match frame.

2.7 ALUMINUM FINISHES

**EDITOR NOTE:** Choose the appropriate finish below based on project requirements.

- A. Finish designations that are prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
  1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color: As indicated on drawings)

**PART 3 EXECUTION**

3.1 EXAMINATION

- A. With installer present, examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work:
  1. Verify rough opening dimensions.
  2. Verify levelness of sill plate.
  3. Verify operational clearances.
  4. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components for proper water management.
  5. Masonry Surfaces:
    - a. Masonry surfaces must be visibly dry and free of excess mortar, sand, and other construction debris.
  6. Wood Frame Walls:
    - a. Wood frame walls must be dry, clean, sound, well nailed, free of voids, and without offsets at joints.
    - b. Ensure that nail heads are driven flush with surfaces in opening and within 3" (76.2 mm) of opening.
  7. Metal Surfaces:
    - a. Metal surfaces must be dry and clean (free of grease, oil, dirt, rust, corrosion, and welding slag).
    - b. Ensure that metal surfaces are without sharp edges or offsets at joints.
- B. Proceed with installation only after correcting unsatisfactory conditions.

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install aluminum-framed window system so that components:
  - 1. Are level, plumb, square, and true to line
  - 2. Are without distortion and do not impede thermal movement
  - 3. Are anchored securely in place to structural support
  - 4. Are in proper relation to wall flashing and other adjacent construction
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.
- D. Install aluminum-framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

#### **PART 4 FIELD QUALITY CONTROL**

- A. Field Tests:
  - 1. Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured.
  - 2. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
  - 3. Tests that do not meet the specified performance requirements and units that have deficiencies shall be corrected as part of the contract amount.
  - 4. Testing shall be performed per AAMA 502 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
  - 5. Air Infiltration Tests:
    - a. Conduct tests in accordance with ASTM E 783.
    - b. AW rating: Test shall be conducted at a minimum uniform static pressure of 6.2 psf (300 Pa). The maximum allowable rates of air infiltration for field testing shall not exceed 1.5 times the project specifications
  - 6. Water Infiltration Tests:
    - a. Conduct tests in accordance with ASTM E 1105.
    - b. No uncontrolled water infiltration is permitted when tested at a static test pressure equal to two-thirds of the tested laboratory performance test pressure.
- B. Manufacturer's Field Services:

1. Upon owner's written request, provide periodic site visit by manufacturer's field service representative.

**PART 5 ADJUSTING, CLEANING, AND PROTECTION**

A. Adjusting:

1. Adjust operating sashes, screens, hardware, and accessories for tight fit at contact points and weather stripping for smooth operation and weather tight closure.
2. Lubricate hardware and moving parts.

B. Cleaning:

1. Avoid damaging protective coatings and finishes.
2. Clean glass and aluminum surfaces of product immediately after installation.
3. Comply with glass manufacturer's written recommendations for final cleaning and maintenance.
4. Remove non-permanent labels and clean surfaces.
5. Remove excess sealants, glazing materials, dirt, and other substances.
6. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.
7. Remove construction debris from project site and legally dispose of debris.

C. Protection:

1. Protect installed product's finish surfaces from damage during construction.

**END OF SECTION 085113**

## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.01 SUMMARY

A. Section includes:

1. Mechanical door hardware
2. Electronic access control system components (See GC bid packages/ Scopes or work for access control scope of work and responsibilities.)

B. Related Sections:

1. Division 06 Section "Rough Carpentry"
2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
3. Division 08 Sections:
  - a. Hollow Metal Doors and Frames
  - b. Timely Metal Door Frames
  - c. Molded Composite doors
  - d. Aluminum Storefronts
4. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
5. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

#### 1.02 REFERENCES

A. UL LLC

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. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association



1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit 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. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

- a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
- a. Submit 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 critical in Project construction schedule.
  - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
  - c. Indicate complete designations of each item required for each opening, include:
    - 1) Door Index: door number, heading number, and Architect's hardware set number.
    - 2) Quantity, type, style, function, size, and finish of each hardware item.
    - 3) Name and manufacturer of each item.
    - 4) Fastenings and other pertinent information.
    - 5) Location of each hardware set cross-referenced to indications on Drawings.
    - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for hardware.
    - 8) Door and frame sizes and materials.
    - 9) Degree of door swing and handing.
    - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations 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. 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.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
  2. Provide Product Data:
    - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    - b. Include warranties for specified door hardware.
- D. 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. Final approved hardware schedule edited to reflect conditions as installed.
    - d. Final keying schedule
    - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
    - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
- E. Inspection and Testing:
1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
    - a. Fire door assemblies, in compliance with NFPA 80.
    - b. Required egress door assemblies, in compliance with NFPA 101.

#### 1.04 QUALITY ASSURANCE

- A. Qualifications and Responsibilities:
1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
  3. Architectural Hardware Consultant: 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:

- a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to Architect and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.
  - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- B. Certifications:
1. Fire-Rated Door Openings:
    - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
    - b. Provide only items of door hardware that are listed products tested by UL LLC, 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.
  2. Smoke and Draft Control Door Assemblies:
    - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
  3. Electrified Door Hardware
    - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
  4. Accessibility Requirements:
    - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference
    - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

- 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
- 2) Preliminary key system schematic diagram.
- 3) Requirements for key control system.
- 4) Requirements for access control.
- 5) Address for delivery of keys.

## 2. Pre-installation Conference

- a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- b. Inspect and discuss preparatory work performed by other trades.
- c. Inspect and discuss electrical roughing-in for electrified door hardware.
- d. Review sequence of operation for each type of electrified door hardware.
- e. Review required testing, inspecting, and certifying procedures.
- f. Review questions or concerns related to proper installation and adjustment of door hardware.

## 3. Hardware Coordination Conference:

- a. **Prior to ordering hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames with GC, hardware provider, access control provider, hardware installers, architect and owner.**

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- 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. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. 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.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

- B. 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.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

#### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    - a. Mechanical Warranty
      - 1) Locks
        - a) 10 years
      - 2) Exit Devices
        - a) 10 years
      - 3) Closers
        - a) 10 years

#### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. 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.
- B. 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.

- C. 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. Fabrication

- 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
- 2. Finish exposed 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 wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

### B. 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.

### C. Cable and Connectors:

- 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
- 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
- 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

### A. Manufacturers and Products:

- 1. Acceptable Manufacturers and Products:
  - a. McKinney TB series
  - b. Stanley FBB series
  - c. Ives 5BB series
  - d. Ives 3SP1 series
  - e. Hager

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/8 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
4. 1-3/8 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
5. 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
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. 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.
8. 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
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

## 2.04 FLUSH BOLTS

A. Manufacturers:

1. Acceptable Manufacturers:
  - a. Ives
  - b. Burns
  - c. 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.

## 2.05 MORTISE LOCKS (For use in Common areas)

### A. Manufacturers and Products:

1. Basis of Design Manufacture:
  - a. Falcon MA series
2. Acceptable Manufacturers and Products:
  - a. Corbin-Russwin ML2000 series
  - b. Sargent 8200 series

### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
3. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
6. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
  - a. Lever Design: Avalon
  - b. Tim Style – Napa(N)
  - c. Finish: Satin Chrome (US26D)

## 2.06 CYLINDRICAL LOCKS – GRADE 2 (For use in residential units)

### A. Manufacturers and Products:

1. Basis of Design Manufacture:
    - a. Falcon W series
  2. Acceptable Manufacturers and Products:
    - a. Corbin-Russwin CL3800 series
    - b. Sargent 6500 series
- B. Requirements:
1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 2, 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. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
    - a. Lever Design: Avalon
    - b. Rose Diameter – Small (2 9/16")
    - c. Finish: Satin Chrome (US26D)

## 2.07 EXIT DEVICES

- A. Manufacturers and Products:
1. Basis of design Manufacture:
    - a. Falcon 24/25 series
  2. Acceptable Manufacturers and Products:
    - a. Detex Advantex series
    - b. Precision Apex 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. 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.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
15. Finish:
  - a. Interior Doors: Satin Chrome (US26D)
  - b. Exterior Storefronts: Satin Stainless steel (US32D)

## 2.08 ELECTRONIC PROGRAMMABLE INTERCONNECTED LOCKSETS

### A. Manufacturers and Products:

1. Basis of Design Manufacturers and Products:
  - a. Salto XS4- Original – ANSI
  - b. ( See Access Control Basis of design notes on drawings)

## 2.09 ACCESS CONTROL CREDENTIALS

### A. Manufacturer:

1. Basis of Design Manufacturer:
  - a. Salto Design XS wall reader and Salto Carrier Fobs
  - b. ( See Access Control Basis of design notes on drawings)

## 2.10 ACCESS CONTROL PLATFORM

### A. Manufacturers and Products:

1. Basis of Design Manufacturer:
  - a. Salto Space, Wire Free Access Control Technology
  - b. ( See Access Control Basis of design notes on drawings)

B. Requirements:

1. Provide a platform capable of managing users, credentials, access rights, schedules, and audits.
2. All locks must be supplied in construction mode.
3. Provide a platform that supports a mobile application (app). Mobile application must allow for:
  - a. Commissioning and configuring devices
  - b. Immediately updating door files
  - c. Retrieving audit information
  - d. Performing firmware updates
4. Provide software set up on the owner's workstation and Mobile Device which includes:
  - a. Creation of the Owner's Account
  - b. Creation of the Project Site
  - c. Creation of the Team as directed by the Owner
  - d. Addition of five users
  - e. Set up and update firmware
  - f. Create unique credentials and verify proper commissioning of ten locks
5. Provide, at the owner's request, the following on-site training prior to the expiration of the service agreement:
  - a. Completing the following software:
    - 1) Modifying the Team
    - 2) Move in/move out procedure including
      - a) Adding and Deleting Users
      - b) Adding and Deleting Doors
    - 3) Adding, assigning and programming credentials for access
    - 4) Replacing or deleting lost credentials.
    - 5) Retrieving and viewing of audit information
    - 6) Assigning temporary access
  - b. Commissioning and verifying proper functioning between locks and credentials.
  - c. Updating firmware on the locks.
6. **Must include a service agreement ending a year after Substantial Completion. This service agreement includes being on-site up to 16 hours for set-up and training, as listed above.**

## 2.11 ELECTRIC STRIKES

- A. Manufacturers and Products: Electric Strikes manufacture to be compatible with selected access control manufacture.
  - 1. Basis of design Manufacturer and Product:
    - a. Von Duprin 6000 Series
  - 2. Acceptable Manufacturers and Products:
    - a. Folger Adam 300 Series
    - b. 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 that are tested to a minimum endurance test of 1,000,000 cycles.
  - 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.

## 2.12 POWER SUPPLIES

- A. Manufacturers and Products: Power Supply manufacture to be compatible with selected access control manufacture.
  - 1. Basis of Design Manufacturer and Product:
    - a. Schlage/Von Duprin PS900 Series
  - 2. Acceptable Manufacturers and Products:
    - a. Securitron BPS series
    - b. 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.

## 2.13 KEYING

### A. Scheduled System:

#### 1. New factory registered system:

- a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

### B. Requirements:

#### 1. Permanent Keying:

- a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
  - 1) Master Keying system as directed by the Owner.
- b. 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.
- c. Provide keys with the following features:
  - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
  - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
- d. Identification:
  - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
  - 2) Identification stamping provisions must be approved by the Architect and Owner.
  - 3) 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.
  - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.

5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

e. Quantity: Furnish in the following quantities.

- 1) Change (Day) Keys: 3 per cylinder/core.
- 2) Master Keys: 6.

#### 2.14 DOOR CLOSERS ( Heavy Duty) ( For use on Storefront doors and Stari doors)

##### A. Manufacturers and Products:

###### 1. Basis of Design Manufacturer and Product:

- a. Falcon SC70A series

###### 2. Acceptable Manufacturers and Products:

- a. LCN 4050 series
- b. Sargent 351 series

##### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 5/8-inch (16 mm) diameter 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. Pressure Relief Valve (PRV) Technology: Not permitted.
8. 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.
9. Finish: Aluminum

#### 2.15 DOOR CLOSERS ( Medium Duty)( For use on Trash Roo and mechanical room doors)

##### A. Manufacturers and Products:

###### 1. Basis of design Manufacturer and Product:

- a. Falcon SC80A series
2. Acceptable Manufacturers and Products:
  - a. LCN 1450 series
  - b. Sargent 1331 series
- B. Requirements:
  1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
  2. Provide door closers with fully hydraulic, full rack and pinion action with aluminum cylinder.
  3. Closer Body: 1-1/4-inch (32 mm) diameter, with 5/8-inch (16 mm) diameter 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. Pressure Relief Valve (PRV) Technology: Not permitted.
  8. 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.
  9. Finish: Aluminum

## 2.16 PROTECTION PLATES

- A. Manufacturers:
  1. Scheduled Manufacturer:
    - a. Ives
  2. Acceptable Manufacturers:
    - a. Trimco
    - b. Rockwood
- B. Requirements:
  1. Provide protection plates with a 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 plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.



3. At fire rated doors, provide protection plates over 16 inches high with UL label.
4. Finish: Satin Chrom (US 626)

## 2.17 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

### A. Manufacturers:

#### 1. Scheduled Manufacturers:

- a. Glynn-Johnson

#### 2. Acceptable Manufacturers:

- a. Rixson
- b. Sargent

### B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.
3. Finish - Aluminum

## 2.18 DOOR STOPS AND HOLDERS

### A. Manufacturers:

#### 1. Scheduled Manufacturer:

- a. Ives

#### 2. Acceptable Manufacturers:

- a. Burns
- b. Rockwood

### B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where wall or floor stop cannot be used, provide overhead stop.
3. Provide roller bumper where doors open into each other and overhead stop cannot be used.
4. Finish: Satin Chrom (US 626)

## 2.19 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Zero International
2. Acceptable Manufacturers:
  - a. National Guard
  - b. Legacy

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems 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.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.
5. Finish – Aluminum

## 2.20 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Rockwood
  - b. Trimco

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.

## 2.21 BALL CATCHES

A. Manufacturers:

1. Scheduled Manufacturer:
    - a. Ives
  2. Acceptable Manufacturers:
    - a. Rockwood
    - b. Trimco
- B. Requirements:
1. Provide ball catches at single doors with strike to fit ANSI frame prep. If dummy levers are used in conjunction with ball catch, mount ball catch at a height as to not interfere with proper mounting and height of dummy lever.
  2. Provide ball catches with full lip strike at pair doors. Mount rolling ball in top rail of each leaf per manufacturer's template.
  3. Finish: Satin Chrome (US26D):

## 2.22 FINISHES

- A. FINISH: BHMA 626/652 (US26D); EXCEPT: As noted on hardware schedule
1. Hinges at Exterior Doors: (US315)
  2. Aluminum Geared Continuous Hinges: (US28)
  3. Push Plates, Pulls, and Push Bars on Storefront Doors : Satin Stainless Steel (US32D)
  4. Panic hardware and leavers @ Storefront Doors : Satin Stainless steel (US32D)
  5. Panic hardware and leavers @ Interior Doors: Satin Chrome (US26D):
  6. Interior Latches & locksets: Satin Chrome (US26D):
  7. Protection Plates: Satin Chrom (US32D)
  8. Overhead Stops and Holders: Aluminum
  9. Door Closers: Aluminum
  10. Wall Stops: Satin Chrom (US32D)
  11. Latch Protectors: Satin Chrom (US32D)
  12. Weatherstripping: Clear Anodized Aluminum
  13. Thresholds: Mill Finish Aluminum

## 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. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

- C. Submit a list of deficiencies in writing and 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. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
  - 1. Install construction cores to secure building and areas during construction period.
  - 2. Replace construction cores with permanent cores as indicated in keying section.
  - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY 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. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

- L. 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.
- M. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. 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.
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. 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.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.03 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. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
  - 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions 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.

### DOOR HARDWARE SCHEDULE

**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.**

**Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.**

**See Drawings Foor Hardware Schedules**

## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Doors.
  - 2. Aluminum Window Systems
  - 3. Storefront framing.
  - 4. Glazed entrances.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:
  - 1. Design Wind Pressures: As indicated on Drawings.
  - 2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
  - 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

#### 1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
  - 1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

#### 1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches wide x 12" tall.

- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Preconstruction adhesion and compatibility test report.

#### 1.5 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
  - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
  - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

#### 1.6 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
  - 1. Warranty Period: 10 years from date of Substantial Completion.



- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  - 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

### 2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
  - 1. Products: Subject to compliance with requirements, provide spandrel glass that coordinates with the glazing system chosen.
  - 2. Glass: Clear float.

### 2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
  - 1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
  - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
  - 3. Interlayer Color: Clear unless otherwise indicated.

### 2.4 TEMPERED GLASS

- A. Glass General: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials. Provide in locations as provided by the building code.

### 2.5 INSULATING GLASS

- A. Manufacturers: Subject to compliance with requirements, provide the following insulated glass, or an approved equal.
- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
  - 1. Sealing System: Dual seal.
  - 2. Spacer: Aluminum with mill or clear anodic finish or Aluminum with bronze, color anodic finish to match framing.

### 2.6 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
  - 1. Neoprene complying with ASTM C 864.
  - 2. EPDM complying with ASTM C 864.
  - 3. Silicone complying with ASTM C 1115.
  - 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, or other pre-approved gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
  - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

## 2.7 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
  - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

## 2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.9 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.10 INSULATING-GLASS TYPES

- A. GLASS TYPE #1 - (1" insulated vision glass for aluminum storefronts.)
  - 1. Overall Unit Thickness :1" (Heat strengthened or fully tempered to withstand solar induced thermal stress)
  - 2. Thickness of Each Lite: 1/4" glass
  - 3. Interspace Content: Air. (1/2")
  - 4. Outdoor Lite: 1/4" glass; Solar band 60 on the #2 surface.
  - 5. Glass Tint Color: Clear
  - 6. Indoor Lite: 1/4" clear glass. (Tempered)
  - 7. Contractor to submit 12" wide x12" tall samples for approval.
  - 8. Thermal performance characteristics of insulated assembly:
    - a. Overall Unit Thickness: 1 inch. (Heat strengthened or fully tempered to withstand solar induced thermal stress)
    - b. Interspace Content: Air.
    - c. Winter Nighttime U-Factor: .29 (Btu/hr-ft<sup>2</sup>-F) maximum.
    - d. Summer Daytime U-Factor: .27 (Btu/hr-ft<sup>2</sup>-F) maximum.
    - e. Solar Heat Gain Coefficient: .41
    - f. Shading Coefficient: .48
  - 9. Optical performance characteristics of insulated assembly:
    - a. Visible Light Transmittance: 11%
- B. GLASS TYPE #2 - (3/4" insulated vision glass for aluminum storefronts.)
  - 1. Overall Unit Thickness :3/4" (Heat strengthened or fully tempered to withstand solar induced thermal stress)
  - 2. Interspace Content: Air. (1/2")
  - 3. Outdoor Lite: 1/8" glass; Solar band 60 on the #2 surface.
  - 4. Glass Tint Color: Clear
  - 5. Indoor Lite:1/8" clear glass. (Tempered)

6. Contractor to submit 12" wide x12" tall samples for approval.
  7. Thermal performance characteristics of insulated assembly:
    - a. Overall Unit Thickness: 3/4 inch. (Heat strengthened or fully tempered to withstand solar induced thermal stress)
    - b. Interspace Content: Air.
    - c. Winter Nighttime U-Factor: .29 (Btu/hr-ft<sup>2</sup>-F) maximum.
    - d. Summer Daytime U-Factor: .27 (Btu/hr-ft<sup>2</sup>-F) maximum.
    - e. Solar Heat Gain Coefficient: .40
    - f. Shading Coefficient: .48
  8. Optical performance characteristics of insulated assembly:
    - a. Visible Light Transmittance: 72%
- C. GLASS TYPE #3 (alternate) - (1" offset Laminated glazing for improved STC ratings in Unit window on north façade)
1. Overall Unit Thickness :3/4" (Heat strengthened or fully tempered to withstand solar induced thermal stress)
  2. Interspace Content: Air. (1/2")
  3. Outdoor Lite: 1/8" Clear, 0.060" PVB Laminated, 1/8" Clear
  4. Glass Tint Color: Clear
  5. Indoor Lite: 3/16" Clear Solar band 60 on the #2 surface.
  6. Contractor to submit 12" wide x12" tall samples for approval.
  7. Thermal performance characteristics of insulated assembly:
    - a. Overall Unit Thickness: 1 inch. (Heat strengthened or fully tempered to withstand solar induced thermal stress)
    - b. Interspace Content: Air.
    - c. Winter Nighttime U-Factor: .29 (Btu/hr-ft<sup>2</sup>-F) maximum.
    - d. Summer Daytime U-Factor: .27 (Btu/hr-ft<sup>2</sup>-F) maximum.
    - e. Solar Heat Gain Coefficient: .43
    - f. Shading Coefficient: .48
  8. Optical performance characteristics of insulated assembly:
    - a. Visible Light Transmittance: 67%
- D. GLASS TYPE #4 -Uncoated Clear tempered (safety glazing) Float Glass: Class 1
1. ¼ "thickness
  2. Clear glass as noted on the drawings.
  3. Contractor to submit 12" wide x 12" tall samples for approval.

## PART 3 - EXECUTION

### 3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

### 3.2 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

**END OF SECTION 088000**

## SECTION 088170 – FIRE-RATED GLASS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Fire-rated glazing materials installed as vision lights in fire-rated doors.

B. Related Sections include the following:

1. Section 081113 Hollow Metal Doors and Frames for vision panels in exterior doors.
2. Section 081600 Molded Composite Doors for vision panels in interior doors.

#### 1.2 REFERENCES

1. ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
2. ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

C. Glass Association of North America (GANA):

1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

D. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.
2. NFPA 252 – Fire Tests of Door Assemblies.
3. NFPA 257 – Fire Tests of Window Assemblies.

E. Underwriters Laboratories, Inc. (UL):

1. UL 9 – Fire Tests of Window Assemblies.
2. UL 10B – Fire Tests of Door Assemblies.
3. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

F. The following building code will be used to review this project – 200 version of NFPA 101 and the 2008 Indiana building code. (This is the 2003 IBC with Indiana amendments.)



### 1.3 PERFORMANCE REQUIREMENTS

- A. Fire-rated glass ceramic laminated clear and wireless glazing material for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements ranging from 20 minutes to 3 hours with required hose stream test.
- B. Passes positive pressure test standards UL10C, UBC 7-2 and UBC 7-4.

### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.
- B. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.
- C. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.
- D. Samples: Submit, for verification purposes, approx. 8-inch by 10-inch sample for each type of glass indicated.

### 1.5 QUALITY ASSURANCE

- A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.
- B. Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of UL certifying it for use in tested and rated fire protective assemblies.
- C. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E2074-00 and UL 10B, labeled and listed by UL.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials in a safe and secure manner
- B. Deliver materials to specified destination in manufacturer or distributor's packaging, undamaged, complete with installation instructions.
- C. Store off ground, under cover, protected from weather and construction activities.

## 1.7 WARRANTY

- A. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 FIRE-RATED GLAZING MATERIALS

- A. Manufacturer: FireLite Plus<sup>®</sup> as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-800-451-9857.
- B. Properties:
  - 1. Thickness: 5/16 inch [8 mm] overall.
  - 2. Weight: 4 lbs./sq. ft.
  - 3. Approximate Visible Transmission: 85 percent.
  - 4. Approximate Visible Reflection: 9 percent.
  - 5. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
  - 6. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
  - 7. STC Rating: Approximately 35 dB.
  - 8. Surface Finish: Premium (polished).
  - 9. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
- C. Maximum sheet sizes based on surface finish:
  - 1. Premium: 48 inches by 96 inches.
- D. Labeling: Permanently label each piece of FireLite Plus<sup>®</sup> with the FireLite<sup>®</sup> logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite<sup>®</sup> label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).
- E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with [ASTM E2074-00 and ASTM E2010-01] [ULC Standards CAN4 S-104 and CAN4 S-106] [NPFA 252 and NFPA 257] [UL 9, UL 10B and UL 10C].

### 2.2 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

- A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

- B. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
- C. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

## 2.3 FABRICATION

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
  - 2. Minimum required face or edge clearances.
  - 3. Observable edge damage or face imperfections.
- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.
- C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

### 3.2 INSTALLATION (GLAZING)

- A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.
- B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
- C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

- E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.
- F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- G. Place glazing tape on free perimeter of glazing in same manner described above.
- H. Install removable stop and secure without displacement of tape.
- I. Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.
- J. Install in vision panels in fire-rated doors to requirements of NFPA 80.
- K. Install so that appropriate [UL] [FireLite Plus®] markings remain permanently visible.

### 3.3 PROTECTION AND CLEANING

- A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.
- B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

3.4 GLAZING SCHEDULE

Rating	Assembly	Max. Exposed Area (Sq. In.)	Max. Width Of Exposed Glazing (In.)	OR	Max. Height Of Exposed Glazing (In.)	Stop Height
20 min.	Doors HMS or Wood*	3,204	36		89	5/8"
	Other than doors HMS	3,325	95		95	5/8"
45 min.	Doors HMS or Wood	3,204	36		89	5/8"
	Other than doors HMS	3,325	95		95	5/8"
60 min.	Doors (non-temp rise) HMS or Wood	3,204	36		89	5/8"
		100	12		33	5/8"
	Doors (temp rise) Other than doors HMS	3,325	95		95	5/8"
90 min.	Doors (non-temp rise) HMS or Wood	2,034	36		56 1/2"	3/4"
		100	12		33	1/2"
	Doors (temp rise) Other than doors HMS	2,627	56 1/2"		56 1/2"	5/8"

\* HMS indicates hollow metal steel framing.

END OF SECTION 088170

## SECTION 092116.23 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

### 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 gypsum board shaft-wall assemblies for the following:
  - 1. Trash Chute and Mechanical Shafts
- B. Related Sections include the following:
  - 1. Section 078413 Penetration Firestopping

#### 1.3 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.
- B. Provide UL design data and UL Design numbers for each system specified and or supplied on the project.
  - 1. Include stud profiles and gage.
  - 2. Provide product data on each type of gypsum board being used on the project.
  - 3. Include the UL required installation requirements.
  - 4. Indicate in the shop drawings the fire rating of the system submitted.

#### 1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.

- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
- C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

#### 1.7 REFERENCES

- A. ASTM A653/A653M: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B. ASTM C475: Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
- C. ASTM C645: Standard Specification for Nonstructural Steel Framing Members
- D. ASTM C665, Type I: Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- E. ASTM C840: Standard Specification for Application and Finishing of Gypsum Board.
- F. ASTM C919: Standard Practice for Use of Sealants in Acoustical Applications
- G. ASTM C954: Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
- H. ASTM C1002: Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- I. ASTM C1325: Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
- J. ASTM C1396: Standard Specification for Gypsum Board
- K. ASTM C1658: Standard Specification for Glass Mat Gypsum Panels

- L. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- M. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- N. NFPA 252: Standard Methods of Fire Tests of Door Assemblies

## PART 2 - PRODUCTS

### 2.1 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:
  - 1. National Gypsum Company
  - 2. G-P Gypsum.
  - 3. USG Corporation.

### 2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

- A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
  - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
  - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
  - 3. Provide a UL rated assembly for the fire resistive rating noted in the specifications and drawings.

### 2.3 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: 1-2 hour. Refer to the drawings for the location of the rated walls.
- B. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
  - 1. Depth: As indicated on drawings
  - 2. Minimum Base-Metal Thickness: 20 gage.



- C. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
  - 1. Minimum Base-Metal Thickness: Matching steel studs.
- D. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.
- E. Room-Side Finish: Gypsum board
- F. Shaft-Side Finish: Gypsum shaftliner board, Type X

## 2.4 PANEL PRODUCTS

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. G-P Gypsum.
    - b. National Gypsum Company.
    - c. USG Corporation.
- B. Walls:
  - 1. Type X
    - a. Fire rated walls ( See drawings )
    - b. Thickness: 5/8-inch
    - c. Long Edges: Tapered
- C. Gypsum Liner Panels: Comply with ASTM C 442 or ASTM C 1396
  - 1. Type X (UL type SLX): Manufacturer's proprietary liner panels with moisture-resistant paper faces.
    - a. Core: 1 inch (25.4 mm) thick.
    - b. Long Edges: Double bevel.

## 2.5 NON-LOAD-BEARING STEEL FRAMING

- A. Framing Members: Comply with ASTM C 754 for conditions indicated.
- B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
  - 1. Protective Coating: hot-dip galvanized, unless otherwise indicated.

## 2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "Gypsum Board" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- C. Gypsum Board Joint-Treatment Materials: ASTM C475 and as specified in Division 9 Section "Gypsum Board."
- D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated to meet Manufacturer's UL rating.
- E. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
  - 1. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- F. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

## 2.7 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

- A. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing agency.
- B. Fire-Resistance Rating: 1 hour and 2-hour
  - 1. Contractor to size the metal C-H / H studs for the required floor to floor or floor to roof heights.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
  - 1. Depth: C-H/ H studs to be sized for the required framing height and at 24" o.c..
  - 2. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated

- D. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.
  - 1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
  - 1. 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. Dietrich Metal Framing; The System by Metal-Lite, Inc.
    - b. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
- F. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches in depth matching studs, and not less than : 0.0179 inch thick.
- G. Room-Side Finish: Gypsum board and finish as indicated.
- H. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft-wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft-wall assemblies to comply with requirements specified in Division 7 Section "Sprayed Fire-Resistive Materials."

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runner 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.
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft-wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

### 3.3 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
  1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
  2. Division 9 Section "Gypsum Board for applying and finishing panels.
  3. Where handrails/crash rails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch minimum thickness of base uncoated metal, accurately positioned and secured behind at least 1 gypsum board face-layer panel.
- B. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- C. All penetrations thru the shaft wall assembly shall receive UL approved Fire stopping
- A. Shaft wall systems may be installed horizontally for exit enclosures, corridor ceilings and stairway soffits or duct enclosures. Contractor to size the horizontal stud for the maximum span of the rated ceiling. Install horizontal shaft wall per the MFG's recommendations.
- B. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- C. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- D. Control Joints: Install control joints according to ASTM C 840 while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.
- E. Seal gypsum board shaft walls with UL approved fire stopping sealant at perimeter of each assembly.

- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3mm) from the plane formed by faces of adjacent framing.

#### 3.4 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and 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 092116.23

## SECTION 092216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
  - 1. Interior framing systems
  - 2. Interior suspension systems
- B. Related Sections include the following:
  - 1. Section 078413 Penetration firestopping
  - 2. Section 061600 Sheathing
  - 3. Section 05400 Cold Formed Metal Framing
  - 4. Section 092900 Gypsum Board
  - 5. Section 092116 Gypsum Shaft Wall assemblies

#### 1.3 SUBMITTALS

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

#### 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.

## PART 2 - PRODUCTS

### 2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.

### 2.2 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.
- B. Hanger Attachments to Concrete as required:
  - 1. 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, 0.162-inch diameter.
- D. Flat Hangers: Steel sheet and zinc coated or protected with rust-inhibitive paint, 1 by 3/16 inch.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.
  - 1. Depth: 2 inches deep.
- F. Steel Studs, Runners And Furring Channels:
  - 1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
    - a. Depth: 3/4 inch and as indicated on the drawings.
    - b. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
    - c. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire

2. Steel Studs: ASTM C 645. Refer to plans and details for depth of metal studs
    - a. For interior non load bearing studs provide one of the following products. Refer to plans and details for depth and location of metal studs
      1. Interior 6" non load bearing stud partitions use 20 gage at 16" o.c.
      2. Interior 3 5/8" non load bearing metal stud partitions use 20 gage studs at 16" o.c.
  3. Expansion top track at all interior and exterior wall locations shall be equal to the following: Dietrich SLP-TRK Slotted track. Top track shall match the gage of the interior or exterior metal stud.
    1. Standard leg 2 1/2"
    2. Standard vertical slot of 1 1/2" in leg.
    3. Install per MFG's requirements.
  4. Fast Clip. Provide 5 1/2" fast clip at exterior wall framing and exterior soffit framing. Product shall be 14 gage, G90, 50KSI steel.
  5. Easy Clip Series. Contractor to provide accessories from the Dietrich Easy Clip Series as required for a complete installation. Clips shall be 14 gage and hop dipped galvanized. SS grade 50 ksi
  6. Resilient Furring Channels: Standard product fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M) to form 1/2-inch- deep channel of the following configuration:
    - a. Double-Leg Configuration: Hat-shaped channel with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).
- G. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
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. Armstrong World Industries, Inc.; Drywall Grid Systems.
    - b. Chicago Metallic Corporation;
    - c. Drywall Furring System.
    - d. USG Corporation; Drywall Suspension System.



## 2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
  - 1. 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 inserts, hangers and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads.
  - 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. Wind Uplift Bracing. Brace the exterior suspended structure for wind uplift at 48" o.c. unless noted differently on the individual construction document details.
- 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 1/16 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

### 3.5 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
  - 1. Space studs as follows:
    - a. Single-Layer Application: 16 inches unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Top of wall framing: 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 to underside of overhead structure above and secure.
    - d. At walls that terminate at or above the ceiling, provide metal stud kickers going in each direction from the jamb studs to the structure above
  - 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. Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  - 6. Curved Partitions and bulkheads:
    - 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 not less than 2 studs at ends of arcs, place studs 6 inches o.c.

- D. Direct Furring:
  - 1. Screw to stud framing.
  - 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/16 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Interior gypsum board.
  - 2. Moisture Resistant gypsum board.
- B. Related Sections include the following:
  - 1. Division 06 Section "Rough Carpentry" for wood framing that supports gypsum board.
  - 2. Division 06 Section "Interior Architectural Woodwork" for wood blocking and furring that supports gypsum board.
  - 3. Division 07 Section "Thermal Insulation" for sound attenuation batt insulation installed in assemblies that incorporate gypsum board.
  - 4. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board.
  - 5. Division 09 painting Sections for primers applied to gypsum board surfaces.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Contractor to supply shop drawings showing the location of all drywall expansion joints in corridors and rooms within the building for review by the architect and interior designer.

#### 1.3 QUALITY ASSURANCE

- 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. Gypsum Board Winter related Installation recommendations – GA-220-06 or current version.
- C. Repair of fire rated gypsum panel product systems – GA-225-08 or current version.
- D. Application of Gypsum Board to For Curved Surfaces – GA-226-08 or Current Version.
- E. Control joints for Fire-resistance rated systems – GA-234-08 or current version.
- F. Handling and storage of gypsum panel products: A guide for Distributors, Retailers and Contractors – GA-801-07 or current version.
- G. Recommended levels of Gypsum Board Finish – GA-214-10 or current version.

1.4 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT 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 interior products 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 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. G-P Gypsum.
    - b. National Gypsum Company.
    - c. USG Corporation.
- B. Walls:
  - 1. Type X ( See wall type legend on drawing for locations)
    - a. Thickness: 5/8-inch
    - b. Long Edges: Tapered
  - 2. Wet Areas - Moisture Resistant Gypsum Board:
    - a. Non-rated walls: (See Drawing detail for locations of moisture resistant Gyp. Board. )

- 1) Core: 5/8-inch, regular moisture resistant
- 2) Long Edges: Tapered.
- 3) Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274
- 4) Located at walls supporting plumbing fixtures of all new wall construction.

b. Rated walls:

- 1) Core: See 5/8" type "x" , moisture resistant
- 2) Long Edges: Tapered.
- 3) Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274
- 4) Located at walls supporting plumbing fixtures of all new wall construction.

C. Type C:

1. Ceilings ( See horizontal assemblies legend on drawings for locations)
2. Thickness: 5/8 inch
3. Long Edges: Tapered

## 2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc
2. Shapes:
  - a. Cornerbead.
    - a) CBU 103 Delux 90 degree outside finished drywall corner.
    - b) CB12 120/135 degree off angle bead.
  - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - a) Metal "J" trim M402 for 5/8" drywall.
  - c. L-Bead: L-shaped; exposed long flange receives joint compound.
    - a) Metal L-Trim MB20B for 5/8" drywall.
  - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - a) Metal U-Trim/ Spackle J: M20A for 5/8" drywall.
  - e. Drywall Expansion (control) joint.
    - a) 093 Zinc Control Joint (ZNCJ)
  - f. Curved-Edge Cornerbead: With notched or flexible flanges.
    1. All metal beads and trim must be mechanically fastened to the metal stud with drywall fasteners at 16" o.c. Trim accessories may not be stapled or crimp fastened to the drywall.

- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
  - 1. 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:
  - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
  - 3. Finish: Baked-Enamel Finish: AA-C12C42R1x with manufacturer's standard thermosetting organic coating system in color selected by Architect from manufacturer's standard colors.

## 2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Wallboard: Paper.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound
  - 6. Level 5 finish is only required for areas that have a semi-gloss paint.

## 2.5 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. Use adhesives that 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 (0.84 to 2.84 mm) thick.



- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
  - 2. See related specification Division 07 "Thermal Insulation".
- E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
  - 1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840 and GA-216.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. 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. (0.7 sq. m) in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. 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.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

#### A. Single-Layer Application:

- 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) 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 furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

#### B. Multilayer Applications (when applicable):

- 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 1 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 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.

- C. 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.
- D. 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.

### 3.4 PATCHING OF FIRE RATED WALLS

- A. Patching per GA-225-08 or equal.
- B. Fire-rated gypsum panel product systems may be damaged during the life cycle of buildings. To maintain the required fire-rated separation between occupancies or areas, damaged systems must be repaired so that they are restored to their original fire-resistive condition. The repair must follow procedures dictated by the severity of the damage.
- C. Small holes (such as those caused by a door knob) can be repaired by patching. To maintain the integrity of the surface membrane, a gypsum panel product patch must be mechanically secured in the diaphragm; attachment with joint compound material only is not acceptable. The patching material should be cut from type X or proprietary type X gypsum panel product of a thickness equal to the original materials so that the patching material is in the same geometric shape as, but slightly larger than, the damaged area. The damaged area is then further enlarged to match exactly the size of the patching material. Use caution when cutting or fastening into stud cavities to avoid electrical shock or water leaks. Thermal insulation, if present, must be restored. Metal runner track is secured to the inside edges of the damaged area. The patching material is screw attached to the exposed face of the runner track with fasteners a maximum of 8 in. (203 mm) apart. The patch should be treated with tape and joint compound to restore appearance, fire resistance qualities, and acoustical performance.
- D. All patch work shall be flush with the face of the existing walls. Patching of walls by overlaying drywall over the damaged drywall is not acceptable.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect. Refer to the details and construction documents for the spacing of drywall control joints.
- C. Installing Trim Accessories: For trim accessories with flanges, (Corner beads, J-channels, expansion joints etc.) fasten to framing with the same fasteners used to fasten gypsum board. Screw fasteners shall be at 16" o.c. max. Trim accessories may not be stapled or crimp fastened to the drywall. All metal beads and trim must be mechanically fastened to the metal stud with drywall fasteners at 16" o.c. Trim accessories may not be stapled or crimp fastened to the drywall.

1. Install corner bead at external corners.
2. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
  - a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
  - b. Install L-bead where edge trim can only be installed after gypsum panels are installed.
  - c. Install U-bead where indicated.
  - d. Install aluminum trim and other accessories where indicated.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Control Joints:
  1. Control joints shall be manufactured devices designed for this purpose.
  2. Align control joints and door frames when applicable.
  3. Control joints shall be installed where indicated on the plans or as follows
  4. A control joint shall be installed where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
  5. Control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.
  6. Control joints in interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30feet.
  7. Control joints in interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 feet.
  8. Control joints in exterior ceilings and soffits shall be installed so that linear dimensions between control joints do not exceed 30 ft.
  9. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
  10. Control joints shall be installed where specified by the architect or designer as a design accent or architectural feature.
  11. Where a control joint occurs in an acoustical or fire-rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8 in (15.9 mm) type X gypsum panel products, mineral fiber, or other tested equivalent. See the Gypsum Association's *Fire Resistance Design Manual, GA-600*, or *Special Recommendations: Control Joints for Fire-Resistance Rated Systems, GA-234*.
- E. Drywall finishing for Walls concealed above the ceiling:

1. At walls noted to extend to roof deck above, non-rated walls noted to extend to deck above and non-rated walls noted to resist the passage of smoke and all exterior walls
  - a. All vertical and horizontal joints shall receive mud and tape (both sides of wall) full height. Joints above the ceiling do not have to be sanded. Two coats of mud and tape will be required.
    1. If there are gaps between drywall boards installed on the wall that are greater than  $\frac{1}{4}$ ", the drywall shall be removed, and new drywall installed with a gap of less than  $\frac{1}{8}$ " between the boards prior to installing tap and mud.
  - b. The gap between the top of wall and the metal deck must receive acoustical sealant. (Includes all non-rated and acoustical walls.). Fire rated and smoke walls shall receive the required UL approved fire stopping system.
  - c. Where piping, conduit, ducts etc extend thru one or both faces of a drywall wall above the ceiling, the gaps around the items shall receive acoustical sealant to seal off the opening for acoustical separation between areas.
    1. The drywall and framing around larger HVAC ductwork and pipe penetrations shall be installed so the gap between the drywall and ductwork or pipe isles than  $\frac{1}{4}$ ". If the gap is greater than  $\frac{1}{4}$ ", additional drywall will need to be added to the wall or the existing drywall removed and re-installed. The  $\frac{1}{4}$ " gap between the duct and drywall shall receive tape and mud to close the joint.
  - d. Walls noted to be fire rated or noted to be rated smoke walls shall receive approved fire stopping material at all penetrations thru the wall and at the joint between the top of the wall and the metal deck or structure above.
  - e. The drywall joints (both horizontal and vertical) in all exterior walls above the ceiling shall receive drywall tape and two coats of mud. Drywall mud above the ceiling does not have to be sanded between the coats of mud.
    1. In rooms noted not to receive a ceiling, the drywall joints shall be finished full height to the structural deck above. (tape, mud and sand joints full height.)
- F. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - a. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
  - b. Level 2 where panels form substrates for tile and where indicated.
  - c. Level 3 for gypsum board on temporary partitions.
  - d. Level 4 for gypsum board surfaces that will be exposed to view, and gypsum board surfaces scheduled to receive vinyl wall covering.
  - e. Level 5 for gypsum board surfaces noted to receive a semi-gloss finish
  1. Where Level 5 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.
  2. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch

- up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
3. Where Level 3 gypsum board finish is indicated, embed tape in joint compound and apply first and fill (second) coats of joint compound.
  4. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.
  5. Where Level 1 gypsum board finish is indicated, embed tape in joint compound and first coat of joint compound.
  6. Finish exterior gypsum soffit board using setting-type joint compounds to prefill joints and embed tape, and for first, fill (second), and finish (third) coats, with the last coat being a sandable product. Smooth each coat before joint compound hardens to minimize need for sanding. Sand between coats and after finish coat.
  7. Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions.

### 3.7 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

## SECTION 093013 - CERAMIC TILING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Porcelain/ Ceramic / Glass wall tile.
2. Porcelain /Ceramic Floor tile.
3. Waterproofing Membranes
4. Crack Isolation Membranes
5. Thin-set Tile Applications.
6. Metal edge trims as required.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient floor tile.

1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples for Verification: One physical MFG standard sample-size of each color and pattern of floor tile required.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings

#### 1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and 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.

2. Grout: Furnish quantity of grout equal to 1% of amount installed for each type, composition and color indicated.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  1. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

#### 1.6 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.
  2. Step Treads: Minimum 0.6.
  3. Ramp Surfaces: Minimum 0.8.

#### 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 requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has 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 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
  1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.



- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:

1. Joint sealants.

1.9 Preinstallation Conference: Conduct conference at the Project site.

1. Convene one week prior to commencing work of this section.
2. Require attendance of installation, tile installer, drywall installer, plumber, and General contracto. Review installation procedures and coordination required with related work.
  - a. Meeting agenda includes but is not limited to:
    - b. Surface preparation.
    - c. Tile and installation material compatibility.
    - d. Manufacturer and installer warranty duration and scope covered by warranty.
    - e. Edge protection, transition, and pre-fabricated movement joint profiles.
    - f. Waterproofing techniques.
    - g. Crack isolation techniques.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 WALL & FLOOR TILE:

1. SEE FINISH COLOR LEGEND AND FINISH SCHEDULE FOR PRODUCT INFORMATION

2.2 SETTING MATERIALS

- A. Mortar (Thin set) Installation Materials:

- B. Water-Cleanable, Tile-Setting mortar:

1. American National Standards Institute (ANSI) — ANSI A108.5, A118.4 and A118.11 of the American National Standards for the Installation of Ceramic Tile.
2. Modified Thin Set Mortar: Meets the requirements of ANSI A118.4T, A118.11, and A118.15T.
  - a. Color: TBD by contractor.
3. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.

## 2.3 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS AND COUNTERTOPS

- A. Schluter-JOLLY: L-shaped profile. 1/8 inch (3 mm) wide top and vertical wall sections that together form the visible surface. Integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
  - 1. Anchoring Leg: Straight anchoring leg.
  - 2. Material and Finish:
    - a. Satin Chrome Finish
    - .

## 2.4 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.
  - 1. Basis-of-Design Product:
    - a. Mapei Flex color CQ grout. Color selected by the owner and architect.
    - b. 2 colors of grout will be specified on the project.

## 2.5 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 Section 079200 "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
  - 1. Products: Subject to compliance with requirements, provide the following:
    - a. Dow Corning Corporation; Dow Corning 786.
    - b. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
    - c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
    - d. Tremco Incorporated; Tremsil 600 White.

## 2.6 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

- B. 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.
- C. Tile Spacers. Provide MFG's standard tile spacers per grout joints specified.
- D. Trowel: Contractor to utilize required notched trowels as specified by the MFG for proper spreading rate of mortar.

## 2.7 Crack Isolation Membrane

- A. Crack Isolation Membrane per ANSI a118.12 installed per manufacture recommendations equal to:
  - 1. Laticrete – Hydro Ban
  - 2. Custom Building Products – Red Guard
  - 3. Or others as approved by architect.

## 2.8 WATERPROOFING MEMBRANE

- A. Waterproofing Membrane per ANSI a118.10 installed per manufacture recommendations equal to:
  - 1. Laticrete – Hydro Ban
  - 2. Custom Building Products – Red Guard
  - 3. Or others as approved by architect.

## 2.9 SHOWER SHELF

- a. As indicated in drawings (See Interior Finish Legend SS-1 & TSS-1). Installed per manufacture recommendations.

## 2.10 Shower Pan & Water proofing accessories

- a. As indicated in drawings (See Interior Finish Legend SS-1 ). Installed per manufacture recommendations.

## 2.11 Waterproof Wall Tile Backer Boards

- a. As indicated in drawings (See Interior Finish Legend SS-1 & TSS-1). Installed per manufacture recommendations.

## 2.12 Natural Stone Shower Curbs & Accessories

- a. As indicated in drawings (See Interior Finish Legend SS-1). See Quartz Aggregate Countertops section 12 36 61

## 2.13 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 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).
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated. See Finish Materials Legend and Finish plans for grout colors.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
  - 1. Available Products:
    - a. Dow Corning Corporation; Dow Corning 786.
    - b. Tremco, Inc.; Tremsil 600 White.
- D. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
  - 1. Available Products:
    - a. Bostik; Chem-Calk 550.
    - b. Mameco International, Inc.; Vulkem 245.
    - c. Tremco, Inc.; THC-900.

## 2.14 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 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
    - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
  - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
  - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the

ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
  - a. Tile floors in wet areas.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
  1. Ceramic Mosaic Tile: 1/16 inch ( ).
  2. Glazed Wall Tile: 1/16 inch ( ).
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
  1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- K. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

- L. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

### 3.4 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove epoxy and latex-Portland cement grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
  - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.5 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Wall Installations, Bathtub Walls :
  - 1. Ceramic Tile Installation : TCNA B425-16 ; thinnest mortar on Coated Extruded Foam Backer units board equal to ASTM D3273.
    - a. Moisture Resistant Foam backer units installed with sealants per manufacture instructions.
    - b. Thinset Mortar:
    - c. Ceramic Tile Type: as specified on drawings
    - d. Grout: As specified
- B. Interior Wall Installations, Bathtub Walls :
  - 1. Ceramic Tile Installation : TCNA B426-16 ; thinnest mortar on Coated Extruded Foam Backer units board equal to ASTM D3273.
    - a. Moisture Resistant Foam backer units installed with sealants per manufacture instructions.

- b. Moisture Resistant Foam shower pan unit installed with sealants, flashings, curbs and thinnest mortar per manufacture instructions.
  - c. Thinset Mortar:
  - d. Ceramic Tile Type: as specified on drawings
  - e. Grout: As specified
- C. Interior Floor Installations, Concrete Subfloor (above grade):
- 1. Ceramic Tile Installation : TCNA F115a-16; thinnest mortar.
    - a. Crack Isolation membrane
    - b. Thinset Mortar: Improved modified dry-set mortar.
    - c. Ceramic Tile Type: as specified on drawings
    - d. Grout: as specified.
- D. Interior Floor Installations, Poured gypsum underlayment over wood Subfloor (above grade):
- 1. Ceramic Tile Installation : TCNA F180-16; thinnest mortar.
    - a. Crack Isolation membrane
    - b. Thinset Mortar: Improved modified dry-set mortar.
    - c. Ceramic Tile Type: as specified on drawings
    - d. Grout: as specified.

END OF SECTION 093013



## SECTION 095113 - ACOUSTICAL PANEL CEILINGS

### 1.1 GENERAL

- A. Submittals: In addition to Product Data for each type acoustical tile and suspension system required, submit the following:
  - 1. One sample and product data of each acoustical tile type, pattern, and color used on the project.
  - 2. Product data for each of concealed suspension system members, including exposed moldings, for each color and system type required.
- B. Attic Stock Material: Contractor to supply 5% of each type of ceiling tile and grid specified on the project. Place as directed by owner in storage at end of the project.
- C. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:
  - 1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
  - 2. Surface-burning characteristics of acoustical tiles comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
  - 3. Products are identified with appropriate markings of applicable testing and inspecting agency.

### 1.2 PRODUCTS

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Reflected Ceiling Legend in the architectural drawings.
- B. Acoustical Tiles: Manufacturer's standard tiles complying with ASTM E 1264 classifications, unless otherwise indicated, and with requirements indicated in the Acoustical Tile Ceiling Schedule.
  - 1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400 per ASTM E 795.
- C. Metal Suspension System: Manufacturer's standard metal suspension system complying with applicable ASTM C 635 requirements, and with requirements indicated on the Reflected Ceiling Finish Legend
- D. Finishes and Colors for Metal Suspension System, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- E. Suspension System Attachment Devices: Fabricated from corrosion-resistant materials and

sized for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

- F. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire complying with ASTM A 641/A 641M, Class 1 zinc coating, soft temper. Size wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
1. Wire hangers, braces and ties shall not be supported from ductwork, conduit or piping.
  2. If corridor ceiling space is not accessible due to large duct runs and piping, contractor shall coordinate with the MEP contractor for the installation of a unistrut type system extended down from the structure above. The lay-in ceiling grid will be suspended from the unistrut grid system..
- G. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

### 1.3 EXECUTION

#### A. EXAMINATION

- a. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- b. Proceed with installation only after unsatisfactory conditions have been corrected.

#### B. General: Install acoustical tile ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
3. U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.

#### C. Secure ceiling hangers from suspension system members to building's structural members. Install hangers plumb and free from contact with other objects within ceiling plenum. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

1. Do not support/secure ceiling hangers from bottom of ductwork, plumbing or electrical conduit.
2. Do not support ceilings directly from permanent metal forms, or floor or roof deck.

- a. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member.
- b. When required suspend unistrut down from ceiling on tracks. Rod below ductwork is for ceiling support.

D. PREPARATION

1. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and Coordination Drawings.
- E. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
1. Anchor perimeter trim at 32" o.c. around the room.
- F. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- G. All ceiling tile grid runners shall receive wire ties spaced no more than 8"-10" from the wall surface. The weight of the grid will not be allowed to bear on the perimeter wall track. If during inspection, any perimeter wall track is being bent downward due to the weight of the ceiling system, contractor will be required to add additional wire ties around the perimeter of the room or area.

H. CLEANING AND PROTECTION

- A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings after removing strippable, temporary protective covering, if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.
- B. Protect ceiling tile from damage after installation. Damage ceiling tile will be identified on the punch list and will need to be replaced prior to substantial completion.

**1.4 CEILING TILE SCHEDULE**

- **Refer to acoustical ceiling plan and legend for ceiling tile types.**

END OF SECTION 095113

## SECTION 096513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Vinyl base.
2. Resilient stair treads, landing tile and accessories.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

### PART 2 - PRODUCTS see Color Legend for all product information.

#### 2.1 VINYL BASE

A. Products: As noted on drawings

B. Height: As indicated on Drawings.

C. Lengths: Coils in manufacturer's standard length.

D. Outside Corners: Job formed.

E. Inside Corners: Job formed.

#### 2.2 RUBBER STAIR ACCESSORIES (See Color Legend for product information)

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Stair Treads: ASTM F2169, A.D.A., Visually Impaired compliant

1. Type: homogeneous composition of 100% synthetic rubber, high quality additives and colorants
2. Class 2: pattern: embossed

3. Group: 2 (with contrasting color for the visually impaired).
  4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees
  5. Nosing Height: 2 inches (51 mm)
  6. Thickness: .210" to .153" tapered to back edge
  7. Size: Lengths and depths to fit each stair tread in one piece
- C. Integral Risers: Smooth, flat; in height that fully covers substrate
- D.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
    - a. Form without producing discoloration (whitening) at bends.
  - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
    - a. Miter corners to minimize open joints.

### 3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

**END OF SECTION 096513**

## SECTION 096516 - RESILIENT SHEET FLOORING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Vinyl sheet floor covering.
- 2. Flash Cove Base

- B. Related Sections:

- 1. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams (Marked up on floor plans), edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- C. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections of each different color and pattern of floor covering required.
  - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.
- D. Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch (150-by-230-mm). Sample applied to a rigid backing and prepared by Installer for this Project.
- E. Approval letter from the flooring material MFG that the moisture content of the concrete floor is acceptable.
- F. Letter from the Flooring MFG that the Adhesives specified with the finish products is acceptable for the intended substrate.

G. Submit written narrative on how the flooring will be protected during the final months of construction.

H. Product Schedule: For floor coverings.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor covering to include in maintenance manuals.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Covering: Furnish quantity not less than 5 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

#### 1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.
2. The floor covering representative shall visit the site during the flooring installation and confirm in a written letter to the architect that the flooring is being installed per the requirements of the Manufacturer.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
2. F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
3. E 648 Standard Test Method for Critical Radiant Flux of Flooring Systems Using a Radiant Energy Source.
4. E 662 Standard Test Method for Specific Density of Smoke Generated by Solid Materials.
5. F 970 Standard Test Method for Static Load Limit.
6. F 1303 Standard Specification for Sheet Vinyl Floor Covering with Backing.
7. . F 925 Standard Test Method for Resistance to Chemicals of Resilient Flooring.
8. Other Referenced Documents:

a. National Fire Protection Association (NFPA): 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.



b National Fire Protection Association (NFPA) 258 Test Method for Specific Density of Smoke Generated by Solid Materials.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store rolls upright.

## 1.9 FLOOR PREP

- A. Patching and Grinding of new and existing Floors shall be included in the contractors bid.
1. All floor prep for new and existing concrete floors shall be included in the contractor's bid. This shall include any patching, leveling, grinding etc. of new surfaces as required for tile installation.
  2. New and existing concrete/ gypcrete subfloors should meet the guidelines of the latest edition of aci 302 and astm f710, "standard practice for preparing concrete floors to receive resilient flooring" available from the american society for testing and materials, 100 barr harbor drive, west conshohocken, pa 194 28; 610-832-9585; <http://www.astm.org>.
  3. Required Moisture Testing - maximum moisture level per ASTM 1869 CaCl is 8 lbs. and ASTM 2170 In-situ Relative Humidity 90% per 1000 sq.ft. in 24 hours. PH of concrete sub-floor needs to be between 7 &10.
  4. Substrates shall be smooth, structurally sound, dry, clean and free of all foreign material such as dust, wax, solvents, paint, grease, oils, old adhesive residue, curing and hardening/ curing compounds, sealers and other foreign material that might prevent adhesive bond.
  5. On or below-grade slabs must have an effective vapor retarder directly under the slab.
  6. Wet curing 7 days is the preferred method for curing new concrete.
  7. Curing compounds (DO NOT USE). If present they can interfere with the bond of the adhesive to the concrete. Seek assistance from a substrate manufacturer if curing agents are detected.
  8. Remove curing compounds 28 days after placement, so concrete can begin drying.
  9. Concrete and gypcrete floors shall be flat and smooth within 1/8" in 6 feet or 3/16" in 10 feet.

10. F-Number System: Overall values of FF 36/ FL 20 may be appropriate for resilient floor coverings.
11. Expansion and isolation joints in concrete are designed to allow for the expansion and contraction of the concrete. Resilient flooring products should never be installed over expansion joints. Expansion joint covers designed for use with resilient floorings should be used. Control joints (saw cuts) may be patched and covered with resilient once the concrete is thoroughly cured, dry and acclimated.
12. Moisture detection system: ASTM test method f 1869-10 using calcium chloride to determine the vapor emission rate gives you the most accurate quantitative test results. submit moisture test to the architect, owner and sheet flooring supplier. do not install flooring until the moisture emissions.
13. Construction manager shall determine whom is responsible for floor testing, it may not be the floor covering installer's responsibility to conduct these tests. it is, however, the floor covering installer's responsibility to make sure these tests have been conducted, and that the results are acceptable prior to installing the floor covering. when moisture tests are conducted, it indicates the conditions only at the time of the test .

**B. All floor covering manufacturers and adhesive companies require floor Moisture Vapor Emission Rate (MVER) testing, pH testing and Relative Humidity testing prior to flooring installations.**

1. MVER Testing (ASTM F-1869-10)
2. RH Testing (ASTM F-2170 -10)
3. pH Testing (ASTM F-710-10)
4. A minimum of one test per 1,000 square feet of flooring space is required. Always check the manufacturer's recommendations and warranties prior to installation.

1.10 PROJECT CONDITIONS: Ambient temperature range for installation varies among manufacturers. Consult manufacturers for recommendations and revise first paragraph below to suit Project.

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 80 deg F, in spaces to receive floor coverings during the following time periods:
  1. 72 hours before installation.
  2. During installation.
  3. 72 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F (13 deg C) or more than 80 deg F.
- C. Close spaces to traffic during floor covering installation.

- D. Close spaces to traffic for 72 hours after floor covering installation, and for SF-1 (sports flooring), no heavy rolling traffic for 72 hours and normal traffic within 48 hours.
- E. Install floor coverings after other finishing operations, including painting, have been completed.
- F. At the completion of the installation, the flooring shall be protected from damage.
- G.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore Standard.
- B. Low-Emitting Materials: Flooring system 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."

### 2.2 VINYL SHEET FLOOR COVERING : **SEE DRAWINGS FOR COLOR LEGEND AND PRODUCTS**

- A. Products selected are by Mannington Commercial.
  - 1. (1) flooring products are specified.

### 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesive/ Primers: MANNINGTON Adhesive/ Primers.
  - 1. **Sheet vinyl Adhesive:**
    - a. **Only manufacturer's allowed adhesives (in writing per installation instructions).**
    - b. **Provide MFG's approved adhesive that works with moisture levels above 90%.**
      - 1) **Mannington Commercial V-95 Adhesive / Premium universal primer**
- C. Seamless-Installation Accessories:
  - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
    - a. Color: As selected by Architect from manufacturer's full range. One color of welding rods will be selected for each type of sheet vinyl specified.

D. Integral-Flash-Cove-Base Accessories:

1. Cove Strip: 1-inch (25-mm) radius provided or approved by manufacturer.
2. Cap Strip: Square aluminum.
  - a. Contractor shall provide a caulk joint between the aluminum cap and the wall or wall protection.
  - b. Provide 5/8" high impact resistant gyp board backer at locations noted to receive flash cove base.
3. Corners: Heat welded.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- B. Floor Preparation.
  1. Sand or grid all floors prior to installation to remove construction debris and surface irregularities.
  2. Mechanically remove any dirt, loose paint, existing adhesives and all foreign matter that would interfere with a good bond.
- C. Concrete Substrates: Prepare according to ASTM F 710.
  1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing. Perform a minimum of 1 test every 1000sf. Do not install sheet flooring until the moisture emissions rate is below manufacturer's acceptable standards.
  - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
  - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 25-65 percent relative humidity level measurement 72 hours before and 72 hours after installation.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor coverings until they are same temperature as space where they are to be installed.
  1. Move floor coverings and installation materials into spaces where they will be installed at least 72 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

### 3.3 FLOOR COVERING INSTALLATION

- A. By installing your flooring, you are accepting the conditions of the floor surface. If prior contractors damage the sub flooring causing additional work, you must notify the General Contractor prior to the start of the flooring work.
- B. Comply with manufacturer's written instructions for installing floor coverings.
- C. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- D. Lay out floor coverings as follows:
  1. Maintain uniformity of floor covering direction.
  2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in floor covering substrates.
  3. Match edges of floor coverings for color shading at seams.
  4. Avoid cross seams.
- E. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- F. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- G. Install flooring below all vendor supplied casework.

- H. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- I. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
- J. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- K. Seamless Installation:
  - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
  - 2. Do not allow seaming gun to damage surrounding flooring. Damaged flooring due to floor seaming must be removed and replaced.
  - 3. All seams must be 90 degrees to the adjacent seams. Angled seams will not be accepted.
- L. Integral-Flash-Cove Base: Cove base shall be 6 inches or 4 inches as indicated on drawings up vertical surfaces. Support floor coverings at horizontal and vertical junction by cove strip. Butt at top against cap strip.
  - 1. Contractor shall inspect the floor at the areas of the flash cove base and ensure that the drywall and plywood was installed correctly to provide backing for the 1" radius cove strip.
  - 2. When coving, it is necessary to address the floor/wall juncture with a plastic cove fillet strip. When fastening the cove fillet, Cove strip to be set in contact adhesive. Contractor to confirm that the fillet is secure and conforms to both the vertical surface and floor and leaves no voids behind or below the cove fillet. The fillet strip should be a minimum of 1" radius.
  - 3. Transitioning to door casings may require a field modification of the cove stick so that the radius gradually becomes smaller at the point of contact to eliminate any open voids at the end of the coving when it meets the door casing. All inside and outside corners must be mitered precisely so that the flooring contours perfectly at the corners.
  - 4. When coving, best results can always be achieved by pattern scribing. Inside corners must be cut net with no fullness to avoid unwanted puckers and bubbles, but just as important will be to avoid any gaps where the material meets above the cove stick in the corner of the vertical surface. Outside corners must be filled using a "boot" plug or a "butterfly" plug.
- K. Contractor to inspect sheet vinyl and sheet rubber flooring for damage prior to installation. Any defects or issues with the product shall be brought to the attention of the manufacturer immediately.

1. Lay out sheet vinyl floor coverings to comply with the following requirements:
  - a. Maintain uniformity of sheet vinyl floor covering direction.
  - b. Arrange for a minimum number of seams and place them in inconspicuous and low-traffic areas, and not less than 6 inches away from parallel joints in flooring substrates.
  - c. Match edges of sheet vinyl floor coverings for color shading and pattern at seams.
  - d. Avoid cross seams.
2. Heat-Welded Seams: Rout joints and heat weld with welding bead, permanently fusing sections into a seamless floor covering. Weld to match field color.
3. Hand roll sheet vinyl floor coverings in both directions from center out to embed floor coverings in adhesive and eliminate trapped air.
4. Contractor shall provide a caulk joint at any gaps that exist between the wall cap and the drywall wall surface.
5. Contractor shall provide a color match caulk joint between the sheet vinyl floor and the hollow metal door frame.
6. Contractor shall provide a color match caulk joint between the flash cove base and the hollow metal door frame.
7. Contractors Note: Where different gauges of sheet rubber meet, provide leveling underlayment to create a smooth, flush transition.

#### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings. The floors must be cleaned the first time by the contractor.
- B. Perform the following operations immediately after completing floor covering installation:
  1. Remove adhesive and other blemishes from floor covering surfaces.
  2. Sweep and vacuum floor coverings thoroughly.
  3. Damp-mop floor coverings to remove marks and soil.
  4. If the flooring was subjected to excess dirt, soil and heavy traffic before the initial maintenance, use MFG approved Cleaner mixed according to label instructions with clean potable water.
  5. DO NOT USE ABRASIVE CLEANERS!
  6. Use a standard scrubbing machine or an automatic scrubber equipped with the proper color of pad for the soiling to be cleaned. Test to make sure the pad selected does not damage the floor's surface.
  7. Rinse using a clean mop and clean water. Change rinse water often to avoid leaving a dirty residue.
- C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor coverings until Substantial Completion. Damaged flooring will be the responsibility of the flooring contractor to repair.

END OF SECTION 096516



## SECTION 096519 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Luxury Vinyl plank

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
  - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- C. Samples for Verification: One physical MFG standard sample-size of each color and pattern of floor tile required.
- D. Product Schedule: For floor tile. Use same designations indicated on Drawings

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

## 1.8 FIELD CONDITIONS

- A. Acclimate flooring, adhesives, and the job-site: only install flooring in climate-controlled structures consistently maintained at temperatures between 65°-85°F (18°-29°C) and 35%-65% RH a minimum of 48-72 hours before, all times during, and continuously after installation (depending on adhesive).
- B. Interior environmental conditions must be maintained at 65°-85°F (18°-29°C) and 35%-65% RH a minimum of 48 hours before testing, and at all times during testing (ASTM F710).
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.
- F. Areas to receive flooring should be adequately lighted during all phases of the installation process. Controlled environments are critical. Fully functional HVAC systems are the best way to ensure temperature and humidity control.
- G. Do not install resilient flooring products until the work area can be temperature controlled

## 1.9 FLOOR PREP

- A. Patching and Grinding of new and existing Floors shall be included in the contractors bid.
  - 1. All floor prep for new and existing concrete floors shall be included in the contractor's bid. This shall include any patching, leveling, grinding etc. of new surfaces as required for tile installation.
  - 2. New and existing concrete/ gypcrete subfloors should meet the guidelines of the latest edition of aci 302 and astm f710, "standard practice for preparing concrete floors to receive resilient flooring" available from the american society for testing and

materials, 100 barr harbor drive, west conshohocken, pa 194 28;  
610-832-9585; <http://www.astm.org>.

3. Required Moisture Testing - maximum moisture level per ASTM 1869 CaCl is 8 lbs. and ASTM 2170 In-situ Relative Humidity 90% per 1000 sq.ft. in 24 hours. PH of concrete sub-floor needs to be between 7 &10.
4. Substrates shall be smooth, structurally sound, dry, clean and free of all foreign material such as dust, wax, solvents, paint, grease, oils, old adhesive residue, curing and hardening/ curing compounds, sealers and other foreign material that might prevent adhesive bond.
5. On or below-grade slabs must have an effective vapor retarder directly under the slab.
6. Wet curing 7 days is the preferred method for curing new concrete.
7. Curing compounds (DO NOT USE). If present they can interfere with the bond of the adhesive to the concrete. Seek assistance from a substrate manufacturer if curing agents are detected.
8. Remove curing compounds 28 days after placement, so concrete can begin drying.
9. Concrete and gypcrete floors shall be flat and smooth within 1/8" in 6 feet or 3/16" in 10 feet.
10. F-Number System: Overall values of FF 36/ FL 20 may be appropriate for resilient floor coverings.
11. Expansion and isolation joints in concrete are designed to allow for the expansion and contraction of the concrete. Resilient flooring products should never be installed over expansion joints. Expansion joint covers designed for use with resilient floorings should be used. Control joints (saw cuts) may be patched and covered with resilient once the concrete is thoroughly cured, dry and acclimated.
12. Moisture detection system: ASTM test method f 1869-10 using calcium chloride to determine the vapor emission rate gives you the most accurate quantitative test results. submit moisture test to the architect, owner and sheet flooring supplier. do not install flooring until the moisture emissions.
13. Construction manager shall determine whom is responsible for floor testing, it may not be the floor covering installer's responsibility to conduct these tests. it is, however, the floor covering installer's responsibility to make sure these tests have been conducted, and that the results are acceptable prior to installing the floor covering. when moisture tests are conducted, it indicates the conditions only at the time of the test .

**B. All floor covering manufacturers and adhesive companies require floor Moisture Vapor Emission Rate (MVER) testing, pH testing and Relative Humidity testing prior to flooring installations.**

1. MVER Testing (ASTM F-1869-10)

2. RH Testing (ASTM F-2170 -10)
3. pH Testing (ASTM F-710-10)
4. A minimum of one test per 1,000 square feet of flooring space is required. Always check the manufacturer's recommendations and warranties prior to installation.

## PART 2 - PRODUCTS

### 2.1 SEE COLOR LEGEND AND FINISH SCHEDULE FOR PRODUCT INFORMATION

### 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
  1. Only manufacturer's allowed adhesives (in writing per installation instructions).
  2. Primers & Adhesives: High moisture adhesives equal to **Shaw 9050 primer & Shaw 4151 adhesive** or equal to be provided as recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
  1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  3. It is the carpet installer's responsibility to prep the floor and prior to carpet installation. This includes grinding of the floor to remove bumps, ridges and debris.
- C. Expansion Joints / Isolation Joints: Such joints (or other moving joints) are incorporated into concrete floor slabs in order to permit movement without causing random cracks in the concrete. These joints must be honored and not be filled with underlayment products or other materials, and floor coverings must not be laid over them. Expansion joint covering systems should be detailed by the architect or engineer, and based upon intended usage and aesthetic considerations.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
1. Lay tiles square with room axis and in pattern indicated on Finish Plans.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
1. Lay tiles in pattern of colors and sizes indicated on Finish Plans.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

#### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

## SECTION 096813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes modular, tufted carpet tile.
- B. Related Requirements:
  - 1. Section 096513 "Resilient Base and Accessories" and Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.
    - d. Transition accessories.

#### 1.4 ACTION SUBMITTALS

- A. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: one MFG standard sample size
  - 2. Exposed Edge, Transition, and Other Accessory Stripping: one MFG standard sample size
- B. Product Schedule: For carpet tile. Use same designations indicated on Color Legend.

1.5 INFORMATIONAL SUBMITTALS

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

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to one full carton of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

1.9 FLOOR PREP

- A. Patching and Grinding of new and existing Floors shall be included in the contractors bid.
  - 1. All floor prep for new concrete floors shall be included in the contractor's bid. This shall include any patching, leveling, grinding etc. of new surfaces as required for tile installation.
  - 2. Contractor shall inspect the site prior to submitting bid.
- B. Moisture Detection System: Provide all floor and substrate tests as required in writing by Flooring Manufacturer in installation instructions. Including but not limited to: Moisture Vapor Emission Rate (MVER) testing, pH testing and Relative Humidity testing prior to flooring installations.
  - 1. MVER Testing (ASTM F-1869-10)
  - 2. RH Testing (ASTM F-2170 -10)
  - 3. pH Testing (ASTM F-710-10)
  - 4. A minimum of one test per 1,000 square feet of flooring space is required. Always check the manufacturer's recommendations and warranties prior to installation.



- C. Submit moisture test to the Architect, Owner and Sheet flooring supplier. Do not install flooring until the moisture emissions rate is below manufacturer's acceptable standards. Conduct a test for every 1000 sq ft or per manufacturer's requirements.

#### 1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

#### 1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

### **PART 3 - See Finish Schedule and Finish Legend**

#### 3.1 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation recommended by carpet tile manufacturer.
- A. **Adhesives/ Primers:** Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements

for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

- a. **Provide Plus (US) Adhesive 2500 with XI Brand RH 95 primers per flooring manufactures written instructions.**
- B. Metal Edge/Transition Strips: As scheduled. Refer to the floor finish plan for standard flooring transition details.
- C. Provide carpet to sheet vinyl/LVT transition strips as noted in the standard flooring transition details shown on the Finish Schedule sheet.
- D. Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
  1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Adhesives 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."

#### PART 4 - EXECUTION

##### 4.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- 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 carpet tile manufacturer.
  2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
  3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 4.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds recommended by manufacturer and according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions **1/8 inch (3 mm)** wide or wider and protrusions more than **1/32 inch (0.8 mm)** unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

#### 4.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As scheduled.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Floor Preparation - Carpet is required to be installed over properly prepared substrates that are suitable for the specific product and installation method selected. All cracks, holes and flooring irregularities are required to be repaired to ensure a smooth, finished appearance, prevent accelerated wear and telegraphing substrate irregularities. Substrates are required to be structurally sound and free of foreign substances that will compromise the carpet or its installation. Patching compounds are required to be suitable for the use application. Select polymer-fortified patching compounds according to the carpet manufacturer's instructions. (Refer to ASTM E1155-96 (2008)).
  - 1. It is the carpet installer's responsibility to prep the floor and prior to carpet installation. This includes grinding of the floor to remove bumps, ridges and debris.

- G. Patched areas may be porous and highly alkaline, which will prevent adequate adhesive bond. For best results, prime patched areas. Consult patch manufacturer for primer recommendations and compatibility with adhesives.
- H. Prior to installation carpet, the flooring contractor shall check the moisture content of the floor and report back to the general contractor and architect the findings of the test results.
- I. 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 nonpermanent, nonstaining marking device.

#### 4.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine as recommended by carpet tile manufacturer..
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer. Contractor is responsible for replacement of damaged work.

END OF SECTION 096813

## SECTION 09 77 25 - FIBERGLASS REINFORCED PLASTIC PANELS

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. Section Includes: Special wall surfaces, including fiberglass reinforced plastic panels.

#### 1.02 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide fiberglass reinforced plastic (FRP) panels which have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.
- B. This section describes the requirements for furnishing and installing fiberglass reinforced plastic panels according to manufacturer's recommendations.

#### 1.03 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's product sheet, for specified products
  - 1. FRP panel and trim
  - 2. Adhesives.
- B. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures. Indicate location and dimension of joints and fastener attachment.
- C. Samples: Submit full range of MFG color selection, **physical samples**, for final selection during shop drawings. Final selection will decide finishes, colors and textures. Submit 1 samples of each type of panel, trim and fastener.
- D. Submit manufacturer's installation guide for panels and adhesives.
- E. Quality Assurance Submittals: Submit the following:
  - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
  - 3. Provide panels, adhesives and molding only from the manufacturer specified to ensure warranty and color harmonization of accessories.
- F. Closeout Submittals: Submit the following:
  - 1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 01 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.

#### 1.04 QUALITY ASSURANCE

##### A. Qualifications:

1. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.
2. Manufacturer Qualifications: Manufacturer should be capable of providing field service representation during construction and should be capable of approving application method.

#### 1.05 REFERENCE STANDARDS

##### A. ASTM International (ASTM) ([www.astm.org](http://www.astm.org)):

1. ASTM D 2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
2. ASTM D 5319 – Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
3. ASTM D 5420 – Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
4. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

##### B. FM Global (FM) ([www.fmglobal.com](http://www.fmglobal.com)):

1. ANSI FM Approval 4880 – Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior; Wall Systems.

#### 1.06 DELIVERY, STORAGE & HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package sheets on skids or pallets for shipment to project site.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store panels indoors in a dry place at the project site.
- C. Handling: Remove foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

#### 1.07 PROJECT CONDITIONS

##### A. Environmental Requirements:

1. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.
2. During installation, and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.
- B. 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 WARRANTY

- A. 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 years commencing on Date of Substantial Completion.

#### PART 2 PRODUCTS

##### 2.01 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS – **BASIS OF DESIGN**

- A. Manufacturer: Crane Composites, Inc.
  1. Telephone: (800) 435-0080
- B. Fiberglass Reinforced Plastic (FRP) Panels.
  - a. Fiberglass Reinforced Plastic (FRP) Panels: Crane Composites FM Approved "Glasbord Smooth Finish FSFM".
  - b. Class A.
  - c. Use: Walls.
  - d. Surface Finish: Smooth.
  - e. Scratch Resistance, ASTM D 2583, Barcol Hardness: 55.
  - f. Abrasion Resistance, Taber Abrasion Test, CS-17 abrasive wheels with 1,000 g weight:
    - 1) Weight loss after 25 cycles of no more than 0.038 percent.
  - g. Impact Strength, ASTM D 5420: 11.0 in-lbs (0.58 J), showing no visible damage on finish side Color: -As indicated on drawings.
  - h. Size: 4'-0" x 10'-0" -Cutting of the panel in the field will be required to match ceiling tile height. Wall panels shall extend full height from finish floor to underside of lay-in ceiling above. Cut top of panel for noted ceiling height.
  - i. Moldings: Provide harmonizing PVC (polyvinyl chloride) moldings. Color – TBD in shop drawing submittals
  - j. FRP panel will be installed over 5/8" type "x" gyp Board.
- C. Surface Protection: Provide manufacturer's *Surfaseal* surface protection for fiberglass reinforced plastic (FRP) panels.
- D. Division Bars, Corner Trim: Panel manufacturer's standard length extruded vinyl pieces; longest length possible to eliminate end joints.
  1. At the top of the panel below the lay-in ceiling tile grid, cap the top of the panel with the MFG's standard "CP" cap.

2. Contractor to caulk the joint between the top cap of the RFP panel and the ceiling grid.

## 2.02 ACCESSORIES

- A. Adhesive: Provide panel adhesive as recommended by panel manufacturer. Install adhesive at a rate required by the MFG. Adhesive shall be equal to Titebond Green Choice Advanced Polymer Panel Adhesive. Adhesive must be VOC compliant.

## 2.03 SOURCE QUALITY

- A. Source Quality: Obtain fiberglass reinforced plastic (FRP) panels, adhesives and trim accessories from a single manufacturer. Provide panels and molding only from manufacturer specified to ensure warranty and color harmonization of accessories.

## PART 3 EXECUTION

### 3.01 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.

### 3.02 EXAMINATION

- A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
  1. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails are countersunk and joints and cracks are filled flush and smooth with the adjoining surface.
  2. Do not begin installation until backup surfaces are in satisfactory condition.

### 3.03 PREPARATION

- A. Surface Preparation: Prior to the installation of the FRP panel, the walls shall be free from dust and debris. Consult MFG for proper drywall joint treatment.

### 3.04 INSTALLATION

- A. Fiberglass Reinforced Panel (FRP) Installation:
  1. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.
  2. Install panels with manufacturer's recommended gap for panel field trim and corner joints.
  3. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
  4. Use products acceptable to panel manufacturer and install FRP system in accordance with panel manufacturer's printed instructions.



- B. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related materials installation.

### 3.05 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have been installed and are damaged. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
  - 1. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

### 3.06 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 097725

## SECTION 099113 - EXTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Fiber-cement board.
  - 2. Steel and iron.
  - 3. Galvanized metal.
  - 4. Aluminum (not anodized or otherwise coated).

#### 1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and each color and gloss of topcoat.

#### 1.4 QUALITY ASSURANCE

- A. MPI Standards:

1. Products: Complying with MPI Standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

### 2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Fiber-Cement Board: 12 percent.
  2. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
  2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature.
- C. Clean substrates of substances that could impair bond paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
  1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

### 3.4 FIELD QUALITY CONTROL

- A. Testing of Paint materials: Owner reserves the right to invoke the following procedures at any time and as often as Owner deems necessary during the period when paints are being applied.
  - 1. Owner, if required, will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance of paint materials with product requirements.
  - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove non-complying paint materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 EXTERIOR PAINTING SCHEDULE

- A. Cement Board Substrates & Extruded Aluminum Cement board reveal system (Alternate):
  - 1. Latex System MPI EXT 3.3J:
    - a. Prime Coat: Factory Applied Primer by Siding/ Trim Manufacture.
    - b. Intermediate Coat: Latex, exterior, matching topcoat.
    - c. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

- 1) Sherwin Williams, A-100 Exterior Acrylic Latex, Satin,
- B. Exterior Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Clean metals with approved solvents prior to painting.
1. Gloss Finish, Fast Dry Alkyd Enamel System: 2 finish coats over a rust inhibitive primer.
    - a. Prime Coat: Primer, alkyd, anticorrosive, for metal.
      - 1) Applied at spreading rate recommended by the manufacturer. Shop primed metals shall be re-primed prior to placing of finish coat of paint.
      - 2) Sherwin Williams, Fast Drying Primer, Interior/Exterior Oil-Based, Y24W8980.
    - b. Intermediate Coat: Same as top coat.
    - c. Topcoat: Fast Dry Alkyd Enamel, exterior coating, (MPI Gloss Level 6).
      - 1) Applied at spreading rate recommended by the manufacturer.
      - 2) Sherwin Williams, Industrial Enamel B54W001## (per base color).
- C. Exterior Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces. Clean metals with approved solvents prior to painting.
1. Gloss finish, Fast Dry Alkyd Enamel System: 2 finish coats over a metal primer.
    - a. Prime Coat: Waterborne rust-inhibitive 100% acrylic metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer. Shop primed metals shall be re-primed prior to placing of finish coat of paint.
      - 1) Sherwin Williams, Fast Drying Primer, Interior/Exterior Oil-Based, Y24W8980.
    - b. Intermediate Coat: Same as Topcoat.
    - c. Topcoat: Fast Dry Alkyd Enamel, exterior coating (MPI Gloss Level 6).
      - 1) Sherwin Williams, Industrial Enamel B54W001##.
- D. Aluminum Substrates: (Other than Easy Trim reveals in Cement Board siding.)
1. Latex System MPI EXT 5.4H:
    - a. Prime Coat: Factory Primed
    - b. Intermediate Coat: Latex, exterior, matching topcoat.
    - c. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

- 1) Sherwin Williams, Duration Exterior Acrylic Latex, K33 Series.

END OF SECTION 099113

## SECTION 099123 - INTERIOR PAINTING

### 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 surface preparation and the application of paint systems on the following interior substrates:
  - 1. Steel.
  - 2. Galvanized metal.
  - 3. Wood.
  - 4. Gypsum board.
- B. Related Sections include the following:
  - 1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
  - 2. Division 06 Sections for shop priming carpentry with primers specified in this Section.
  - 3. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
  - 4. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
  - 1. Submit Physical Samples , 8 inches square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:



1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F .
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

#### 1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F .
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

#### 1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

### PART 2 - PRODUCTS

#### 2.1 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. Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. The following manufacturers paint is specified below.
    - a. Sherwin-Williams Company (The). – ProMar 200 paint and epoxy

#### 2.2 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
  2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
  3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  4. Floor Coatings: VOC not more than 100 g/L.
  5. Shellacs, Clear: VOC not more than 730 g/L.
  6. Shellacs, Pigmented: VOC not more than 550 g/L.
  7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
  8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
  9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  10. Floor Coatings: VOC not more than 100 g/L.
  11. Shellacs, Clear: VOC not more than 730 g/L.
  12. Shellacs, Pigmented: VOC not more than 550 g/L.
  13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
  14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
  15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
  16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
- C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
  2. Restricted Components: Paints and coatings shall not contain any of the following:
    - a. Acrolein.
    - b. Acrylonitrile.
    - c. Antimony.
    - d. Benzene.
    - e. Butyl benzyl phthalate.
    - f. Cadmium.
    - g. Di (2-ethylhexyl) phthalate.
    - h. Di-n-butyl phthalate.

- i. Di-n-octyl phthalate.
- j. 1,2-dichlorobenzene.
- k. Diethyl phthalate.
- l. Dimethyl phthalate.
- m. Ethylbenzene.
- n. Formaldehyde.
- o. Hexavalent chromium.
- p. Isophorone.
- q. Lead.
- r. Mercury.
- s. Methyl ethyl ketone.
- t. Methyl isobutyl ketone.
- u. Methylene chloride.
- v. Naphthalene.
- w. Toluene (methylbenzene).
- x. 1,1,1-trichloroethane.
- y. Vinyl chloride.

D. Colors: See Color Legend

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows: Contractor shall provide a log of material moisture content on the project prior to the start of painting.
  - 1. Concrete: 8 percent.
  - 2. Masonry (Clay and CMU): 8 percent.
  - 3. Wood: 10 percent.
  - 4. Gypsum Board: 8 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions. Surfaces must be clean and dry prior to priming.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions. Surfaces must be clean and dry prior priming.
- F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Aluminum Substrates: Remove surface oxidation.
- I. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- J. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry, sanded smooth and excess dust removed.

- K. Previously prime substrates: Clean using methods recommended in writing by paint manufacturer. Verify that factory applied prime paint is properly adhered. If prime paint is scratch or damaged, touch up are as required prior to new costs of paint.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
  - 1. Mechanical Work: Mechanical equipment that is indicated to have a factory-primed finish for field painting.
  - 2. Electrical Work: Electrical equipment that is indicated to have a factory-primed finish for field painting.

### 3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
  - 1. Owner, if required, will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove non complying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected

materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
  - 1. **Ceilings** - Flat - (Gloss Level 2. Interior latex wall and Trim enamel)
    - a. Primer: 100% acrylic Latex-based, interior primer applied at spreading rate recommended by the manufacturer.
      - 1. ProMar 200 Zero VOC Latex Primer, B28W2600
        - a. Tint base coat to match finish color.
    - b. finish Coats Flat, interior 100% Acrylic latex wall paint applied at spreading rate recommended by the manufacturer. (See Finish Coat Schedule below for # of coats and Shien)
      - 1. ProMar 200 Ceiling flat
  - 2. **Walls**– Eggshell Gloss Level 3. Interior latex wall and Trim enamel
    - a. Primer: 100% acrylic Latex-based, interior primer applied at spreading rate recommended by the manufacturer.
      - 1. ProMar 200 Zero VOC Latex Primer, B28W2600
        - a. Tint base coat to match finish color.
    - b. Finish Coats Eggshell/ Flatt, interior 100% acrylic latex wall paint applied at spreading rate recommended by the manufacturer. (See Finish Coat Schedule below for # of coats and Shien)
      - 1. ProMar 200 Eg-shell/ Flatt Finish.

B. Wood) - Provide the following finish systems over wood ( doors/ trims/ casings ) surfaces:

2. **Wood** –Semi Gloss Gloss Level 3. Interior latex wall and Trim enamel
  - a. Primer: 100% acrylic Latex-based, interior primer applied at spreading rate recommended by the manufacturer.
    1. ProMar 200 Zero VOC Latex Primer, B28W2600
      - a. Tint base coat to match finish color.
  - b. finish Coats: Eggshell, interior 100% acrylic latex wall paint applied at spreading rate recommended by the manufacturer. (See Finish Coat Schedule below for # of coats and Shien)
    1. ProMar 200 Semi - Gloss Finish.

C. Interior Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semi gloss, Water Based Epoxy – Pre-Catalyzed
  - a. Primer: High quality, interior, corrosion inhibitive primer applied as recommended by the manufacturer for substrate.
    1. Pro Industrial Water Based Epoxy Catalyzed Epoxy B73-300 Series – Semi-gloss finish
  - b. finish Coats: Water Based Epoxy Interior paint applied at spreading rate recommended by the manufacturer. (See Finish Coat Schedule below for # of coats and Shien)
    1. Pro Industrial Water Based Epoxy Catalyzed Epoxy B73-300 Series – Semi-gloss finish

A. Finish Coat schedule

- a. Ceilings
  - 1) Prime Coat: 1
  - 2) Finish coat(s): 1 (Flat)
- b. Walls:
  - 1) Prime Coat: 1
  - 2) Finish coat(s): 2 (Eg-Shell)
- c. Wood ( doors/ trims/ casings )
  - 1) Prime Coat: 1
  - 2) Finish coat(s): 2 (Smi-Gloss)

- d. Ferrous Metals ( Door Frames , stairs, Handrails )
  - 1) Prime Coat: 1
  - 2) Finish coat(s): 2 (Smi-Gloss)

END OF SECTION 099123



## SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Private-use bathroom accessories.
  - 2. Custodial accessories.

#### 1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

#### 1.3 ACTION SUBMITTALS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.6 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 15 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
  - 1. See Toilet accessories schedule on drawings for product specifications.
  - 2. TOILET ACCESSORIES BoD TBD BY CONTRACTOR FROM ACCEPTABLE MANUFACTURERS BELOW GIVEN ALL TOILET ACCESSORIES ARE PROVIDED FROM A SINGLE PRODUCT FAMILY AND ARE SATIN NICKLE FINISH
    - a. MANUFACTURERS
      - 1) BRADLEY
      - 2) BOBRICK
      - 3) ASI
      - 4) KOHLER
      - 5) MOHEN
      - 6) DELTA
      - 7) EQUAL AS APPROVED.

### 2.3 CUSTODIAL ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.

### 2.4 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

## 2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Future Grab Bars: Blocking to be installed with Base Bed for future install of grab bars able to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

## SECTION 105200 - FIRE-PROTECTION SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes portable fire extinguishers and cabinets.
- B. Provide extinguishers in cabinets as noted on the plans.
- C. Provide extinguishers and wall brackets as noted on the plans.

#### 1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
  - 1. Fire Extinguishers: Include rating and classification.
  - 2. Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.

#### 1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

#### 1.4 COORDINATION

- A. Coordinate size of cabinets to ensure that type and capacity of extinguishers indicated are accommodated.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 366/A 366M carbon steel, commercial quality, stretcher leveled, temper rolled.

#### 2.2 PORTABLE FIRE EXTINGUISHERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. JL Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers for each cabinet and other locations indicated.

1. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher indicated and with plated or baked-enamel finish.
  - a. Provide wall brackets for extinguishers not located in cabinets.
2. Identification: Lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as directed by Architect.
  - a. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals or signage applied to wall surface.

C. **Contractor shall fill and have certified all fire extinguishers supplied on the project.**

D. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container.

## 2.3 WALL SIGNAGE

A. Graphic Lettering and wall signage:

- a. On outside face of the cabinet door, provide vertical red lettering "Fire Extinguisher" by cabinet manufacture.
- b. **On the wall above all the fire extinguisher cabinets and wall brackets, provide a sign mounted 90 degrees to the wall. Sign size shall be 6"x6"x1/8" thick with white lettering on a red background. Sign shall indicate in lettering " FIRE EXTINGUISHER" with a graphic symbol for the extinguisher below the lettering. Prior to mounting signs, consult with building owner on exact locations on wall for signage. Provide blocking in the wall for the attachment of the site sign**
  1. Provide two 1"x1"x 1/8" thick aluminum angles full height of sign for mounting to the wall. Provide a bolted connection between the angles and the sign and screw fasteners to mount the angles to the wall.

2.4 Exposed Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish. (typical at mechanical rooms, elevator machine rooms and other service type areas).

1. Color: Red.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
3. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

- a. Orientation: Vertical

## 2.5 FIRE-PROTECTION CABINET

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. JL Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter Roemer; Div. of Smith Industries, Inc.

- B. Fire Protection Cabinet:

1. Cabinet Construction: provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
  - a. Cabinet Metal: Enameled-steel sheet.
2. Cabinet Type: Suitable in size for each type of fire extinguisher specified in section 2.2 above.
  - a. Refer to the fire rated walls plans for fire extinguisher cabinets that are mounted in rated walls. **Provide fire rated fire extinguisher cabinets at these locations.**
3. Cabinet Mounting: Semi Recessed
4. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
  - a. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
    - 1) 2 ½" rolled edge Semi-recessed trims
5. Cabinet Trim Material: Manufacturer's standard steel sheet.
6. Door Material: Manufacturer's standard steel sheet.
7. Door Glazing: Manufacturer's standard, as follows:
  - a. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, Class 1 (clear).
8. Door Style: Manufacturer's standard design vertical duo panel with frame and tempered safety glass..
9. Door Construction: Fabricate doors according to manufacturer's standard, of materials indicated, and coordinated with cabinet types and trim styles selected.
  - a. Provide minimum 1/2 inch (13 mm) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.
  - b. Provide inside latch and lock for break-glass panels.
10. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with

cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

11. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as directed by Architect.
  - a. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
    - 1) Application Process: Decals.
    - 2) Lettering Color: Red.
    - 3) Orientation: Vertical.

## 2.6 FINISHES

- A. Steel Cabinet and Door Finishes: Provide manufacture's standard baked-enamel paint for the following:
  1. Exterior of cabinets and doors, except for those surfaces indicated to receive another finish.
  2. Interior of cabinets and doors.
- B. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- C. Steel, Factory Priming for Field-Painted Finish: Apply manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer shop primer immediately after surface preparation and pretreatment.
- D. Steel Baked Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Minimum dry film thickness of 2 mils (0.05 mm).
  1. Color: As selected by the Architect from manufacturer's standard.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All fire extinguishers required shall be provided with and in cabinets in all locations except mechanical equipment rooms and lofts. Extinguishers in mechanical equipment locations shall be installed on appropriate brackets and properly identified with signage.
- B. Coordinate the location of the wall sign above the fire extinguisher with the architect and owner prior to fabrication. Provide wood blocking in the wall for the sign attachment.
- C. Examine roughing-in for cabinets to verify actual locations before cabinet installation.
- D. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed. Provide blocking in the wall each side of the extinguisher for securing the cabinet.
- E. At wall bracket locations, provide wood blocking in the wall as required for bracket installation.

- F. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.
- G. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
  - 1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
  - 2. Fasten mounting brackets to structure and cabinets, square and plumb.
  - 3. Fasten cabinets to structure, square and plumb.
- H. Adjust cabinet doors that do not swing or operate freely.
- I. Refinish or replace cabinets and doors damaged during installation.

END OF SECTION 105200



## SECTION 105500.13 - USPS-DELIVERY POSTAL SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Mail receptacles.
  - 2. Accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For postal specialties. Include plans, elevations, sections, and attachment details, numbering and signage schedules.
- C. Samples: For each type of exposed finish.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Furnish lock keys according to USPS requirements; with temporary identification for their respective locks, bagged, and securely taped inside the collection compartment for shipping.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: [**Five**] years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MAIL RECEPTACLES

- A. Front-Loading Mail Receptacles USPS-STD-4C; consisting of multiple compartments with fixed, solid compartment backs, enclosed within a recessed wall box.
  - 1. Front-Loading Master Door: Fabricated from extruded aluminum and braced and framed to hold compartment doors; prepared to receive master-door lock.
    - a. Master-Door Lock: Door prepared to receive lock provided by local postmaster.
  - 2. Compartments: **[As indicated on Drawings.]**
  - 3. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock and tenant identification as required by USPS-STD-4C. **[Provide mail slot in the compartment with master-door lock.]**
    - a. Compartment-Door Locks: USPS-L-1172C; with three keys for each compartment door.
    - b. Parcel-Locker-Compartment-Door Locks: Two-key security system in which control key provides access to parcel-locker-compartment key, which opens compartment and is retained once opened.
  - 4. Frames: Extruded aluminum or aluminum sheet; ganged and nested units, with cardholder and blank cards for tenant's identification within each compartment.
  - 5. Concealed Components and Mounting Frames: Aluminum or steel sheet.
  - 6. Exposed Aluminum Finish:
    - a. Baked-Enamel or Powder-Coated Finish: **[Black]**

### 2.2 FABRICATION

- A. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.
- B. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.
- C. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Mail Receptacles: Install mail receptacles with center of tenant-door lock cylinders and bottom of compartments at the maximum and minimum heights above finished floor established by the USPS and manufacturer's written instructions.
- B. Pedestal-Mounted Postal Specialties: Anchor units with **1/2-inch-** (13-mm-) diameter, stainless-steel anchor bolts with hooked ends.
- C. Collection Boxes: Install collection boxes with **[handle of hopper doors]** not more than **48 inches (1219 mm)** above finished floor.

#### 3.2 FIELD QUALITY CONTROL

- A. Arrange for USPS personnel to examine and test postal specialties served by the USPS after they have been installed according to USPS regulations.

END OF SECTION 105500.13

## SECTION 113013 - RESIDENTIAL APPLIANCES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cooking appliances.
  - 2. Kitchen exhaust ventilation.
  - 3. Refrigeration appliances.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [**Project site**]

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Field quality-control reports.
- C. Sample warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. In addition to those installed in each unit (208) Provide a total of (3) additional of each (Ranges, Refrigerators, Dishwashers, over the range microwaves) as provided in each apartment to owner to be stored on site for “ future” use.

1.7 QUALITY ASSURANCE.

1.8 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: [**Two**] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 RANGES

- A. Electric Range Rear Control – NON ADA [**Plan note 11.02** ]

1. Manufacture: GE
2. Model # : GRF600AVSS
3. Dimensions: 47 H x 29 7/8 W x 28 D
4. Color: Black/ Stainless Steel
5. Electric Burner Elements: [**Four**] [ [**radiant**] type burners.
6. Top Material: [**Manufacturer's standard**]
7. Anti-Tip Device: Manufacturer's standard.
8. Width: 30"

- B. Electric Range Front Control – ADA [**Plan note 11.02A**]

1. Manufacture: GE
2. Model # : JB480STSS
3. Dimensions: 37 1/4" H x 29 7/8 W x 28 D
4. Color: Black/ Stainless Steel
5. Electric Burner Elements: [**Four**] [ [**radiant**] type burners.
6. Top Material: [**Manufacturer's standard**]
7. Anti-Tip Device: Manufacturer's standard.
8. Width: 30"

2.3 MICROWAVE OVENS

- A. Microwave Oven Above the Range – NON ADA [**Plan note 11.03**]

1. Manufacture: GE

2. Model # : J JB480STSS
3. Dimensions: 16 ½" H x 29 7/8" W x 15 7/8" D
4. Color: Stainless Steel
5. Mounting: [**Undercabinet**] [
6. Exhaust Fan: [**Variable**] [**Two**] [**nonvented, recirculating type with charcoal filter**] and with manufacturer's standard capacity.
7. Microwave Power Rating: [**Manufacturer's standard**] [**1000 W**]

B. Microwave Oven Provide in (ADA units freestanding on countertop)]

1. Manufacture: GE
2. Model # : PEM31SFSS
3. Dimensions: 12 H x 24" W x 12" D
4. Color: Stainless Steel
5. Mounting: [**Countertop**] [
6. Exhaust Fan: [**none**]
7. Microwave Power Rating: [**Manufacturer's standard**] [**1000 W**]

## 2.4 REFRIGERATOR/FREEZERS

A. Refrigerator/Freezer [**Plan note 11.05**]

1. Manufacture: GE
2. Model # : GIE19JSNRSS
3. Dimensions: 66 3/8"H x 29 3/4" W x 34 1/2" D
4. Color: Stainless Steel
5. Type: [**Freestanding**]
6. Storage Capacity:
  - a. Refrigeration Compartment Volume: [**19.2 cu. Ft**]
7. General Features:
  - a. Dispenser in door for NONE
  - b. Interior light in refrigeration compartment.
  - c. [**Automatic**] defrost.
  - d. Interior light in freezer compartment.
  - e. Automatic icemaker and storage bin.
8. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
9. Front Panel(s): [**Manufacturer's standard**]

## 2.5 DISHWASHERS

A. Dishwasher – NON ADA [**Plan note 11.04**] Complying with AHAM DW-1.

1. Manufacture: GE
2. Model # : GDT550PYRFS
3. Dimensions: 33 3/8" H x 23 3/4" W x 24" D
4. Color: Stainless Steel
5. Type: **[Built-in undercounter]**
6. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
7. Front Panel: **[Manufacturer's standard]**

B. Dishwasher – ADA **[Plan notes 11.04a]** - Complying with AHAM DW-1.

1. Manufacture: GE
2. Model # : GIE19JSNRSS
3. Dimensions: 32 1/4" H x 23 3/4" W x 24" D
4. Color: Stainless Steel
5. Type: **[Built-in undercounter]**
6. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
7. Front Panel: **[Manufacturer's standard]**

## 2.6 CLOTHES WASHERS AND DRYERS

A. Clothes Washer **[Plan Note 11.06 & 11.06a]** Complying with AHAM HLW-1.

1. Manufacture: GE
2. Model # : GDT550PYRFS
3. Dimensions: 39 3/4" H x 28" W x 32" D
4. Color: White
5. Type: **[Freestanding]** ,**[Front]** loading unit.
6. Capacity: **[4.5 cu. ft.]**
7. Agitator: **[Center spindle]**
8. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.

B. Clothes Dryer **[Plan Note 11.06 & 11.06a]** Complying with AHAM HLW-1. Manufacture: GE

1. Model # : GDT550PYRFS
2. Dimensions: 39 3/4" H x 28" W x 32" D
3. Color: White
4. Type: **[Freestanding]** , frontloading, **[electric]** unit.
5. Capacity: **[7.0 cu. ft. (0.20 cu. m)]**
6. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.

- C. In non-ada units units (Plan note 11.06) Provide washer & Dryer equal to plan note 11.06 with stacking kit equal to : GFA28KITN

## 2.7 INSTALLATION

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

## 2.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections[ **with the assistance of a factory-authorized service representative**]:
  1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
  2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  3. Operational Test: After installation, start units to confirm proper operation.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 113013



## SECTION 122113 - HORIZONTAL LOUVER BLINDS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Horizontal louver blinds, aluminum slats.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples for Initial Selection: For each type and color of horizontal louver blind.
  - 1. Include Samples of all accessories involving color selection.
- D. Samples for Verification: For each type and color of horizontal louver blind indicated.
  - 1. Slat: Not less than **12 inches (300 mm)** long.
  - 2. Horizontal Louver Blind: Full-size unit, not less than **16 inches (400 mm)** wide by **24 inches (600 mm)** long.
  - 3. Valance: Full-size unit, not less than **12 inches (300 mm)** wide.
- E. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

#### 1.3 INFORMATIONAL SUBMITTALS

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Basis-of-Design: Hunter Douglas Everwood Faux Wood, 2" slat, push button control, solid color selected from MFG full range.
- B. Slats: Faux Wood
  - 1. Width: **2 inch**
    - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.

2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.

- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
  - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
  - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Locate so exterior slat edges are not closer than 1 inch (25 mm) from interior faces of glass and not closer than 1/2 inch (13 mm) from interior faces of glazing frames through full operating ranges of blinds.
  - 2. Install mounting and intermediate brackets to prevent deflection of headrails.

3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- B. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

### 3.3 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

### 3.4 DEMONSTRATION

END OF SECTION 122113

## SECTION 123530 - RESIDENTIAL CASEWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. **[Kitchen] [and] [vanity]** cabinets.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For residential casework. Include plans, elevations, details, and attachments to other work.
- C. Samples: For casework and hardware finishes.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For casework.

### PART 2 - PRODUCTS

#### 2.1 CABINETS

- A. Quality Standard: Provide cabinets that comply with KCMA A161.1.
  - a. Cabinets Basis of Design:
    - 1) Manufacture: Smart Cabinet
    - 2) Species: Maple
    - 3) Door Style: Full Slab Overlay
    - 4) Color: See casework finish legend on Drawings.
- B. Acceptable Manufactures
  - 1. Smart Cabinet
  - 2. Bertch Cabinets LLC.
  - 3. Echelon Cabinetry
  - 4. Bella Innovative Modern Cabinetry
  - 5. Sauder
  - 6. Woodstar Derby

## 2.2 CABINET MATERIALS

- A. Hardwood Lumber: Kiln dried to 7 percent moisture content.
- B. Softwood Lumber: Kiln dried to 10 percent moisture content.
- C. Hardwood Plywood: HPVA HP-1.
- D. Hardboard: ANSI A135.4, Class 1 tempered.
- E. Exposed Materials:
  - 1. Exposed Wood Species: **[Maple]**
    - a. surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
    - b. Staining and Finish: **[As selected by Architect from manufacturer's full range]**.
  - 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.

## 2.3 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish **[as indicated by manufacturer's designations]**
- B. Pulls: **[Surface-mounted decorative pulls as indicated on drawings ]**
- C. Hinges: **[Concealed butt hinges]**
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.
- E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
  - 1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
  - 2. Drawers: Provide one bumper on back side of drawer front at each corner.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.

- B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install casework level and plumb to a tolerance of **1/8 inch in 8 feet (3 mm in 2.4 m)**.
- D. Fasten casework to adjacent units and to backing.
  - 1. Fasten wall cabinets through back, near top and bottom, and at ends not more than **16 inches (400 mm)** o.c.
    - a. Fasteners: **[No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips] [No. 10 wafer-head sheet metal screws through the metal backing or metal framing behind the wall finish] [Toggle bolts through the metal backing or metal framing behind the wall finish]**.
- E. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- F. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123530

## SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Quartz agglomerate countertops.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

### PART 2 - PRODUCTS

#### 2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ISFA 3-01.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  - 2. Colors and Patterns: **[As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].**

#### 2.2 FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. Color: As indicated on drawings.
- B. Configuration:
  - 1. Vanity Countertops:  $\frac{3}{4}$ " thick with  $\frac{1}{4}$ " beveled top edge.
  - 2. Vanity Countertops:  $1\frac{1}{2}$ " thick with  $\frac{1}{4}$ " beveled top edge.



C. Joints:

1. Fabricate countertops without joints.

D. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures[ **in shop**] using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.

- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- F. Install aprons to backing and countertops with adhesive.
- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Machine Room less Electric traction elevators.
2. Products Supplied but Not Installed Under this Section:
  - a. Hoist Beam
  - b. Pit Ladder
  - c. Inserts mounted in block walls for rail attachments
3. Work Supplied Under Other Sections:
  - a. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
  - b. Main line disconnects for each elevator.
  - c. One fused three phase permanent power in building electrical distribution room
  - d. Hoistway ventilation shall be in accordance with local and national building code requirements.
  - e. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
  - f. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
  - g. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
  - h. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
  - i. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.

### 1.2 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment.
2. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples: For finishes involving color selection.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as indicated on Drawings, and electrical service as shown and specified, are adequate for elevator system being provided.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard [**five-year**] maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.5 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
1. Warranty Period: <1> year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
1. Project Seismic Design Category: [**A**]

2. Elevator Component Importance Factor: [1.0].

## 2.2 MANUFACTURERS

### A. Basis of design:

1. Kone Monospace 500DX Traction Elevator
  - a. Capacity - 3500 #
  - b. Openings – Front
  - c. See attached layout drawings and power configuration from the Manufacture.

## 2.3 ELEVATORS

### A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.

1. Machine Type: [Gearless] [traction.
2. Rated Load: [3500 lb (2270 kg)].
3. Freight Loading Class for Service Elevator(s): Class A.
4. Rated Speed: [150 fpm ]
5. Operation System: Equipment Control: KCM831
- A. , Drive: Regenerative
6. Power requirement: 208v, + 5% , 3 phase, 4-wire
7. Auxiliary Operations:
  - a. Battery-powered automatic evacuation.
  - b. Automatic dispatching of loaded car.
  - c. (Note: Variance from state of Indiana has been granted to eliminate the requirements for Emergency power to 6 stop elevator. The EC shall provide transfer switch to allow connection of elevator to temporary generator in alley per electrical drawings.)
  - d. Operation: Simplex
  - e. Machine Location: Inside the hoistway mounted on car guide rail
  - f. Control Space Location: Integrated control
  - g. Elevator Equipment shall conform to the requirements of seismic zone: Non-Seismic
8. Car Enclosures:
  - a. Inside Width: [6' 5 11/16"] from side wall to side wall.
  - b. Inside Depth: [5' 6 11/16"] from back wall to front wall (return panels).
  - c. Inside Height: Not less than [7'-6" (2362 mm)] to underside of ceiling.
  - d. Front Walls (Return Panels):] [Satin stainless steel, ASTM A480/A480M, No. 4 finish].
  - e. Car Fixtures: [Satin stainless steel, ASTM A480/A480M, No. 4 finish].
  - f. Side and Rear Wall Panels: [Plastic laminate] To be selected by Architect from Manufacturers full range of colors
  - g. Door Faces (Interior): [Satin stainless steel, ASTM A480/A480M, No. 4 finish]
  - h. Ceiling: [Suspended Downlight Ceiling with Recessed LED Lights]

- i. Handrails: [1-1/2 inches (38 mm) flat] [satin stainless steel], at [sides & rear] — of car.
  - j. Floor prepared to receive carpet (specified in Section 096816 "Tile Carpeting").
  - k. **Provide cab with hooks for protection blankets. Elevator manufacture shall provide as part of bid (1) set of temporary protection blankets for hanging in cab interior.**
9. Hoistway Entrances:
- a. Width: [54 inches (1372 mm)]
  - b. Height: [84 inches (2134 mm)]
  - c. Type: [Two-speed side sliding] .
  - d. Frames [Satin stainless steel, ASTM A480/A480M, No. 4 finish].
  - e. Doors [Satin stainless steel, ASTM A480/A480M, No. 4 finish]
10. Hall Fixtures [Satin stainless steel, ASTM A480/A480M, No. 4 finish].
11. Additional Requirements:
- a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from [satin stainless steel, ASTM A480/A480M, No. 4 finish]
  - b. Provide hooks for protective pads in [service car] and [one] complete set(s) of full-height protective pads.

## 2.4 TRACTION SYSTEMS

- A. Elevator Machines: Variable-voltage, variable-frequency, ac-type hoisting machines[ and solid-state power converters.
1. Provide regenerative system that complies with the IgCC.
  2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
- B. Fluid for Hydraulic Buffers: Fire-resistant fluid.
- C. Machine Beams: Provided by Elevator manufacture installed by GC.
- D. Guides: Provided by Elevator manufacture installed by GC.
- E. Pit Ladder: Provided by Elevator manufacture installed by GC.

## 2.5 OPERATION SYSTEMS

- A. Provide manufacturer's standard microprocessor operation systems as required to provide type of operation indicated.
- B. Auxiliary Operations:
1. Single-Car Battery-Powered Automatic Evacuation: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it moves

to the next floor above or below, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.

2. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re-energized before car doors open.

## 2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.
- B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

## 2.7 CAR ENCLOSURES

Provide [**powder-coated steel car enclosures to receive removable**] wall panels, with [**removable**] car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.
- B. Materials and Finishes: Manufacturer's standards, but not less than the following:
  1. Enameled or Powder-Coated Steel Wall Panels: Flush, formed-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel or powder-coat finish; colors as selected by Architect from manufacturer's full range.
  2. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to [**1/2-inch (13-mm) fire-retardant-treated particleboard**] with [**plastic-laminate panel backing and**] manufacturer's standard protective edge trim. Panels shall have a flame-spread index of [**25**] or less, when tested according to ASTM E84. Plastic-laminate color, texture, and pattern as selected by Architect from [**plastic-laminate**] manufacturer's full range.
  3. Stainless Steel Doors: Flush, hollow-metal construction; fabricated [**from stainless steel sheet**]
  4. Sight Guards: Provide sight guards on car doors.
  5. Sills: Extruded or machined metal, with grooved surface, **1/4 inch (6.4 mm)** thick.
  6. Luminous Ceiling: Suspended Downlight Ceiling with Recessed LED Lighting . Equal to: Kone (CL88)
  7. [**Metal**] Ceiling: Flush panels, with [**3 low-voltage downlights in**] each panel.[ **Align ceiling panel joints with joints between wall panels.**]
  8. Light Fixture Efficiency: Not less than 35 lumens/W.
  9. Ventilation Fan Efficiency: Not less than **3.0 cfm/W (1.4 L/s per W)**.

## 2.8 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
  - 1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at as close-to-neutral pressure as possible according to [NFPA 252] .
  - 1. Fire-Protection Rating: [1-1/2 hours] with 30-minute temperature rise of 450 deg F (250 deg C).
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
  - 1. Stainless Steel Frames: Formed from stainless steel sheet.
  - 2. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches (76 mm) high, on both jambs of hoistway door frames.
  - 3. Stainless Steel Doors [ ]: Flush, hollow-metal construction; fabricated [from stainless steel sheet] [
  - 4. Sight Guards: Provide sight guards on doors matching door edges.
  - 5. Sills: Extruded or machined metal, with grooved surface, 1/4 inch (6.4 mm) thick.

## 2.9 SIGNAL EQUIPMENT

- A. Provide [hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled] Provide [vandal-resistant] buttons and lighted elements illuminated with LEDs.
- B. Car-Control Stations: Provide manufacturer's standard [recessed] car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
  - 1. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- D. **Car Position Indicator:** Provide [illuminated, ]digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.

- E. Hall Push-Button Stations: **[Provide one hall push-button station at each landing]**
- F. Hall Position Indicators: Provide **[illuminated, ]**digital-display-type position indicators, located above**[ each]** hoistway entrance.. Provide units with flat faceplate and with body of unit recessed in wall.
- G. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

## 2.10 FINISH MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, pickled.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304.
- D. Stainless Steel Bars: ASTM A276/A276M, Type 441.
- E. Stainless Steel Tubing: ASTM A554, Grade MT 304.
- F. Aluminum Extrusions: **ASTM B221 (ASTM B221M)**, Alloy 6063.
- G. Plastic Laminate: High-pressure type complying with ISO 4586-3, Type HGS or Type HGL.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- B. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- C. Leveling Tolerance: **1/8 inch (3 mm)**, up or down, regardless of load and travel direction.
- D. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- E. Locate hall signal equipment for elevators as follows unless otherwise indicated:
  - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.



### 3.2 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

### 3.3 PROTECTION

- A. Temporary Use: [**Limit temporary use for construction purposes to one elevator.**] Comply with the following requirements for [**each**] elevator used for construction purposes:
  - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
  - 2. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
  - 3. Engage elevator Installer to provide full maintenance service.
  - 4. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

### 3.4 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include <12> months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity.

END OF SECTION 142100

# Site Information

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## ELEVATOR GROUP INFORMATION

	ELEVATOR EL1
MODEL	MONOSPACE 500 DX
CAPACITY	3500#
SPEED	200 FPM
TOTAL TRAVEL	58'-6"
LOADING TYPE	CLASS A
FRONT DOOR TYPE	RIGHT OPENING
REAR DOOR TYPE	N/A
CONTROL SPACE	ICS

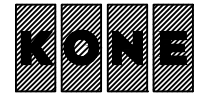
## CAB OVERVIEW

	ELEVATOR EL1
CAB SHELL HEIGHT	8'-0"
SIDE WALL FINISH	ASIAN NIGHT RAISED PANEL
REAR WALL FINISH	ASIAN NIGHT RAISED PANEL
CEILING TYPE	ROUND LED SPOTLIGHTS, 441 BRUSHED STAINLESS
HANDRAIL	FLAT - 441 BRUSHED STAINLESS (SIDE/REAR)
FLOOR WEIGHT	3.0 LBS/SQ FT
FLOOR THICKNESS	1"

## FLOOR SCHEDULE

FLOOR	FRONT FLOOR MARK	REAR FLOOR MARK	FLOOR ELEVATION	FLOOR TO FLOOR	ELV EL1 FRONT	ELV EL1 REAR
6	6		158'-6"		X	--
5	5		147'-6"	11'-0"	X	--
4	4		136'-6"	11'-0"	X	--
3	3		125'-6"	11'-0"	X	--
2	2		114'-6"	11'-0"	X	--
1	*1		100'-0"	14'-6"	M	--

X = SERVED  
 -- = NOT SERVED  
 M = MAIN FLOOR



## BUILDING INFORMATION

BUILDING VOLTAGE: 208 V  
 SEISMIC?: NO  
 BUILDING CODE: IBC 2015  
 ELEVATOR CODE: ASME A17.1-2007  
 STATE CODE: INDIANA

ELEVATIONS OR FLOOR MARKINGS OF THE FOLLOWING MUST BE NOTED WHEN APPLICABLE.

ELEVATOR I.D.	EL1		
DESIGNATION		FLOOR MARKING	
MAIN ELEVATION LOBBY	*1		
FIRE SERVICE RETURN	*1		
ALTERNATE FIRE SERVICE RETURN	2		
EMERGENCY POWER RETURN	*1		
FLOOD RETURN LANDING	N/A		

APPROVED BY

## APPROVAL SPACE

PROJECT:  
 NORTHERN EDGE APARTMENTS  
 BUILDING: BUILDING 1 GROUP: GROUP 2  
 LOCATION:

ENG/ARCH:  
 LRK ARCHITECTS  
 CONTRACTOR:  
 BUCKINGHAM COMPANIES CORPORATION

UNIT INFO	ITEM NO.	NETWORK NO.	EQUIPMENT NO.

REVISIONS	DATE	NO	BY	CK	DESCRIPTION
	2024-06-26	-	BEN		PRELIMINARY

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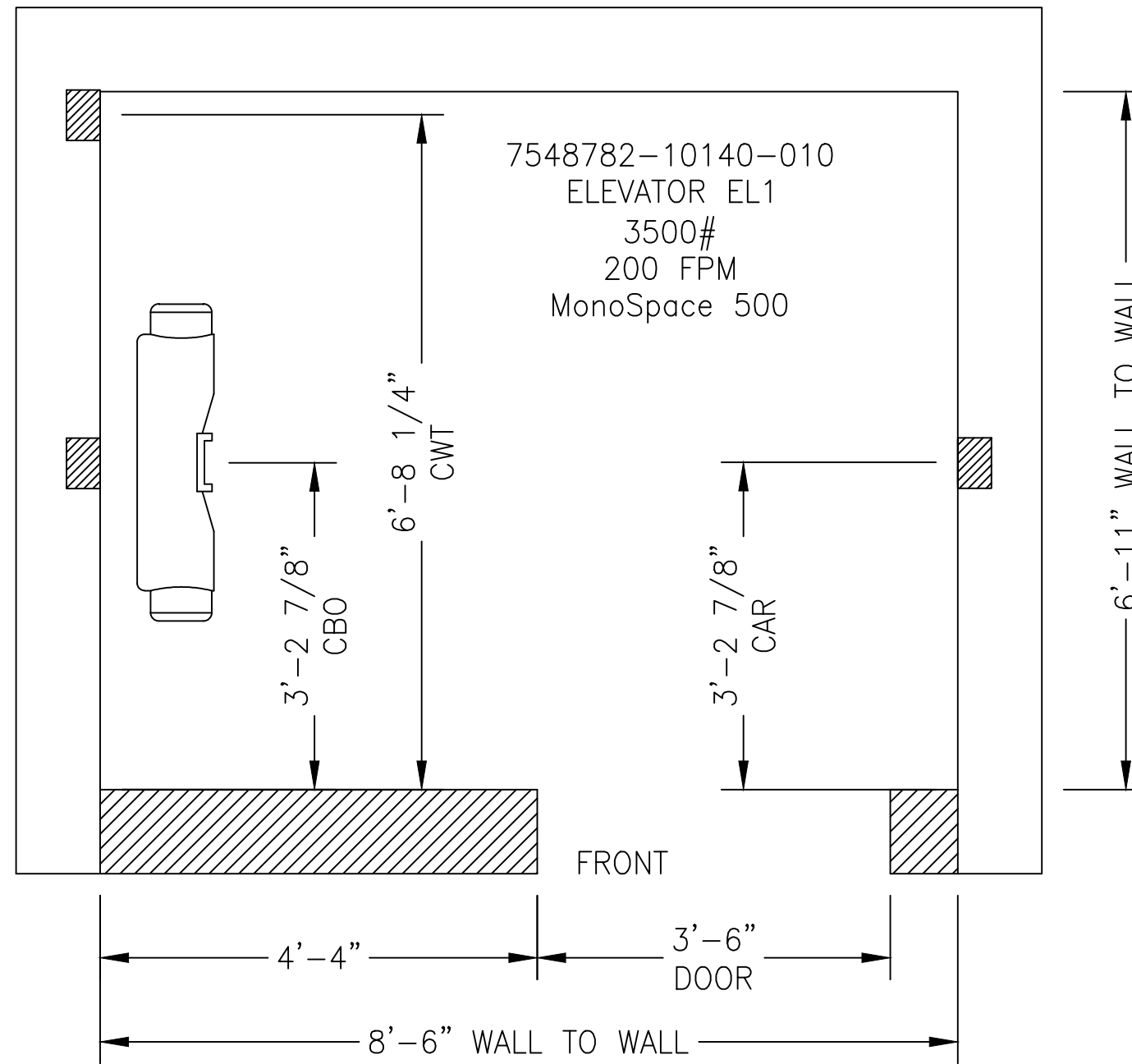
GENERATED ON: 06/26/24	BY: BEL	REV
UNITS: IMPERIAL	1-23.2	-
DRAWING M-7548782-10140	DESCRIPTION TOC	SHEET 1 of 21

4 3 2 1

NOTES:  
 A. MINIMUM REQUIRED HORIZONTAL AND VERTICAL ROUGH OPENINGS FOR EACH LANDING ARE DETAILED ON ENTRANCE DRAWINGS.

FOR REFERENCE ONLY:  
 BRACKET CENTERLINE DIMENSIONS (LANDING #2).  
 SEE BRACKET SHEET FOR ALL CENTERLINE DIMENSIONS.

CAR = CAR BRACKET CENTERLINE  
 CWT = COUNTERWEIGHT BRACKET CENTERLINE  
 CBO = COMBINATION BRACKET CENTERLINE  
 (DIMENSION MAY DIFFER SLIGHTLY FROM CAR BRACKET)



APPROVED BY

APPROVAL SPACE

PROJECT:  
 NORTHERN EDGE APARTMENTS

BUILDING: BUILDING 1 GROUP: GROUP 2

LOCATION:

ENG/ARCH:  
 LRK ARCHITECTS

CONTRACTOR:  
 BUCKINGHAM COMPANIES CORPORATION

UNIT	NO	BY	CK	DESCRIPTION
2024-06-26	-	BEN		PRELIMINARY

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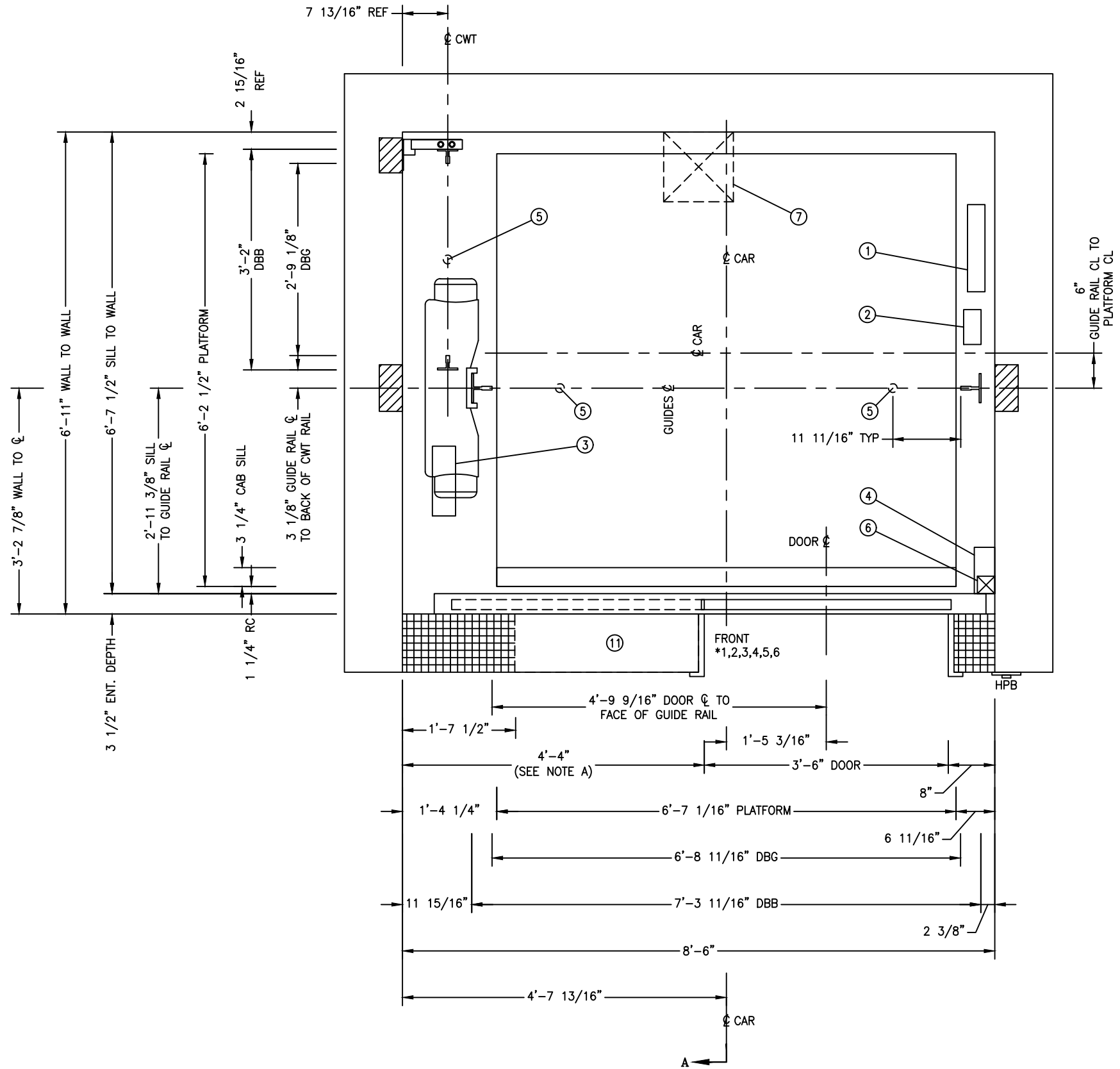
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 UNITS: IMPERIAL 1-23.2  
 DRAWING M-7548782-10140 DESCRIPTION GROUP LAYOUT SHEET 2 of 21

COORDINATION PAGE FOR SHAFT DIMENSIONS. SEE SPECIFIC PAGES FOR FURTHER DETAILS.

4 3 2 1

7548782-10140-010  
 Monospace 500  
 ELEVATOR EL1  
 3500#  
 200 FPM



- NOTES:
- A. MINIMUM REQUIRED HORIZONTAL AND VERTICAL ROUGH OPENINGS FOR EACH LANDING ARE DETAILED ON ENTRANCE DRAWINGS.
  - B. GOVERNOR TO BE POSITIONED WITH ELECTRICAL BOXES TOWARDS CAR SIDE AND ENCODER TOWARDS FRONT SIDE.
  - C. TERMINATE WIRE DUCT 48in [1220mm] ABOVE LOWEST LANDING. PIT LADDER TO BE POSITIONED DIRECTLY BELOW DUCT.
  - D. REFER TO DATA SHEET FOR FURTHER DETAILS CONCERNING ALLOWABLE CLEAR HOISTWAY TOLERANCES.
  - E. MINIMUM CLEAR HOISTWAY WIDTH SHOWN. CONTACT KONE FOR MAXIMUM ALLOWABLE CLEAR HOISTWAY.
  - F. ALL CAR AND CWT RAIL BRACKETS ATTACH TO SIDE HOISTWAY WALLS.
  - G. FILLER BIT HEIGHTS ARE BASED ON A COMPLETE CAB INSTALLATION.
  - H. CONTROLLER TO ALWAYS BE INSTALLED ON TOP LANDING WITH REQUIREMENT OF WALL THICKNESS. MIN 8.27IN AND MAX 29IN.
- INSTALLATION NOTES:
- 1) DBG TELESCOPE POLE SETTINGS = 7'-8 5/8"
  - 2) BALANCE WEIGHTS: OLBS QTY: 0  
TRACTION WEIGHTS: OLBS QTY: 0
- NOTE: ALL TRACTION WEIGHTS MUST BE INSTALLED FOR TRACTION PURPOSES.

E-FILLERS: OLBS  
 SPLIT[LEGO] FILLER BIT HT (STEEL): 1'-0"  
 FULL FILLER BIT HT (STEEL): 3'-8 1/4"  
 BALANCING FILLERS KIT, INCLUDED  
 AS EXTRA WEIGHT(150lbs)

APPROVED BY			
APPROVAL SPACE			
PROJECT: NORTHERN EDGE APARTMENTS			
BUILDING: BUILDING 1	GROUP: GROUP 2		
LOCATION:			
ENG/ARCH: LRK ARCHITECTS			
CONTRACTOR: BUCKINGHAM COMPANIES CORPORATION			
U N I T I N F O	ITEM NO.	NETWORK NO.	EQUIPMENT NO.
R E V I S I O N S	DATE	BY	DESCRIPTION
	2024-06-26	BEN	PRELIMINARY

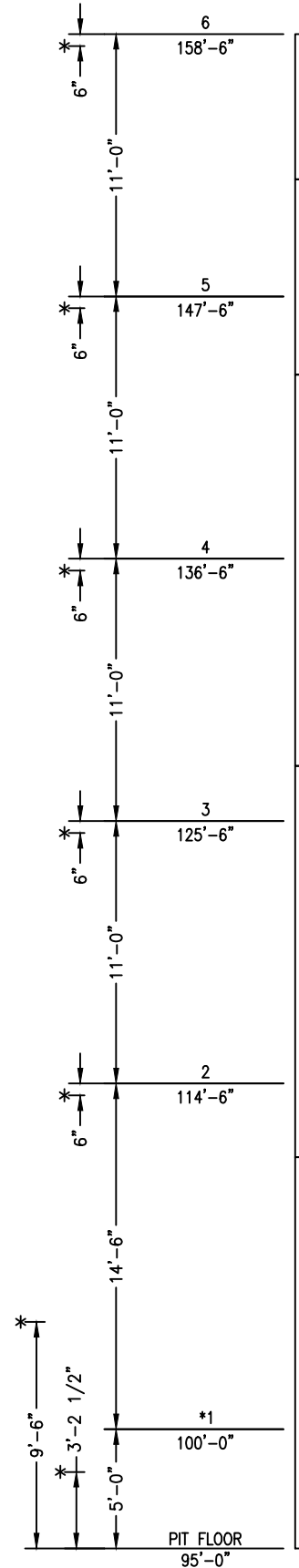
- NOTE: HPB = HALL PUSH BUTTON  
 (1) TRAVELING CABLE  
 (2) DEAD-END HITCH  
 (3) CAR GOVERNOR / TENSION WT ASSEMBLY (SEE NOTE B).  
 (4) PIT LADDER (KONE SUPPLIED/INSTALLED)  
 MIN. CLEARANCE FROM FRONT WALL:  
 SS/CO 8.25"[210mm], 2S 10.25"[260mm].
- (5) TYP BUFFER LOCATION / SEE GENERAL DATA SHEET FOR REACTIONS  
 (6) WIRE DUCT (SEE NOTE C)  
 (7) RECOMMENDED SUMP PUMP LOCATION (IF REQUIRED)
- (11) CONTROLLER - TOP FLOOR ONLY

FOR APPROVAL - NOT FOR CONSTRUCTION

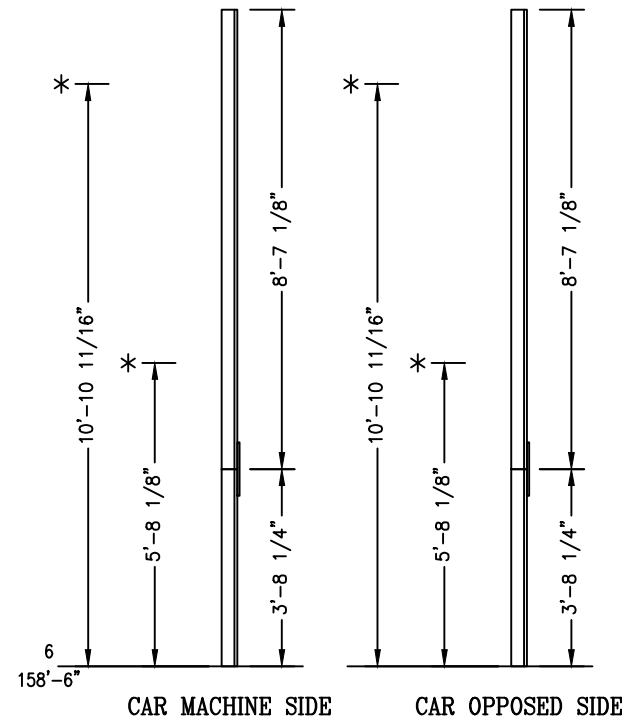
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UNITS: IMPERIAL	1-23.2	-
DRAWING M-7548782-10140-010	DESCRIPTION HOISTWAY	SHEET 3 of 21

7548782-10140-010  
 Monospace 500  
 ELEVATOR EL1  
 3500#  
 200 FPM

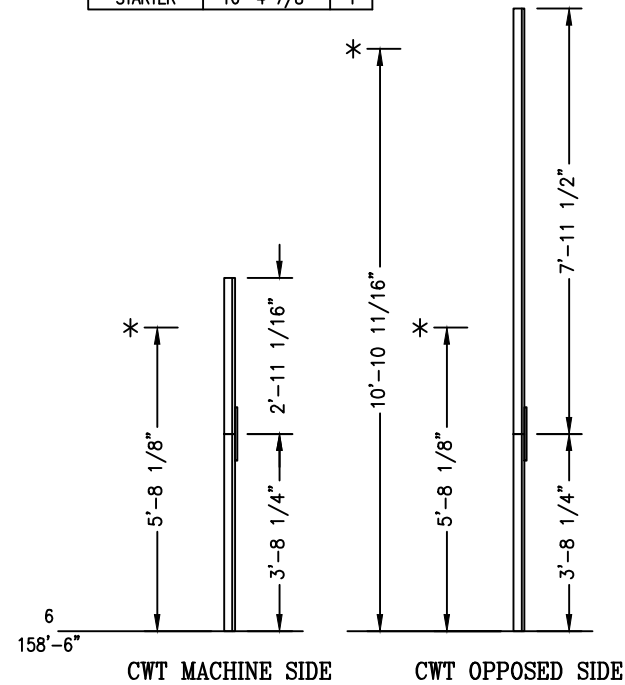
FLOOR SCHEDULE			
FLOOR NO.	FRONT	REAR	DISTANCE
6	6	--	
5	5	--	11'-0"
4	4	--	11'-0"
3	3	--	11'-0"
2	2	--	11'-0"
1	*1	--	14'-6"



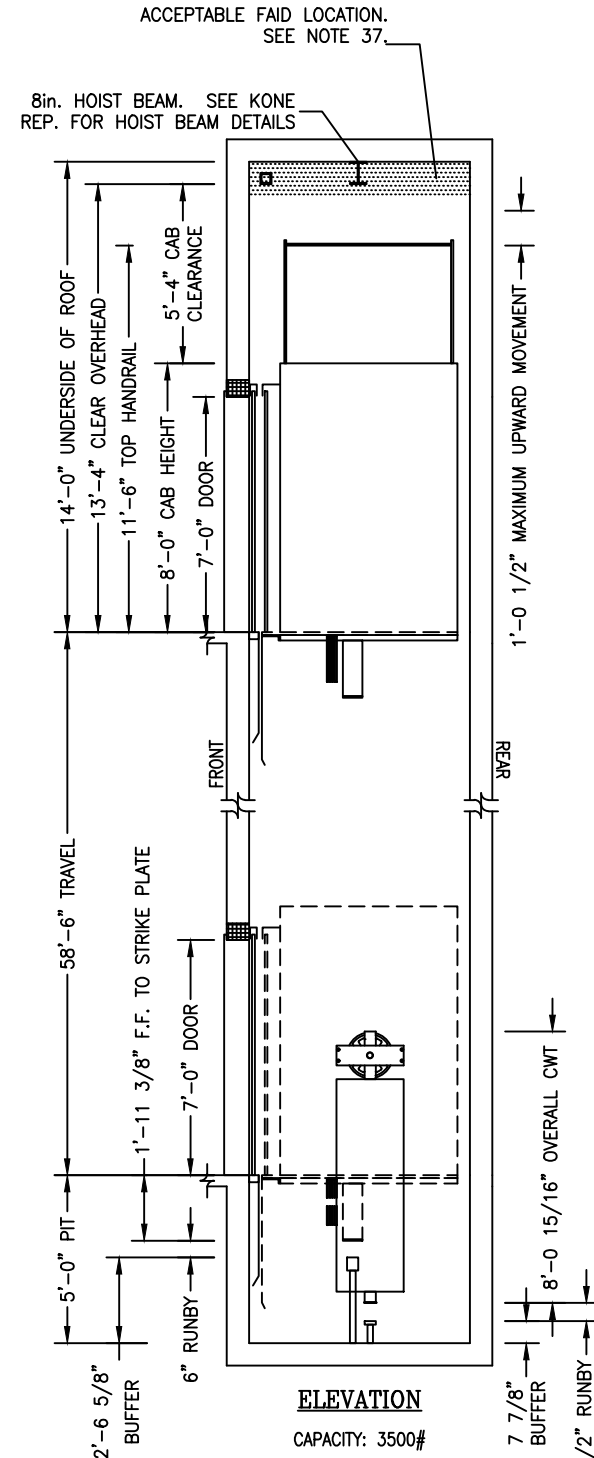
**RAILSTACK**  
 MAXIMUM BRACKET SPACING = 136"



RAIL SCHEDULE		
LOCATION	RAIL LENGTH	QTY
FILLER RAIL	9'-9 1/4"	1
MIDDLE	8'-2 7/16"	1
MIDDLE	16'-4 7/8"	2
STARTER	16'-4 7/8"	1



\*\* DENOTES CENTER LINE OF BRACKETS.  
 BRACKET SUPPORTS ARE REQUIRED AT THESE POINTS.



COUNTERWEIGHT SAFETIES HAVE NOT BEEN PROVIDED.  
 KONE IS NOT AWARE OF ANY ACCESSIBLE SPACE BELOW THE PIT.

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APPROVAL SPACE

PROJECT:  
 NORTHERN EDGE APARTMENTS

BUILDING: BUILDING 1 GROUP: GROUP 2

LOCATION:

ENG/ARCH:  
 LRK ARCHITECTS

CONTRACTOR:  
 BUCKINGHAM COMPANIES CORPORATION

ITEM NO.	NETWORK NO.	EQUIPMENT NO.

2024-06-26 - BEN PRELIMINARY  
 DATE NO BY CK DESCRIPTION

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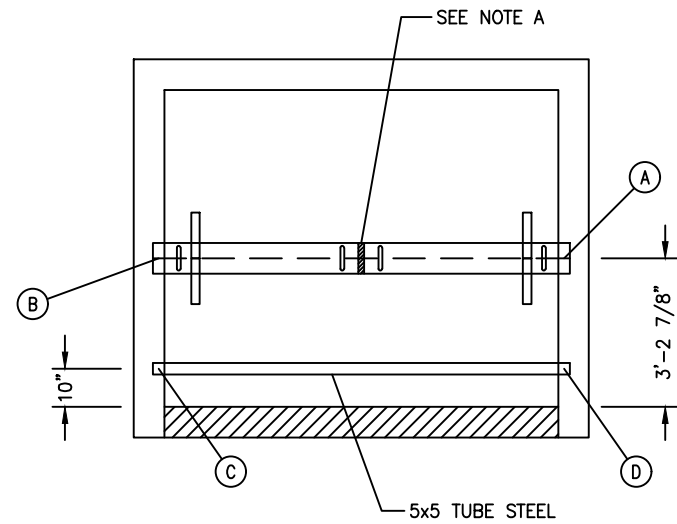
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UNITS: IMPERIAL	1-23.2	-
DRAWING M-7548782-10140-010	DESCRIPTION RAILSTACK	SHEET 4 of 21



7548782-10140-010  
 Monospace 500  
 ELEVATOR EL1  
 3500#  
 200 FPM

Notes:  
 A. PLACE YELLOW LINE AT CENTER OF HOISTWAY  
 LEFT TO RIGHT



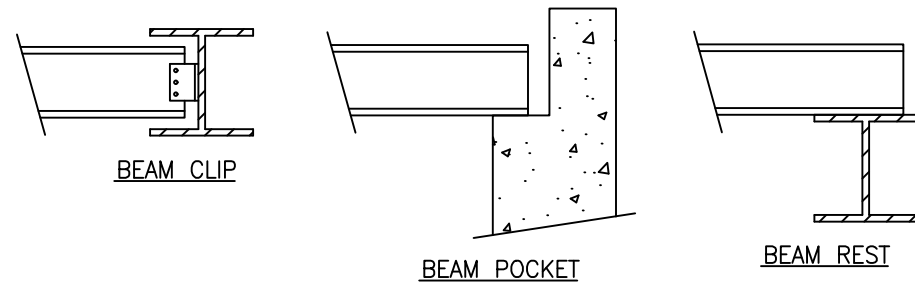
**BUILDING LOADS FOR HOISTING BEAM & TUBE STEEL SUPPORT**

FOR ADJACENT HOISTWAYS COMBINED LOADS ON A COMMON STRUCTURAL SUPPORT SHOULD BE TAKEN INTO CONSIDERATION. REACTIONS SHOWN BELOW ARE FOR THIS ELEVATOR ONLY. THE REACTION LOADS BELOW ARE ASD LEVEL & UNFACTORED.

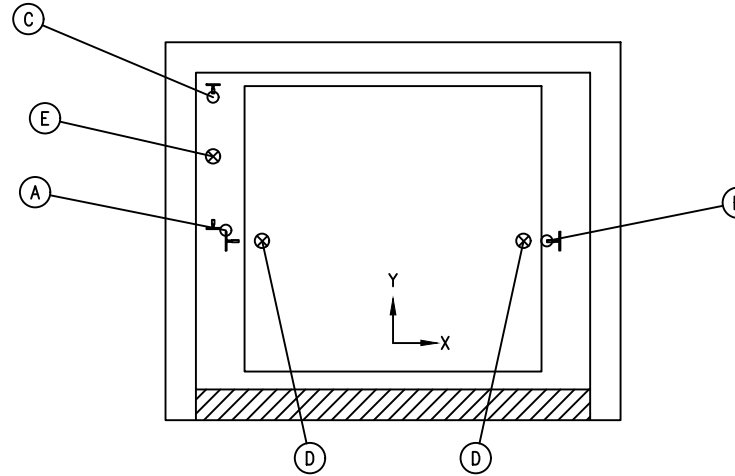
PLANVIEW IS AT TOP OF OVERHEAD LOOKING DOWN ON THE BEAMS. ALL U-BOLTS HANG DOWN TOWARDS THE PIT FLOOR. SEE BRACKET SHEET FOR THE ELEVATION OF SUPPORTS.

VERTICAL FORCES* (lbf)				
REACTION LOCATION	A	B	C	D
Z DIRECTION	5610	4840	5000	5000

\*REACTIONS A AND B ARE SIZED TO SUPPORT THE MAXIMUM WORKING LOAD OF THE INSTALLATION HOIST. REACTIONS D AND C SUPPORT FALL ARREST LIFELINES PER OSHA MINIMUM SUPPORT LOADS. REACTIONS A & B MAY BE CONSIDERED TO OCCUR SEPARATELY FROM C & D.



**ATTACHMENT DETAILS**



**GUIDE RAIL REACTIONS\***

FOR ADJACENT HOISTWAYS COMBINED LOADS ON A COMMON STRUCTURAL SUPPORT SHOULD BE TAKEN INTO CONSIDERATION. REACTIONS SHOWN BELOW ARE FOR THIS ELEVATOR ONLY. THE REACTION LOADS BELOW ARE ASD LEVEL & UNFACTORED.

NON-SEISMIC REACTIONS			
BRKTS ABOVE TOPMOST LANDING - IMPACT LOADING REACTIONS (lbf)			
REACTION LOCATION	A	B	C
X DIRECTION	1470	280	50
Y DIRECTION	550	1500	100
MAX STRESS NOT TO EXCEED 27,500psi DUE TO APPLIED LOADS			

BRKTS BELOW TOPMOST LANDING - RUNNING REACTIONS (lbf)			
REACTION LOCATION	A	B	C
X DIRECTION	330	280	50
Y DIRECTION	240	140	100
MAX DEFLECTION NOT TO EXCEED 0.125" DUE TO APPLIED LOADS			

\*Governor system related loads are included in the rail reactions.

**PIT FLOOR REACTIONS\*\***

VERTICAL FORCES ONTO PIT FLOOR (lbf)					
REACTION LOCATION	A	B	C	D	E
Z DIRECTION	17100	8500	4400	14100	21100

\*\*VERTICAL REACTIONS A, B & C OCCUR SIMULTANEOUSLY. VERTICAL REACTIONS D and E OCCUR INDIVIDUALLY AND SEPARATELY FROM A B and C.

**SEISMIC DESIGN CRITERIA**

BUILDING CODE: IBC  
 SEISMIC DESIGN REQUIRED: NO  
 DESIGN CATEGORY: A

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APPROVAL SPACE

PROJECT:  
 NORTHERN EDGE APARTMENTS

BUILDING: BUILDING 1 GROUP: GROUP 2

LOCATION:

ENG/ARCH:  
 LRK ARCHITECTS

CONTRACTOR:  
 BUCKINGHAM COMPANIES CORPORATION

UNIT INFO	ITEM NO.	NETWORK NO.	EQUIPMENT NO.

REVISIONS

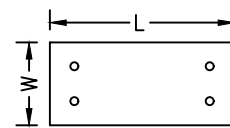
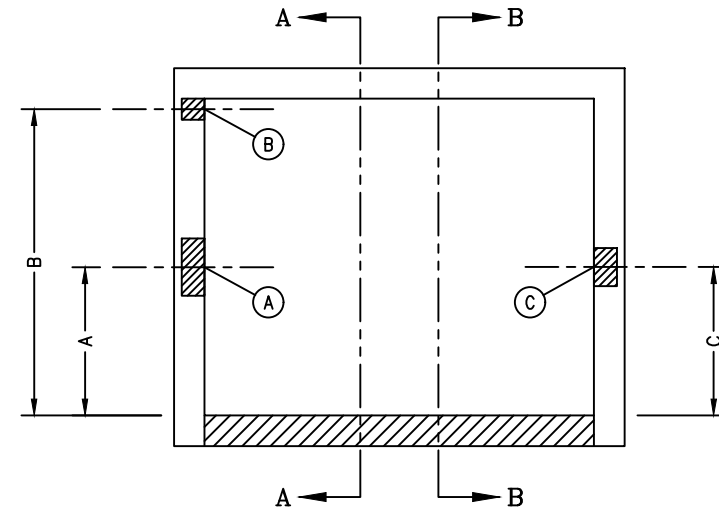
DATE	NO	BY	CK	DESCRIPTION
2024-06-26	-	BEN		PRELIMINARY

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**KONE**

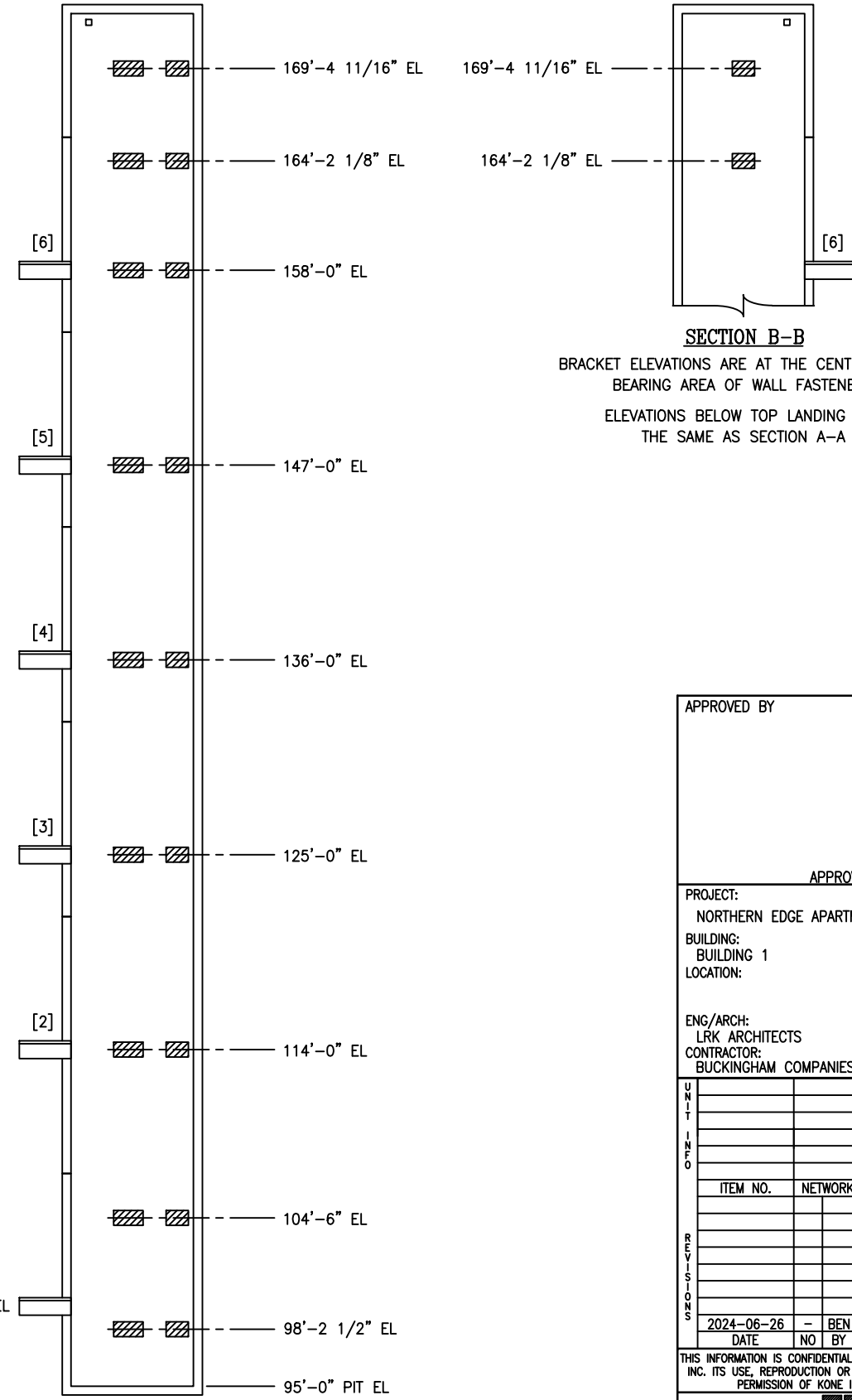
GENERATED ON: 06/26/24	BY: BEL	REV -
UNITS: IMPERIAL	1-23.2	
DRAWING M-7548782-10140-010	DESCRIPTION REACTION	SHEET 6 of 21

7548782-10140-010  
 Monospace 500  
 ELEVATOR EL1  
 3500#  
 200 FPM



NOTE:  
 GUIDE RAIL BRACKET ATTACHMENT PLATE  
 FOOTPRINT IS SHOWN FOR REFERENCE ONLY.  
 HOLE CONFIGURATION SUBJECT TO CHANGE  
 BASED ON CONNECTION INTERFACE MATERIAL.

LOCATION	BRACKET TYPE	ATTACHMENT TYPE	PART NUMBER	L	W	POSITION
OVERHEAD	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
FLOOR 6	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
FLOOR 5	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
FLOOR 4	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
FLOOR 3	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
FLOOR 2	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
FLOOR 1	A COMBO	HEX BOLTS / STL WALL	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	HEX BOLTS / STL WALL	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	HEX BOLTS / STL WALL	KM872678H02	17 3/8	4 1/2	3'-2 7/8"
PIT	A COMBO	EXP. ANCHOR, CONC.	KM880040H01	13 5/8	5 7/8	3'-2 7/8"
	B CWT	EXP. ANCHOR, CONC.	KM51199728V002	5 5/16	3 9/16	6'-8 1/4"
	C CAR	EXP. ANCHOR, CONC.	KM872678H02	17 3/8	4 1/2	3'-2 7/8"



**SECTION B-B**  
 BRACKET ELEVATIONS ARE AT THE CENTERLINE OF  
 BEARING AREA OF WALL FASTENERS  
 ELEVATIONS BELOW TOP LANDING ARE  
 THE SAME AS SECTION A-A

[\*1] 100'-0" EL

**SECTION A-A**  
 BRACKET ELEVATIONS ARE AT THE CENTERLINE OF  
 BEARING AREA OF WALL FASTENERS

APPROVED BY

APPROVAL SPACE

PROJECT:  
 NORTHERN EDGE APARTMENTS

BUILDING: BUILDING 1 GROUP: GROUP 2  
 LOCATION:

ENG/ARCH:  
 LRK ARCHITECTS  
 CONTRACTOR:  
 BUCKINGHAM COMPANIES CORPORATION

UNIT	NO	DATE	BY	CK	DESCRIPTION
		2024-06-26	BEN		PRELIMINARY

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**KONE**

GENERATED ON: 06/26/24	BY: BEL	REV: -
UNITS: IMPERIAL	1-23.2	
DRAWING: M-7548782-10140-010	DESCRIPTION: BRACKET	SHEET: 7 of 21





# Site Safety Requirements / Work by Others

## KONE MonoSpace 500 Bid Attachment "B"



PURCHASER TO PROVIDE THE FOLLOWING IN ACCORDANCE WITH CODE REQUIREMENTS:  
NOTE: ALL SITE PREPARATION REQUIRED TO BE IN PLACE PRIOR TO KONE'S START MUST BE READY TWO (2) WEEKS PRIOR TO THE START OF INSTALLATION.

### General

1. Provide sufficient on-site refuse containers for the disposal of the elevator packing material. Should sufficient containers not be provided, the removal of the elevator packing material shall become the responsibility of others.
2. Provide forklift for KONE exclusive use during the unloading of the elevator at time of delivery.
3. Provide any cutouts to accommodate the elevator equipment (see notes below).
4. Provide and install finished elevator cab flooring prior to balancing cabs (coordinate with KONE). Cab flooring/weight allowance shall be in accordance with KONE's approved layouts. Owner must provide certification (to the elevator inspector at time of inspection) that flooring meets flame spread and smoke density requirements. (ASME A17.1/CSA B44 sec 2.14.2.1)
5. Provide permanent elevator lobby lighting, ceiling and flooring prior to inspection date.
6. Owner must provide certification (to the elevator inspector at time of inspection) that owner-supplied elevator interior finishes meet flame spread and smoke density requirements (ASME A17.1/CSA B44 sec. 2.14.2.1). In the case of using glass, transparent or translucent plastic panels for car interiors, they shall meet the requirements of ASME A17.1/CSAB44 sec. 2.14.1.8, ANSI Z97.1/ CGSB 12.1 in Canada.
7. Provide cutting/ coring of all openings and penetrations required to install hall push buttons, signal fixtures, wiring duct and piping, and sleeves. Sleeves will be required in the hoistway wall for EACH elevator.
8. Provide any repairs such as grouting, patching and painting made necessary by such cutting/ coring. Provide fire caulking around all fixtures and as needed to satisfy NFPA 70 article 300.21, or any applicable local code.
9. Please note that none of the elevator components are weather-proof and that the elevator entrances do not seal the hoistway from inclement weather. The entire elevator, hoistway, and controls must remain protected from inclement weather prior to and throughout the installation.
10. Communications Means for Emergency Personnel: Required for units with travel greater or equal to 60 ft (18 m), or if located in a seismic zone and the code year is 2016 or later (regardless the travel): For code year 2019 and later, customer will provide a dedicated Windows-based PC or laptop with Chrome browser and 24-hour/day internet access. This computer must be accessible by emergency personnel to communicate through voice and text with people in the elevator and to have a video display of the cab interior. When provided, the communication means for emergency personnel shall be located as follows:
  - a. In jurisdictions not enforcing National Building Code of Canada (NBCC), the Fire Command Center (FCC).
  - b. In jurisdictions enforcing the NBCC, the Central Alarm and Control Facility (CACF).
  - c. In buildings without an FCC or CACF, on the designated level in a location approved by the local fire authority.

### Safety

11. Provide adequate, roll-able access with a minimum opening of 8' x 8' [2.5m x 2.5m] into the building. Clean, safe, secure and dry space is required adjacent to the hoistway at grade level, minimum of 21' x 56' [6.4m x 17m] per elevator for storage of materials.
12. Provide free-standing, removable, OSHA-compliant barricades capable of withstanding 200lb (890N) of force in all directions around all hoistway openings per OSHA 29 CFR 1926.502, and/or any applicable local code.
13. Provide and install full-covering entry protection as per local requirements and manufacturer's requirements. Protection to be made of nylon mesh or reinforced plastic, at all hoistway openings to prevent materials or tooling from falling into the elevator shaft during installation per Federal OSHA requirements listed in 29 CFR 1926.502(j). In Canada, where required by Provincial regulation, enclose the front of the hoistway with removable hoarding or screening to prevent material from entering the hoistway. Design and install entrance protection in such a way as to allow quick accessibility in and out of the hoistway.
14. Provide two (2) lifeline attachments at the top, front of the hoistway. Each must be capable of withstanding a 5000 lb [2250 Kg] load per OSHA 29 CFR 1926.502, or any applicable local code. For machine-room-less applications, provide attachments as described above, or install KONE-provided 5" x 5" x 3/8" (127mm x 127mm x 9.6mm) tube steel lifeline beam in the elevator hoistway overhead 10 inches (254 mm) from front of hoistway to center line, with bottom of lifeline beam at same elevation as bottom of hoisting l-beam. Lifeline tube steel supplied by KONE by request at no additional cost. Engineering details, attachment details and/or modifications, or any beam(s) alterations in the field for installation is by others.
15. Provide proper lighting in all work areas and stairways, including access to all floors and machine rooms per OSHA 29.CFR1926.1052 or any applicable local code.
16. Provide and maintain 6-foot (1800 mm) clear work area in front of all entrance openings per OSHA 29.CFR1926.502 or any applicable local code.

### Hoistway

17. Provide a clear and plumb hoistway of size shown on approved KONE final layout drawings. Any variations from the detailed dimensions may not exceed 2" [50 mm] greater and may not be less than the clear dimensions detailed. (Tolerance: -0" + 2" [-0 mm +50 mm]).
18. Provide hoistway ventilation per local building code requirements as applicable. For proper equipment operation, the machine space in the machine room or at the top of the hoistway must maintain a temperature between 41° F [5° C] and 104° F [40° C]. Maximum allowed humidity is 95% non-condensing. For proper equipment operation, the space below the top of the hoistway, including the pit, must maintain a temperature between 5° F [-15° C] and 135° F [57° C] when the hoistway is located in a structure exposed to direct sunlight or not environmentally conditioned (e.g. parking garages). Maximum allowed humidity is 95% non-condensing.
19. Provide any partitions between common hoistways if applicable.
20. Install hoist beam(s) in overhead(s) per the KONE final layout drawings. Beam supplied by KONE unless otherwise noted on the layouts. Engineering and attachment details or field modifications of the beam is by others.

21. In cases where multiple elevators are in a common hoistway, and the counterweights are located between elevators, the entire length of counterweight runway must be guarded. The guard shall extend at least 6 inches (150mm) horizontally beyond each counterweight rail. The guard shall be made from wire-mesh material equal to or stronger than .048 inch diameter wire with openings not exceeding 1/2 inch (13 mm), securely fastened to keep the guard taut and plumb.
22. On applications where working platforms are required, working platforms provided shall comply with the requirements of the current ASME A17.1 / CSA-B44 code edition in effect at the time of installation and/or any applicable local code.
23. Provide adequate support for guide rail brackets from pit floor to the top of the hoistway. Locate rail backing per KONE final approved layout drawings. When maximum bracket span is exceeded, additional support shall be provided at purchaser's expense. Any bracket mounting surface that is not in line with the clear hoistway dimension detailed on the approved KONE final layout drawings may need to be corrected to meet the proper dimension at purchaser's expense.
24. If guide rail brackets are to attach to steel, ensure all brackets are installed prior to applying fireproofing to the steel. Otherwise, removal and reapplication of fireproofing will be at purchaser's expense.
25. All offsets, ledges or projections within the hoistway shall be addressed in accordance with applicable local code. All offsets, ledges or projections within the hoistway greater than 4 inches (100mm) must be tapered to not less than 75 degrees (ASME A17.1/CSA B44 sec 2.1.6.2). Maximum ledge or projection is 2 inches (50mm) in Massachusetts, California, District of Columbia, and New York City.
26. If concrete block wall construction, refer to the approved KONE final approved layout drawings for proper installation of rail bracket attachments. Inserts provided by KONE unless otherwise noted on the approved KONE final approved layout drawings. Insert type must be approved by KONE. Concrete masonry units, mortar and grout, shall conform to International Building Code (IBC) or any applicable local code. Concrete masonry units shall have a minimum compressive strength of 1500 PSI (10.5 MPa). Mortar and grout shall have a minimum compressive strength of 2000 PSI (13.8 MPa).
27. KONE entrance jambs are non-ferrous and material may not be attached to them (i.e. fire doors/curtains).
28. Arrange for entrance walls to be constructed at the time doorframes and sills are installed to facilitate timely installation of hall fixture faceplates. Entire front wall must be left open at top and bottom landings until elevator equipment is installed. Intermediate landings must have rough openings of the size and location shown on KONE final approved layout drawings to allow installation of entrances. All entrance openings must be aligned vertically. Adequate support for entrance attachment points shall be provided at all landings, according to reaction loads shown on KONE Final Approved Layout Drawings (FALD) (ref. ASME A17.1/CSA B44 section 2.11). Any marble, stone or similar wall material must be prepared after the entrance frames are installed. Provide corridor lines for any marble or "special finish" walls.

NOTE: If concrete block wall construction- to prevent overloading entrance frames, top of entrances should not receive more than one row of block. A lintel must be installed to support additional rows of block.

29. Provide elevator landings suitably prepared to accept entrance sill installation per KONE final layout drawings. Grouting to be done by purchaser after sills are installed. NOTE: Traditional angle or concrete sill support is not required.
30. Provide finished-floor height visible from hoistway openings at all landings minimum one week prior to beginning entrance installation. Placing floor height mark on hoistway wall is desirable. Complete "Contractor Verification Form of Sill to Sill Heights and Remote Machine Piping", CONSTR-07-0675.
31. Provide suitable, permanent lighting for control space with light switch located within 18" [457 mm] of strike jamb side of control space door where practical.
32. Electric lighting shall have a minimum lighting intensity of 200 lx (19 fc) at the floor level. When permitted by state and local code the light switch should also control the machine space lighting if control space is adjacent to the hoistway at the top landing.
33. If the control space is located remote from the elevator hoistway at top landing the following may apply:
  - a. If applicable, provide machine space access door of the size and in the location shown on the KONE final layout drawings. The access door shall be secured against unauthorized access. It shall be self-closing, self-locking and operable from the inside without a key.
  - b. Provide suitable lighting in or above the machine space access with light switch located within 18" [457 mm] of strike jamb side of access space door where practical.
  - c. When permitted by state and local code the light switch should also control the machine space lighting.
  - d. In cases where a battery lowering device is provided, control closet may not be adequate. Please consult KONE representative.
34. Provide and install GFCI-type receptacle located at machine in the top of the hoistway or in machine room as applicable (NFPA 70 article 620 or CEC article 38 whichever is applicable).
35. Provide and install light switch located at manual brake release location: may also be required in control space per local jurisdiction.
36. Where a single elevator is installed in a hoistway and a portion of the travel extends higher than 11m (36 ft.) between entrances (single blind hoistway), emergency door(s) must be provided. Emergency doors and their electrical contacts shall comply with the current ASME A17.1/CSA-B44 code edition in effect at the time of installation and/or any applicable local code. ASME A17.1-2019/B44-19 requirement Section 2.11.1.2 covers "Emergency Doors in Blind Hoistways" and Section 2.26.2 covers Electrical Protective Devices. Each emergency door must be provided with an electrical contact with minimum UL/CSA NEMA A300 rating suitable for use in a 3-amp 230VAC circuit. Consult KONE representative if there are any questions concerning the code requirements.
37. In jurisdictions enforcing the NBCC and in jurisdictions enforcing NFPA 72, the means for testing and maintenance of fire alarm initiating devices without having to enter the hoistway shall be permitted. When this means is provided it must comply with ASME A17.1-2019/CSA B44-19 (and later editions) requirement 2.8.2.4 and the location of equipment inside the elevator hoistway must be coordinated with KONE sales and/or operations representative.
38. When Emergency Responder Radio Coverage (ERRC) equipment is required and located in the hoistway, consult KONE representative to ensure required running clearances are maintained and layout drawings are updated, if required. Reference ASME A17.1-2022/CSA B44-22 (and later editions) requirements 2.8.7, 2.27.12 and 2.28.1.

APPROVED BY		
APPROVAL SPACE		
PROJECT: NORTHERN EDGE APARTMENTS		
BUILDING: BUILDING 1		GROUP: GROUP 2
LOCATION:		
ENG/ARCH: LRK ARCHITECTS		
CONTRACTOR: BUCKINGHAM COMPANIES CORPORATION		
U N I T I N G	ITEM NO.	EQUIPMENT NO.
R E V I S I O N S		
2024-06-26	- BEN	PRELIMINARY
DATE	NO BY CK	DESCRIPTION
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GENERATED ON: 06/26/24	BY: BEL	REV
UNITS: IMPERIAL	1-23.2	-
DRAWING M-7548782-10140	DESCRIPTION CONTRACT	SHEET 9 of 21

Site Safety Requirements / Work by Others  
KONE MonoSpace 500 Bid Attachment "B"



PURCHASER TO PROVIDE THE FOLLOWING IN ACCORDANCE WITH CODE REQUIREMENTS:

NOTE: ALL SITE PREPARATION REQUIRED TO BE IN PLACE PRIOR TO KONE'S START MUST BE READY TWO (2) WEEKS PRIOR TO THE START OF INSTALLATION.

**Pit**

- 39. Provide a legal, dry and clean pit with level pit floor, built per KONE final layout drawings. Pit shall be reinforced to sustain vertical forces detailed on KONE final layout drawings (vertical forces detailed are two times the static loads.)
- 40. Sumps and/or sump pumps (where permitted) located within the pit may not interfere with the elevator equipment. Sumps to be covered with flush mounted, non-combustible cover capable of withstanding 150 lbs per square foot (7 kPa). The sump pump/drain must, at minimum, remove 3,000 gal/h (11.4 m<sup>3</sup>/h) per elevator.
  - a. ASME A17.1-2016/CSA B44-16 and earlier, per elevator.
  - b. ASME A17.1-2019/CSA B44-19 and later, per single hoistway or multiple car hoistway.
- 41. Provide a pit light fixture with switch and guards with an illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, and later editions. Recommended to provide minimum 4-foot double tube fluorescent fixture, with suitable guard and mounted to rear wall of pit per KONE installation representative's direction.
- 42. Provide a dedicated pit circuit with GFCI-protected 15 or 20 amp 120V AC duplex outlet. Location to be coordinated with the KONE project team using the KONE final approved layout drawings (NFPA 70 article 620; CEC article 38 whichever is applicable).
- 43. Provide single receptacle for sump pumps in accordance with (NFPA 70 article 620, or CEC article 38 whichever is applicable)
- 44. Pit ladder to be constructed of non-combustible material extending from pit floor to 48" [1200 mm] above the sill of the access landing. Pit ladder is supplied by KONE; provided by purchaser on other KONE products unless otherwise noted on the layout drawing. Locate per KONE final layout drawings. Coordinate ladder sizing and location with KONE representative to assure proper fit in hoistway.
- 45. When a separate pit access door is provided, it must conform to ASME A17.1, requirement 2.2.4.5. When an electric contact is required, it shall comply with ASME A17.1, requirement 2.2.4.5 (b) (1).

**Electrical**

- 46. US Applications - Purchaser provides in accordance with National Electrical Code, NFPA 70 (NEC) Article 620 or any applicable local code.
- 47. Canadian Applications - Purchaser provides in accordance with Canadian Electrical Code, C22.1 Section 38 or any applicable local code.
- 48. Provide dedicated GFCI-protected 20 amp 120VAC duplex (15 amp in Canada) outlet next to each control cabinet.
- 49. Provide for all electrical branch circuits/disconnects to be labeled (NFPA 70 article 620, CEC articles 38/36).
- 50. Provide 480/208 VAC (USA) or 575/208 VAC (Canada) three-phase main line power, including piping, wiring and fused disconnect, to controller location to facilitate elevator installation prior to start of project.  
 WARNING: An Open Delta transformer is not acceptable to supply the main line power to elevators with regenerative drives, either for temporary or permanent power. Doing so can permanently damage the drive.
- 51. Provide 220 VAC single-phase temp. power and 115 VAC single-phase temp. power, of permanent characteristics at each elevator landing for lighting and installation method tools. Locate connection points at elevator hoistway.  
 NOTE: For installation purposes related to items 49 and 50, please consult your KONE representative to confirm disconnect location(s) and type of temporary power.
- 52. When generator is used to provide 3-phase 480/208 VAC (USA) or 575/208 VAC (Canada) power for installation, purchaser to accept change notice for additional costs, estimated locally by installing office, to cover inefficiencies and any damages resulting from installing without permanent power present.  
 NOTE: Our elevator controllers require Wye configuration transformers. It is also the responsibility of the purchaser to provide consistent three-phase voltages balanced within +/-10% when measured phase-to-phase and +/-10% when measured phase-to-ground.
- 53. Provide a dedicated 20 amp 115VAC circuit in the fire command room piped and wired to the lobby panel where applicable.
- 54. Provide a separate 15 amp 115VAC fused service with ground (supplied through automatic emergency lighting supply if available in building) connected to each elevator signal control cabinet for car lighting. Must include the means to disconnect this service and lock-off in the "open" position (NFPA 70 article 620 or CEC article 38).
- 55. Provide a separate 15 amp 115VAC fused service with ground (supplied through automatic emergency lighting supply if available in building) for each seismic device; when required. Must include the means to disconnect this service and lock-off in the "open" position (NFPA 70 article 620 or CEC article 38, whichever is applicable).
- 56. Hoistway lighting. If hoistway lighting is supplied or if ASME A17.1/CSA B44 Code Year 2022 or later, provide one additional fused 120VAC 20A services with ground (supplied through automatic emergency lighting supply if available in building) and land in a junction box (provided by KONE) located in the top of the hoistway. Include the means to disconnect each service and lock-off in the "open" position (NFPA 70 article 620 or CEC article 38, whichever is applicable). Provide a 3-way switch in the hoistway at the pit, wired to a 3-way light switch in the hoistway at the top floor and then to the junction box in the top of the hoistway. These light switches are in addition to and located adjacent to the pit and overhead light switches.  
 NOTE: For installation purposes please consult your KONE representative to confirm disconnect location(s).
- 57. Provide separate 15 amp 115VAC fused service with ground (powered by building emergency power system, when available) for each elevator with KONE 24/7 Emergency Video Communications, when specified. Must include the means to disconnect each service and lock-off in the "open" position (NFPA 70 article 620 or CEC article 38).

**Control Space / Integrated Controls Solution (ICS)**

- 58. Provide a legal control space/ machine room with access as indicated on the KONE final layout drawings. To include a temporary or permanent door that can be locked from outside. Permanent door must be self-closing, self-locking, and require a key to open from outside. Must have adequate temporary or permanent lighting for installation purposes. For proper equipment operation, the temperature in the control space must maintain between 41° F [5° C] and 104° F [40° C]. Maximum allowed humidity is 95% non-condensing.

- 59. Provide safe and convenient access to control space/machine room including provisions for necessary lighting for access path (ASME A17.1/CSA B44 sections 2.8.1 and 2.7.3)
- 60. Provide a clean and dry elevator control room.
- 61. Provide suitable lighting for control space with light switch located within 18" [457 mm] of strike jamb side of control space door where practical. When permitted by state and local code the light switch should also control the machine space lighting if control space is adjacent to the hoistway at the top landing.
- 62. Provide dedicated GFCI-protected 120VAC 20 amp duplex (15 amp in Canada) outlet in the shaft, located above and centered to the entrance opening at the controller landing. Consult KONE installation team for precise location
- 63. Provide a single means of disconnecting all ungrounded main line power conductors for each elevator by an enclosed, externally operable, fused motor circuit switch with UL/CSA Class RK1 or equivalent J-Class fuses. Must be lockable in the open position. This disconnecting means shall disconnect the normal power service as well as emergency power service, when provided.  
 Note 1: If a battery-powered rescue device is required, the above-mentioned disconnect must have an auxiliary contact monitored by elevator controller that is positively opened mechanically and is normally closed (NC) when the main line power is in the ON position, and is normally open (NO) when power is in the OFF position.  
 Note 2: If a battery-powered rescue device is required and a separate shunt trip breaker which is subject to either the hoistway or control space sprinkler system is provided, the shunt trip breaker must have an auxiliary contact that is positively opened mechanically and is normally closed (NC) when the main line power is in the ON position.  
 Note 3: Shunt trip not allowed in Canada and some US jurisdictions
- 64. Provide a Direct-in-dial (DID) analog phone line, activated at least one week prior to inspection, terminated at the appropriate phone jacks in the elevator control room. GC/ Owner may elect to have a separate analog line installed (one per elevator), or GC/ Owner may elect to provide DID lines from an Analog Station Card in the buildings PBX system. If GC/Owner provides a Direct-in-Dial analog phone line or lines off an existing PBX phone system, a backup power source must also be provided. If PBX phone system, VOIP, network or other communications system is used, the phone line provided from the analog station card must be an analog converter configured to drop the voltage just as a regular analog phone line when communications are out of service. All phone and associated equipment provided by GC/ Owner shall be in compliance with the requirements of ASME A17.1/ CSA B44, local codes and applicable law.
- 65. Provide customer maintained routed internet network connection, activated at least one week prior to inspection. Connection is to be terminated at the appropriate RJ45 connection in the elevator control space along with terminated CAT6 patch network cable(s) that reach the installed location of the KONE solution. GC/Owner may elect to provide a network switch located in the elevator control space with sufficient number of connections. Internet connectivity to/from KONE solution(s), has to be provided through a firewall solution by customer. KONE expects customer to follow industry security best practices when configuring firewall. Customer is responsible for maintaining routed internet network connection to ensure operational security is maintained throughout the lifecycle of the building to guarantee the operation of the KONE solution.
- 66. Provide all fire alarm initiating signals as required by all national, state and local codes for termination at the primary elevator signal control cabinet in each group.
- 67. With emergency power service provide emergency power transfer switch and power change pending signals as required; 2 normally open dry contacts from transfer switch to controller (2 pairs plus ground wire). One contact closes to signal emergency power is present, the other contact closes to give 30 second pre-signal prior to transfer switch change. Termination of these wires is at the primary elevator signal control cabinet in each group (2 pairs plus ground wire.)
- 68. Furnish and install smoke detectors and fire operation per ASME A17.1/CSA B44 sec 2.27.3.2, NFPA 72; one for lobby detector, machine room detector, hoistway detector (hoistway detector requirement determined by local code), and one for all grouped non-lobby detectors are required. Provide normally-closed dry contacts, with wiring, to controller for each group listed above.
- 69. Provide and install smoke detector in hoistway as required per local codes, and in all elevator lobbies, machine room and controller space.
- 70. Provide heat detectors and "shunt-trip operation (US Only)" when sprinklers are required in machine room, machinery space, control room, control space, or hoistway, (A17.1 sec 2.8.3.3.2, NFPA 13 and NFPA 72).
- 71. If Fire Status Panel or Security panels are required, all remote conduit runs from elevator equipment room/machine space to these panels shall be by others.
- 72. Non-elevator related piping and equipment is prohibited in machine room or hoistway (ASME A17.1/CSA B44, sections 2.8.1 and 2.8.2).
- 73. Provide and mount at minimum a 10-pound, ABC-type fire extinguisher in control space (ASME A17.1 sec 8.6.1.6.5). (Not required in Canada for ASME A17.1-2019/CSA B44-19 and earlier editions)

**Applicable for Integrated Control Solution (ICS)**

- 74. Provide a completely open front wall at top landing with access as indicated on the KONE Final Approved Layout Drawings. Must have adequate temporary or permanent lighting for installation purposes. NOTE: The lobby side of the ICS control cabinet must be faced with 2 layers of dry wall to comply with UL certification, regardless of front type. See KONE Final Approved Layout Drawings for details and wall type and minimum dimensions.
- 75. Provide environment for proper equipment operation during installation and after acceptance, the temperature at the top floor elevator lobby must maintain between 41° F [5° C] and 104° F [40° C]. Maximum allowed humidity is 95% non-condensing.

APPROVED BY			
APPROVAL SPACE			
PROJECT: NORTHERN EDGE APARTMENTS			
BUILDING: BUILDING 1		GROUP: GROUP 2	
LOCATION:			
ENG/ARCH: LRK ARCHITECTS			
CONTRACTOR: BUCKINGHAM COMPANIES CORPORATION			
UNIT INFO	ITEM NO.	NETWORK NO.	EQUIPMENT NO.
REVISIONS			
2024-06-26	-	BEN	PRELIMINARY
DATE	NO	BY	CK
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GENERATED ON: 06/26/24		BY: BEL	REV
UNITS: IMPERIAL		1-23.2	-
DRAWING M-7548782-10140		DESCRIPTION CONTRACT	SHEET 10 of 21

Site Safety Requirements / Work by Others  
KONE MonoSpace 500 Bid Attachment "B"



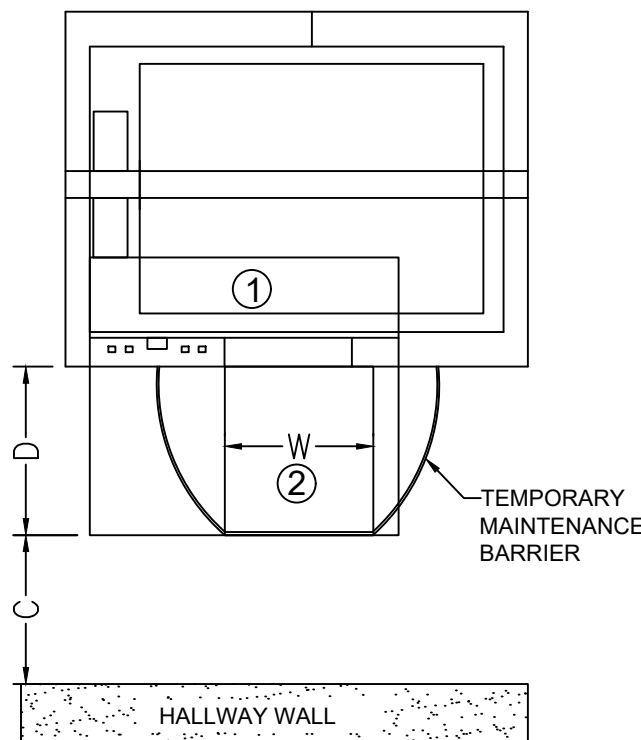
PURCHASER TO PROVIDE THE FOLLOWING IN ACCORDANCE WITH CODE REQUIREMENTS:

NOTE: ALL SITE PREPARATION REQUIRED TO BE IN PLACE PRIOR TO KONE'S START MUST BE READY TWO (2) WEEKS PRIOR TO THE START OF INSTALLATION.

76. Provide safe and convenient rollable access to top floor elevator lobby area. (ASME A17.1/CSA B44 sections 2.8.1 and 2.7.3).
77. Provide 480/208 VAC (USA) or 575/208 VAC (Canada) three-phase main line power, including piping, and wiring from fused disconnect, to junction box located in hoistway at top landing to facilitate elevator installation.  
WARNING: A Wye configuration transformer is required. An Open Delta transformer is not acceptable to supply the main line power to elevators with regenerative drives, either for temporary or permanent power. Doing so can permanently damage the drive.
78. FIRE ALARM INITIATING DEVICE (FAID). FAID is a requirement of ASME A17.1/B44, requirements 2.27.3.2.1 (b) and 2.27.3.2.2 (b). If ICS 2.0, provide two additional fused 120VAC 20A (15 amp in Canada) services with ground (supplied through automatic emergency lighting supply if available in building); both landed in the elevator controller. Include means to disconnect each service and lock-off in the "open" position (NFPA 70 article 620 or CEC article 38 whichever is applicable).  
NOTE: Consult your KONE representative to confirm disconnect location(s).

Fire Service Access and Occupant Evacuation Operation IBC 2018 (and later) or Designated Fire Fighter's Elevator per the NBCC

79. Elevators installed to A17.1-2019/CSA B44:19 and earlier code editions:  
Per Section 3007 of the International Building Code (IBC), Fire Service Access Elevators shall be provided with hoistway lighting. The lighting shall illuminate the entire height of the hoistway and shall be located such that it does not interfere with the operation of the elevator or reduce any clearances below applicable code requirements. Additionally, provide an enclosed 24 VDC relay (Omron G2R-1-S-DC24, or equivalent) local to the controller for interfacing hoistway lighting with elevator control system (applicable only in jurisdictions enforcing the IBC). Consult KONE representative to ensure required clearances are provided.
- Elevators (including Fire Service Access elevators) installed to A17.1-2022/CSA B44:22 and newer code editions: All hoistway lighting is provided and installed by KONE.
80. Fire service access elevators per code requirements (IBC 403.6) shall be provided with hoistway lighting per code requirements (IBC 3007). The hoistway lighting shall illuminate the entire height of the hoistway and shall be located such that it does not interfere with the operation of the elevator or reduce any clearances below applicable code requirements. Additionally, provide an enclosed 24 vdc relay (Omron G2R-1-S-DC24, or equivalent) local to the controller for interfacing hoistway lighting with elevator system (applicable only in jurisdictions enforcing the IBC, (International Building Code). Consult KONE representative to assure required clearances are provided.
81. Conductors and cables located outside of the elevator hoistway, machine space and control space, that provide normal or standby power, car lighting power, car ventilation power, car heating power, car air conditioning power, control signals, communication with the car and fire/heat-detecting systems control signals to Fire Service Access Elevators or designated Firefighter's Elevator, shall be protected by construction having a fire-resistance rating of not less than 2 hours. (APPLICABLE ONLY IN JURISDICTIONS ENFORCING THE IBC BUILDING CODE OR THE NBCC OR ANY APPLICABLE LOCAL CODES).
82. Prevent water from the operation of an automatic sprinkler system outside the enclosed lobby from infiltrating the hoistway enclosure in accordance with an approved method per section 3008.
83. Means for elevator shutdown in accordance with Section 3005 (shunt trip) shall not be installed on elevator systems used for Fire Service Access and/or Occupant Evacuation Elevators per section 3008.
84. Occupant Evacuation elevators shall be continuously monitored at the fire command center or a central control point approved by the fire department and arranged to display all of the following information per section 3008.
- Floor location of each elevator car.
  - Direction of travel of each elevator car.
  - Status of each elevator car with respect to whether it is Occupied.
  - Status of normal power to the elevator equipment, elevator machinery and electrical apparatus cooling equipment where provided, elevator machine room, control room and control space ventilation and cooling equipment.
  - Status of standby or emergency power system that provides backup power to the elevator equipment, elevator machinery and electrical cooling equipment where provided, elevator machine room, control room and control space ventilation and cooling equipment.
  - Activation of any fire alarm initiating device in any elevator lobby, elevator machine room, machine space containing a motor controller or electric driving machine, control space, control room or elevator hoistway.
  - Provide a minimum of one Elevator Guide monitor per landing for each OEO elevator group.
85. Each Fire Service and /or Occupant Evacuation elevator shall be supplied by both normal building power and Type 60/Class 2/Level 1 standby power per section 3008.
- Elevator equipment.
  - Ventilation and cooling equipment for elevator machine rooms, control rooms, machinery spaces and control spaces.
  - Elevator car lighting.
86. Standby power loads shall be based on the determination of the number of occupant evacuation elevators in Sections 3008.1.1 and 3008.8.1.
87. Wires or cables that are located outside of the elevator hoistway, machine room, control room and control space and that provide normal or standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation and fire-detecting systems to occupant evacuation elevators shall be protected using one of the following methods:
- Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than 2 hours.
  - Electrical circuit protective systems shall have a fire-resistance rating of not less than 2 hours. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
  - Construction having a fire-resistance rating of not less than 2 hours.  
Exception: Wiring and cables to control signals are not required to be protected provided that wiring and cables do not serve Phase II emergency in-car operation.



	USA	CANADA	COMMENT
W	30"	1m	NEC2020, CEC2021
D	36"	1m	NEC2020, CEC2021
C	Min 36"	Min 914mm	Minimum recommended. Consult ADA requirements for exact building clearance

- ① Since ICS control enclosure is vented into the hoistway, a fire alarm initiating device (FAID) is required in this portion of the control space.
- ② A fire alarm initiating device (FAID) is required in the lobby area for each elevator (refer to item number 2 in the illustration above) to protect the control space when ICS is open and closed.

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APPROVAL SPACE				
PROJECT: NORTHERN EDGE APARTMENTS				
BUILDING: BUILDING 1		GROUP: GROUP 2		
LOCATION:				
ENG/ARCH: LRK ARCHITECTS				
CONTRACTOR: BUCKINGHAM COMPANIES CORPORATION				
REVISIONS	UNIT			
	INFO			
	ITEM NO.	NETWORK NO.	EQUIPMENT NO.	
	2024-06-26	-	BEN	PRELIMINARY
	DATE	NO	BY	CK
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DRAWING M-7548782-10140		DESCRIPTION CONTRACT	SHEET 11 of 21	

# Advanced People Flow (APF) Attachment to Bid "B"

## Work by Others



PURCHASER TO PROVIDE THE FOLLOWING IN ACCORDANCE WITH CODE REQUIREMENTS:  
 NOTE: ALL WORK BY OTHERS IS REQUIRED TO BE COMPLETED TWO (2) WEEKS PRIOR TO THE START OF APF INSTALLATION.

**KONE Access Control (if provided)**

1. General: provide IP addresses per KONE LAN schedule. IP addresses are required for, but not limited to, KONE Group Controllers (KGC), KONE Interface Controllers (KIC), LAN Destination Operating Panels (DOP), LAN Destination Guidance Displays(DGD), and LAN InfoScreen.
2. If KONE Access 500: provide two (2) dedicated 15 amp 120 VAC fused service with ground in the control space connected to designated ACS cabinet(s) per the ACS wiring diagrams. Must include the means to disconnect this service and lock-off in the "open" position (NFPA 70 article 620.22 and 620.53 or CEC article 38.22 and 38.53).
3. If KONE Access 500: if Mobile Device feature is provided, the customer provides the site-specific configuration cards and two valid mobile credentials for testing to KONE during installation. Consult with your sales rep or bid letter.

**Turnstile Integration for KONE Destination (if provided)**

4. Provide one (1) dedicated GFCI protected 20 amp 120 VAC (15 amp in Canada) duplex outlet for People Flow Servers per the wiring diagrams.
5. KONE recommends a minimum 100 Mbit/s Ethernet for each of the following applications: Security Integrated Touchscreen/Keypad Destination Operating Panels, Monitoring System, Multimedia Equipment, and Card Readers.
6. Provide IP addresses per KONE LAN schedule. IP addresses are required for, but not limited to, KONE Group Controllers (KGC), KONE Interface Controllers (KIC), LAN Destination Operating Panels (DOP), LAN Destination Guidance Displays(DGD), and LAN InfoScreen.
7. Provide and install the required number and size conduit runs from elevator hoistways to turnstile banks. See turnstile integration specifications for site specific requirements.

**3rd Party Access Integration/Security (if provided)**

8. Our proposal includes KONE logic and provisions for the specified Touchscreen(s), Keypad Destination Operating Panel(s), Monitoring System(s), and Multimedia Equipment.
9. Card Readers and/or any additional required hardware & software for proper functionality of access control/security system(s) shall be furnished and installed by others.
10. A designated 15 amp 120 VAC circuit is required at each of the remote monitoring stations.
11. Any required interface software to ensure proper communication between KONE control system(s) and building system(s) shall be the responsibility of others.
12. KONE recommends a minimum 100 Mbit/s Ethernet for each of the following applications: Security Integrated Touchscreen/Keypad Destination Operating Panels, Monitoring System, Multimedia Equipment, and Card Readers.

**KONE Destination Dispatching (if provided)**

13. General: when KONE Destination (Destination Dispatch) is used, provide one (1) dedicated 15 amp 120 VAC used service with ground (supplied through automatic emergency lighting supply if available inbuilding) connected to each elevator signal control cabinet for shaft power. Must include the means to disconnect this service and lock-off in the "open" position (NFPA 70 article 620.22 and 620.53 or CEC article 38.22 and 38.53).
14. Provide IP addresses per KONE LAN schedule. IP addresses are required, but not limited to, KONE Group Controllers (KCEGC), KONE Interface Controllers (KIC), LAN Destination Operating Panels (DOP), LAN Destination Guidance Displays (DGD), and LAN InfoScreen.
15. Provide a VLAN with a minimum 100 MBit/s dual ethernet connections with dual RJ45 jack in each machine room/control room/control space. Consult with your sales rep or bid letter.
16. If KONE Destination 820: provide a minimum 100 MBit/s dual ethernet connections with dual RJ45 jacks between elevator groups and across hallways where machine rooms/control rooms/control spaces form the same group (minimum CAT6 up to 100m, fiber Optics if greater than 100m).
17. If KONE Destination 1020: provide one (1) additional dedicated 15 amp 120 VAC fused service with ground (supplied through automatic emergency lighting supply if available in building) connected to each elevator signal control cabinet that has a LAN riser to power Core and Shaft LAN Switches. Must include the means to disconnect this service and lock-off in the "open" position (NFPA 70 article 620.22 and 620.53 or CEC article 38.22 and 38.53).
18. If KONE Destination 1020: provide one (1) additional dedicated 15 amp 120 VAC fused service with ground (supplied through automatic emergency lighting supply if available in building) to power the Site Controller and Edge Router modules. Must include the means to disconnect this service and lock-off in the "open" position.
19. If KONE Destination 1020: provide a dedicated OM3 optical fiber link with SC connectors and terminated into a patch panel to integrate machine rooms.
20. If KONE Destination 1020: if Elevator Guide (EG) display is provided; provide a Full HD TV with HDMI v1.4 interface and a minimum size of 24". Provide a 120 VAC power outlet at the location of the EG display to provide power to the TV and proper HDMI cables to connect the HDMI output provided by KONE into the HDMI input of the provided TV. If the EG display is located 30 ft (10 m) or farther from the elevator shaft, proper HDMI signal extension means shall be provided.

**E-Link (if provided)**

21. A designated 15 amp 120 VAC circuit is required at each of the remote monitoring stations.
22. KONE recommends a minimum 100 Mbit/s Ethernet for each of the following applications: Security Integrated Touchscreen/Keypad Destination Operating Panels, Monitoring System, Multimedia Equipment, and Card Readers.
23. Provide IP addresses per KONE LAN schedule. IP addresses are required, but not limited to, KONE Group Controllers (KGC), KONE Interface Controllers (KIC), LAN Destination Operating Panels (DOP), LAN Destination Guidance Displays (DGD), and LAN InfoScreen.

**BACnet additional requirements (if provided):**

- a. Provide all E-Link features required.
- b. Provide BACnet Device IDs for Devices.
- c. Provide BACnet Revision Level requested for the site (PR-18 supported or not).

**KONE Remote Call (if provided)**

25. Provide one (1) dedicated GFCI protected 20 amp 120 VAC - amp duplex (15 amp in Canada) outlet per the Remote Call wiring diagrams.
26. KONE recommends a minimum 100 Mbit/s Ethernet for each of the following applications: Security Integrated Touchscreen/Keypad Destination Operating Panels, Monitoring System, Multimedia Equipment, and Card Readers.
27. Provide one (1) public IP v4 address that can be accessed via the Internet.
28. Provide IP addresses per KONE LAN schedule. IP addresses are required, but not limited to, KONE Group Controllers (KGC), KONE Interface Controllers (KIC), LAN Destination Operating Panels (DOP), LAN.

**InfoScreen (if provided)**

29. If InfoScreen is offline, none of the below is applicable. Provide one (1) RJ45 CAT6 jack and network switch in each elevator machine room/control space that has an InfoScreen server. This jack is wired to a building LAN network with internet access. In the machine room/control space, pipe and wire CAT6 cable from the switch to the InfoScreen Server Box.
30. Provide one (1) IP address for each InfoScreen server.
31. Provide another RJ45 CAT6 jack and VLAN configuration to the next elevator machine room/control space that has elevators with InfoScreens. This is to connect two Group Connection Boxes from two elevator machine rooms/control space.
32. Provide a dedicated 15 amp 115 VAC fused disconnect with ground PE per machine room/control space piped and wired to the first InfoScreen Group Connection Box
33. If InfoScreen TV Streaming Video is to be used, the equipment and converters will be located in a building building IT room as shown in the wiring diagram. Provide another RJ45 CAT6 jack and VLAN configuration in InfoScreen IP network range for Video Encoder Board in the machine room/control space that has the last Group Connection Box. Provide a Cable TV Box as needed, or other device that will stream composite video output.

**Elevator Variable Message Display (If provided)**

34. An outlet marked as, "elevator equipment only" must be provided at each display location. The outlets may be powered by a separate breaker but must share the same power source as the elevator. Amperage requirements for the outlets shall be calculated based on the requirements of the monitors provided by others.

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APPROVAL SPACE			
PROJECT: NORTHERN EDGE APARTMENTS			
BUILDING: BUILDING 1	GROUP: GROUP 2		
LOCATION:			
ENG/ARCH: LRK ARCHITECTS			
CONTRACTOR: BUCKINGHAM COMPANIES CORPORATION			
UNIT INFO REVISIONS	ITEM NO.	NETWORK NO.	EQUIPMENT NO.
2024-06-26	-	BEN	PRELIMINARY
DATE	NO	BY	CK DESCRIPTION
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UNITS: IMPERIAL	1-23.2	-	
DRAWING M-7548782-10140	DESCRIPTION CONTRACT	SHEET 12 of 21	

## SECTION 149182 - TRASH CHUTES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Waste and rubbish chutes.

#### 1.2 DEFINITIONS

- A. Access Door: Door other than an intake or discharge door that penetrates the chase wall for service access to devices in the chase.
- B. Chase: The shaft that encloses a chute.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include diagrams for power, signal and control wiring.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chute.
- B. Field quality control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 TRASH CHUTES

- A. Basis of Design: CHUTES International Manufacturing, Internal trash chute.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing and inspecting agency, for fire-protection ratings indicated.
  - 1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
  - 2. Intake Doors: Labeled, 1-1/2-hour fire-resistance rated.
  - 3. Access Doors: Labeled, Labeled, 1-1/2-hour fire-resistance rated.
- C. Discharge-Door Assemblies: Fire-resistive door construction according to NFPA 252 or UL 10B requirements for fire-rated door assemblies.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Standard: Provide chutes complying with NFPA 82.

2.3 WASTE CHUTES

- A. Chute Metal: Aluminum-coated, cold-rolled, commercial steel sheet; ASTM A463/A463M, Type 1, with not less than T1-40 (T1M-120) coating.
  - 1. Thickness: 16 gauge
- B. Chute Size: 30" diameter.

2.4 WASTE CHUTE DOORS

- A. Intake-Door Assemblies: ASTM A240/A240M, Type 304, stainless steel self-closing units with positive latch and latch handle, with stainless steel trim; constructed as required for

performance requirements indicated; and with frame suitable for the enclosing chase construction.

1. Door Type: Hopper.
  2. Size: Manufacturer's standard size for door type, chute type, and diameter indicated.
  3. Finish: Manufacturer's standard satin or ASTM A480/A480M No. 3 directional polish.
  4. Handles and Locks: ADA compliant lever handle, cylinder locks with 2 keys. All locks keyed alike.
  5. Accessible Automatic Door Operating System: Manufacturer's standard system complying with applicable provisions of the cited accessibility standard.
  6. Mechanical Interlocks: Interlock system for system servicing, operated from discharge door to automatically lock intake doors.
  7. Electrical Interlocks: Interlock system that is energized by opening one intake door; remaining intake doors automatically lock when system is energized.
  8. Baffles: Rubber backdraft baffles at each intake.
- B. Discharge-Door Assemblies: Aluminum-coated steel; accordion type, inclined, and horizontally closing and latching; constructed as required for performance requirements indicated; and equipped with 165 deg F fusible links that cause doors to close in the event of fire.
- C. Detector System: Heat and smoke detecting interlock system with temperature-rise elements that locks chute doors when temperature in chute reaches a predetermined, adjustable temperature.
- D. Access Door Assembly: Stainless steel front and back, noiseless, self-closing with positive latch and ADA compliant lever handle; as required to provide fire-protection and temperature rise ratings indicated. And with corrosion-resistant, industrial grade enamel painted steel frame suitable for enclosing chase construction; and in No. 3 finish.
- E. Manual Control System: Control system with manual switches that lock chute doors during shutdown hours and service operations.

## 2.5 ACCESSORIES

- A. Chute Fire Sprinklers: NFPA 13; manufacturer's standard, recessed, automatic, NPS 1/2 (DN 13) sprinklers; ready for piping connections.
- B. Flushing Spray Unit: NPS 3/4 (DN 19) spray-head unit located in chute above highest intake door, ready for hot-water piping connection, and with access door for spray-head and piping maintenance.

## 2.6 FABRICATION

- A. Factory-assemble chutes to greatest extent practicable.



- B. Roof Vent: Extend vent to height above roofing surface as indicated on Drawings. Equip vent with full insect screening and metal explosion-release cap. Fabricate with roof-deck flange, counterflashing, and clamping ring of nonferrous metal compatible with chute metal.
- C. Chute Fire Sprinklers: Install internally within chute, recessed out of the chute area through which material travels, and according to NFPA 13.
- D. Equipment Access: Fabricate chutes with access for maintaining equipment located within the chute, such as flushing units, fire sprinklers, and plumbing and electrical connections.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install and test chutes before installing enclosing chase construction.
- B. Install chutes according to NFPA 82 and manufacturer's written instructions.
- C. Install chutes plumb, without obstructions that might prevent materials from free falling within chutes.
- D. Anchor flanges of chute vents to roof curbs before installing roofing and flashing. Install chute-vent counterflashing after roofing and roof-penetration flashing are installed.
- E. Electrical Interlock System: Install according to applicable NECA 1 recommendations.
- F. Test and adjust chute components after installation. Operate doors, locks, and interlock systems to demonstrate that hardware operates properly and smoothly and electrical wiring is connected correctly.
- G. Test heat and smoke sensing devices for proper operation.

#### 3.2 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain each chute and related equipment.

END OF SECTION 149182

## SECTION 31 00 00 – CONTROL OF SITE WORK

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. All division 31, 32, and 33 specification sections.
- B. Permitting.

#### 1.2 VERIFY EXISTING CONDITIONS:

- A. Contractor shall study the site survey, site demolition drawing, and have the Utility Locator Service mark existing underground utilities prior to construction operations. The Contractor shall locate private utilities. If existing conditions are different than reflected in the site drawings, notify the Owner's Agent for further instruction, and do not proceed with operations until written direction is given. Do not disconnect any utilities until approved by both the property and utility Owner.

#### 1.3 OPERATION OF ADJACENT FACILITIES:

- A. Contractor shall maintain operation of adjacent facilities, including pedestrian and vehicular traffic circulation on neighboring properties and roadways. Any required closures shall be coordinated and approved by all adjacent property Owners in writing, including authorities of jurisdiction, prior to commencing construction operations. Provide an alternate route that meets the Americans With Disabilities Act (ADA) requirements.

#### 1.4 PROTECT EXISTING STRUCTURES AND UTILITIES:

- A. Protect and maintain the provided benchmarks and survey control points from disturbance during construction. Replacement of any control that is disturbed by construction activities shall be by a Registered Land Surveyor at the Contractor's expense.
- B. Contractor to repair damaged field tile as a result of construction operations.
- C. Locate and clearly flag trees and plantings that are identified to remain or to be relocated. Place construction fencing around trees and plantings to remain at the dripline to protect the root system.
- D. Contractor shall restore any items damaged by construction operations including but not limited to: sidewalks, driveways, roadways, lawns, utilities, walls, and building structures, at no additional expense to the Owner.

- E. All construction traffic on roadways and driveways shall be limited to legal weights and measures.

1.5 EROSION CONTROL:

- A. Any erosion of soils or dust generated from construction activities shall be controlled in a manner that will not adversely impact the adjacent properties and roadways. See the erosion control specification for further requirements.
- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
- C. Stockpile soil materials to be re-used in an area designated by the Owner. Grade all piles to provide positive drainage of storm water. Provide temporary seeding according to the site drawings to stabilize sloped surfaces from erosion. Excess satisfactory and all unsatisfactory soil material shall be removed off site and legally disposed of.
- D. All disturbed areas shall be fine graded, and broadcast seeded. Slopes greater than 4:1 shall have erosion control fabric placed as part of the seeding and restoration process.

1.6 PERMITTING:

- A. Contractor shall review and understand any conditions or special provisions of the Improvement Location Permit with the City Planning Office. The contractor is responsible for all requirements of the permit.
- B. Contractor shall comply with any conditions or special provisions of the Sanitary Sewer Permit through the Indiana Department of Environmental Management.
- C. Contractor shall be responsible to pay all permit fees, connection fees, testing fees, and inspection fees required to perform work.

1.7 RECORD DRAWINGS:

- A. Record Drawings: Contractor shall provide a set of record drawings (certified by a Land Surveyor in the State of Indiana) to the owner. Include size, material, depth of cover, location, and elevation of all improvements within the contract documents. Include details of underground structures and connections. Identify any items that deviate from the contract documents including but not limited to: underground utilities, finish grades, substitutions if approved, detail modification, etc.

END OF SECTION 31 00 00

## SECTION 31 10 00 - SITE DEMOLITION

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Removal of trees and plantings.
- B. Demolition of underground utilities.
- C. Protection of existing structures.
- D. Demolition of site structures not classified as a building.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Site Earthwork specification for excavation, backfill, and compaction requirements.
- B. Control of Site Work Specification.

#### 1.3 RECORD OF EXISTING CONDITIONS:

- A. Provide photographs or videotape to sufficiently detail the existing condition of trees, plantings, adjoining construction, existing roadways, and existing structures that are indicated to remain.

#### 1.4 CONTROL OF WORK:

- A. The Contractor shall record all utilities encountered during the clearing and demolition operations. Any additional expense related to uncovering and locating un-marked utility services, or buried drain tile known by the contractor prior to the completion of work, will be the contractor's expense.

#### 1.5 TREE PROTECTION:

- A. Protect trees identified to remain from damage during construction. Damaged trees will be repaired or replaced as determined by the Owner's arborist at the Contractor's expense.
- B. Provide and install a temporary construction fence around trees and plantings identified to remain. Do not store materials, construction equipment or drive vehicles within the barricaded area. Remove the temporary fence when construction is complete.

1.6 PROTECTION OF EXISTING STRUCTURES AND UTILITIES:

- A. Protect existing utilities and building structures not identified to be removed from damage during construction. Damaged utilities will be repaired or replaced at the Contractor's expense.

PART 2 - REMOVALS

2.1 SANITARY SEWER SYSTEM:

- A. Empty existing sewer piping and structures of sewage prior to commencing abandonment operations. All sewage shall be collected, transported, and disposed of by a contractor licensed to do the work. Provide bypass pumping as necessary to maintain existing services to adjacent property owners.
- B. Piping removal: Excavate and completely remove piping as identified on the plans. All removed utilities under parking areas or building foundations and slabs shall be backfilled with #53/#73 crushed limestone.
- C. Pipe abandonment: Existing sewer piping that will not interfere with proposed improvements as shown on the drawings may be abandoned in place by completely filling with flowable concrete fill. Any existing piping that lies within the influence of proposed building foundations, including floor slabs, must be removed.
- D. Structure removal: Excavate and remove structure, close open ends of remaining piping, and backfill to subgrade elevations. See the earthwork specification for filling requirements.

2.2 STORM DRAINAGE SYSTEM

- A. Piping removal: Excavate and completely remove piping as identified on the plans. All removed utilities under parking areas or building foundations and slabs shall be backfilled with #53/#73 crushed limestone.
- B. Pipe abandonment: Existing sewer piping that will not interfere with proposed improvements as shown on the drawings may be abandoned in place by completely filling with flowable concrete fill. Any existing piping that lies within the influence of proposed building foundations, including floor slabs, must be removed.
- C. Structure removal: Excavate and remove structure, close open ends of remaining piping, and backfill to subgrade elevations. See the earthwork specification for filling requirements.

2.3 WATER DISTRIBUTION SYSTEM

- A. Coordinate shut down of water utility with the utility company and building owner. Assure that all sections of piping identified to be removed are fully isolated from the distribution system

prior to demolition operations. Assure protection of the domestic water supply from all contaminants.

- B. Piping removal: Excavate and completely remove piping as identified on the plans. All removed utilities under parking areas or building foundations and slabs shall be backfilled with #53/#73 crushed limestone.
- C. Pipe abandonment: Existing water piping that will not interfere with proposed improvements as shown on the drawings may be abandoned in place by completely filling with flowable concrete fill. Any existing piping that lies within the influence of proposed building foundations, including floor slabs, must be removed. If abandoned water piping is considered rigid and not within the influence of proposed improvements the ends may be plugged with a watertight fitting in lieu of completely filling with flowable concrete fill.
- D. Structure removal: Completely remove all hydrants, valves, and miscellaneous appurtenance.

#### 2.4 PAVEMENT REMOVAL:

- A. Remove concrete slabs, paving, curbs, gutters, and aggregate base as indicated. Saw-cut the existing pavement indicated to remain full depth before removal operations to provide a clean line of separation.

#### 2.5 HAZARDOUS MATERIALS:

- A. Although no hazardous materials are suspected within the project boundary, the Contractor shall immediately report any suspected hazardous materials encountered during demolition operations to the Owner's Agent. Hazardous waste removal and disposal will be performed by a licensed contractor to do the work outside the scope of this section.

#### 2.6 DISPOSAL:

- A. All cleared materials shall become the Contractor's property, except for materials indicated to be salvaged for the Owner. Store and protect all salvaged items in the area identified by the Owner's Agent. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Owner's property.

END OF SECTION 31 10 00

SECTION 31 20 00 - SITE EARTHWORK

PART 1 - GENERAL

1.1 WORK INCLUDES:

- A. Site earthwork as shown on the Site Plans within the project limits.
- B. Excavation and Backfill for site utilities.

1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Terms and conditions of construction as required by the Contractor's permit with the controlling agency. When conditions of the permit conflict with proposed work, the contractor shall notify the Engineer for correction prior to installation. Any non-compliant work performed by the Contractor shall be at the Contractor's expense.
- B. Site Demolition specification for removals and topsoil stripping.
- C. Control of Site Work Specification.

1.3 UNKNOWN CONDITIONS (change to contract):

- A. Rock: Material 1 cy and larger that exceeds a standard penetration resistance of 100 blows/2 inches. Notify the Owner's Agent if any rock is encountered. Removal of material will be considered a change to the contract. Work shall not commence until instructed by the Owner's Agent.
- B. Unsuitable subgrade: Notify the Owner's Agent if any unsuitable subgrade is encountered. Stabilization of subgrade material above and beyond as stated in part two of this section, will be considered a change to the contract beyond the work covered in this specification. Work shall not commence until instructed by the Owner's Agent.

1.4 TESTING:

- A. Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. See Part II of this specification for testing requirements.

1.5 FINISH GRADING:

- A. Final grades shall direct storm water to all collection points and meet the intent of the storm water management plan as identified in the site drawings. Establish grades to within required

tolerances. Fill any settled areas as required to meet the specifications within the one year warranty period. Final grade is defined as the elevation of the final surface, including any mulching material in landscaping beds, applied rubberized surfaces, etc.

1.6 EARTHWORK BALANCE:

- A. No guarantee is made that the site grading plan provides a balanced site condition. The contractor shall import or export soil materials from site as required to meet the conditions of the construction documents.

1.7 PROTECTION OF EXPOSED GRADE:

- A. Protect exposed layers against freezing temperatures, frost, rain, accumulated water, and construction activities, including any open excavations and utility trenches. Reconstruction of damaged layers will be corrected by the contractor according to this specification at no additional cost to the Owner, including areas previously approved by the Geotechnical Engineer.

PART 2 - INSTALLATION

2.1 PREPARATION OF SUBGRADE:

- A. Soil surface immediately below proposed fills (after stripping topsoil) and bottom of proposed excavations (in cut areas).
- B. See the site demolition specification for site clearing requirements.
- C. Notify Geotechnical Engineer when excavations have reached the required subgrade elevations for approval prior to continuing with backfill and fill operations. The contractor shall proof roll the existing subgrade that is not wet or saturated with heavy pneumatic-tired equipment of not less than 10 ton rated weight and identify any soft pockets or areas of excessive yielding. The contractor shall re-work the existing subgrade material to the depth and moisture content as recommended in the soil report. The subgrade will not be approved until both minimum compaction and optimum moisture content is achieved.

2.2 SUBGRADE STABILIZATION (change to contract):

- A. Any stabilization measures must be authorized by the owner and approved by the Geotechnical Engineer prior to operations, or all work shall be at the contractor's risk. No payment will be made for unauthorized work.
- B. If the Geotechnical Engineer determines that unsatisfactory soils are present, continue the excavation and replace with compacted backfill or fill material as directed and after the Owner approves. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work. Any stabilization measures must be authorized by



the owner and approved by the geotechnical engineer prior to operations, or all work shall be at the contractor's risk. No payment will be made for unauthorized work.

### 2.3 BACKFILL AND FILL:

- A. Soil materials used to fill an excavation or raise existing grades.
- B. Subgrade Backfill and Fill: Do not place backfill or fill material on surfaces that are muddy, frozen, wet, or contain frost or ice. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- C. Foundation and Slab Backfill and Fill: Do not place backfill or fill material on surfaces that are muddy, frozen, wet, or contain frost or ice. Place backfill and fill materials in layers not more than 6 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. The Geotechnical Engineer shall test each lift for compliance with the specifications prior to continuing with backfill and fill operations. Each fill and backfill layer will not be approved until both minimum compaction, and optimum moisture content is achieved.
- E. Moisture content: Each fill and backfill layer shall be within 2% of the materials optimum moisture content.
- F. Standard Fill Material: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, CL, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and trash.
- G. Unsuitable Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CH, OL, OH, and PT, or a combination of these group symbols, and standard fill material not maintained within 2 percent of optimum moisture content at time of compaction.
- H. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- I. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.
- J. Amended Topsoil: Topsoil shall be fertile soil capable of sustaining vigorous plant growth, taken from a well drained site. Contractor to amend topsoil onsite to meet the following requirement. It should be free of subsoil, clay or impurities such as plants, weeds, and roots. It should have a minimum ph value of 5.5 and maximum of 7.4.

2.4 PAVEMENTS AND SITE SLABS ON GRADE:

- A. Subgrade: scarify and compact the top 12 inches of existing subgrade, and each following lift of fill or base material to 95 percent of maximum dry unit weight according to ASTM D 1557 (modified proctor). Establish grades to within 1" of proposed.
- B. Fill Material: Place and compact each lift with standard fill material to the bottom of the aggregate base layer.
- C. Aggregate Base: See site drawings for material.
- D. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per 500 sf.

2.5 WALKWAYS:

- A. Subgrade: scarify and compact the top 12 inches of existing subgrade, and each following lift of fill or base material to 95 percent of maximum dry unit weight according to ASTM D 1557 (modified proctor). Establish grades to within 1" of proposed.
- B. Fill Material: Place and compact each lift with standard fill material to the bottom of the aggregate base layer.
- C. Aggregate Base: See site drawings for material.
- D. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per 50 lf.

2.6 BUILDING STRUCTURES:

- A. Buildings, floor slabs, foundations, retaining walls, tanks, or other stationary features.
- B. Subgrade: scarify and compact the top 12 inches of existing subgrade, and each following lift of fill or base material to 98 percent of maximum dry unit weight according to ASTM D 1557 (modified proctor). Establish grades to within 1" of proposed.
- C. Subgrade Fill Material: Place and compact each lift with standard fill material, unless noted otherwise on drawings, to subgrade elevations directly beneath the bottom of the aggregate base layer.
- D. Foundation Wall Backfill: Engineered Fill material unless noted otherwise on the building construction drawings.
- E. Floor Slab Aggregate Base: See building plans for material.
- F. Fill unauthorized excavation under structures by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Engineer.

- G. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per 500 sf of building slab, one test per 50 lf of foundations, one test per column footing.

2.7 LANDSCAPING BEDS:

- A. Subgrade: scarify and compact the top 12 inches of existing subgrade, and each following lift of fill or base material to 90 percent of maximum dry unit weight according to ASTM D 1557 (modified proctor). Establish grades to within 1" of proposed.
- B. Fill Material: Place and compact each lift with standard fill material to the bottom of the topsoil layer. Unsuitable soil materials may be used as fill when approved by the Geotechnical Engineer and the Landscape Architect.
- C. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per 1000 sf.
- D. Final Grade: Establish grades to within 1" of proposed.
- E. Contractor shall repair any settled areas to meet project specifications within the warranty period.
- F. Amended topsoil shall be used in landscaping areas.

2.8 UTILITY TRENCH EXCAVATION AND BACKFILL:

- A. Notify Geotechnical Engineer when excavations have reached the required bottom of trench elevation prior to continuing with backfill and fill operations. If the Geotechnical Engineer determines that unsatisfactory soils are present, the Engineer will instruct the contractor on corrective measures. Additional work required to correct and stabilize the existing subgrade will be paid for according to Contract provisions for changes in the Work.
- B. Fill material required to re-establish the trench bottom due to over-excavation of the utility trench will be bedding material and placed by the contractor at no additional cost to the Owner.
- C. Place and shape the pipe bedding material as shown on the site drawings to provide continuous support for the conduit. Place and compact the initial backfill to a height of 12 inches over the utility pipe. Carefully compact backfill material under the pipe haunches and bring up evenly on both sides.
- D. Backfill material: See site drawings.
- E. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per 100 lf per lift.

2.9 DRAINAGE STRUCTURE EXCAVATION AND BACKFILL:

- A. Notify Geotechnical Engineer when excavations have reached the required the bottom of trench elevation prior to continuing with backfill and fill operations. If the Geotechnical Engineer determines that unsatisfactory soils are present, the Engineer will instruct the contractor on corrective measures. Additional work required to correct and stabilized the existing subgrade will be paid for according to Contract provisions for changes in the Work.
- B. Fill material required to re-establish the bottom of excavation due to over-excavation of the utility trench will be bedding material and placed by the contractor at no additional cost to the Owner.
- C. Place and compact a 6" minimum depth foundation of Class I or Class II special fill material according to ASTM D2321. After placement of structure and connection of sewer piping, continue special fill to a minimum of 12" above sewer piping in lawn areas, and to subgrade elevation in paved areas or within the influence of building foundations or site slabs on grade.
- D. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per structure.

END OF SECTION 31 20 00

## SECTION 316613 - HELICAL PILES

### 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 work pertains to furnishing and installing Helical Piles and Bracket Assemblies shown in the Contract in accordance with the Drawings and this specification. Each Helical Pile shall be installed at the location and to the elevation, minimum length (if noted on Drawings or in Geotechnical Report), installation torque, and allowable capacities shown on the Plans or as established.

#### 1.3 DEFINITIONS

- A. Helical Pile: Manufactured steel foundation with one or more helical bearing plates that is rotated into the ground to support structures.
- B. Inspector: Registered geotechnical engineer retained by Owner or General Contractor to verify Helical Pile quality assurance with the Contract, the Drawings, and this specification.
- C. Allowable Bearing Capacity: Ultimate bearing capacity of the bearing stratum divided by a factor of safety.
- D. Lead Section: The first section of a Helical Pile to enter the ground. Lead Sections consist of a central shaft with a tapered end and one or more helical bearing plates affixed to the shaft.
- E. Extension Section: Helical Pile sections that follow the Lead Section into the ground and extend the Helical Lead to the appropriate depth. Extension Sections consist of a central shaft and may have helical bearing plates affixed to the shaft.
- F. Brackets: Cap plate, angle, thread bar, or other termination device that is bolted or welded to the end of a Helical Pile after completion of installation to facilitate attachment to structures or embedment in cast-in-place concrete.
- G. Augering: Rotation of the shaft with little or no advancement. It can occur when the helical bearing plates pass from a relatively soft material into a comparatively hard material. Augering can also result from insufficient crowd or downward pressure

during installation. In some cases, augering may be (temporarily) necessary in order to grind through an obstruction.

- H. Pile Design Professional: Individual or firm responsible for the design of Helical Piles and Brackets.

#### 1.4 QUALIFICATIONS

- A. Due to the special requirements for manufacture and quality control of Helical Piles and Brackets, all Helical Piles and Brackets shall be obtained from a company specializing in the manufacturing and distribution of these products. Manufacturer qualifications for this project shall be submitted to the Engineer for review. The submittal shall include:

1. A product catalog and all necessary technical data sufficient to qualify the proposed product substitution.
2. Evidence showing manufacturer has at least five years experience in the design and manufacture of Helical Piles.
3. Current ICC-ES product evaluation report or complete description of product testing and engineering calculations used to assess product capacity.

- B. Due to the special requirements for installation of Helical Piles and Brackets, all Helical Piles and Brackets shall be installed by an organization specializing in the installation of those products. Any Contractor desiring to bid as the Helical Pile installer for this project shall submit a request to the Engineer for review. The request must include:

1. Evidence the Contractor has completed training in the proper methods of installation of Helical Piles and the mounting of Brackets.
2. A recent company brochure indicating experience in this type of work.
3. Evidence of having installed Helical Piles on at least five projects with helical piles similar to those shown on Drawings, including project name, number and type of Helical Piles, project location, and client contact information.
4. Resume of Contractor's foreman including experience in the oversight of Helical Pile installation on at least three projects in the last three years with helical piles similar to those shown on Drawings, including project name, number and type of Helical Piles installed, project location, and client contact information.
5. List of installation and testing equipment and detailed description of proposed method of installation and load testing Helical Piles (if testing is required).
6. Current ANSI/AWS welding certificate and documentation of welder experience within the last 5 years (if welding is required).

- C. Due to the special requirements for design of Helical Piles and Brackets, all Helical Piles and Brackets shall be designed by a licensed design professional specialized in the engineering and design of Helical Piles. Pile Design Professional's qualifications shall be submitted to the Engineer for review. The submittal shall include:

1. The curriculum vitae of the designated Pile Design Professional indicating at least five years experience in this type of work.
2. Evidence of Pile Design Professional having designed Helical Piles on at least five projects with helical piles similar to those shown on Drawings, including project name, number and type of Helical Piles, project location, and client contact information.
3. Professional errors and omissions liability insurance certificate.
4. Evidence of current license to practice engineering in the project state.

#### 1.5 SUBMITTALS

- A. Contractor shall prepare and submit to the Engineer for review and approval, Signed and sealed Shop Drawings and specifications for the Helical Piles intended for use on the project at least 14 calendar days prior to planned start of installation. The Shop Drawings shall include the following:
1. Helical Pile product identification number(s) and designation(s)
  2. Maximum allowable mechanical compression and tensile strength of the Helical Piles
  3. Number of Helical Piles and respective design allowable capacities from the Drawings
  4. Planned installation depth and the number of lead and extension sections
  5. Preliminary helical configuration (number and diameter of helical bearing plates)
  6. Manufacturer's recommended capacity to installation torque ratio
  7. Minimum final installation torque(s)
  8. Product identification numbers and designations for all Bracket Assemblies and number and size of connection bolts or concrete reinforcing steel detail
  9. Corrosion protection coating on Helical Piles and Bracket Assemblies
- B. Contractor's Pile Design Professional shall submit to the Engineer signed and sealed design calculations for the Helical Piles and Brackets intended for use on the project at least 14 calendar days prior to planned start of installation. The calculations shall include the following:
1. Reduction in shaft dimension and strength by the sacrificial thickness anticipated based on corrosion loss over the design life for project soil conditions.
  2. Considerations for downdrag, buckling, and expansive soils (as appropriate).
  3. Minimum installation depth to reach bearing stratum and to achieve pullout capacity (if required).
  4. Soil bearing and pullout capacity.
  5. Lateral resistance of the shaft (if required).
  6. Estimated pile head movement at design loads.
  7. All components of the pile system including helicals, shafts, couplers, and pile cap / bracket assemblies.

- C. Contractor shall submit to the Engineer calibration information certified by an independent testing agency for the torque measurement device and all load testing and monitoring equipment to be used on the project. Calibration information shall have been tested within the last year of the date submitted. Calibration information shall include, but is not limited to, the name of the testing agency, identification number or serial number of device calibrated, and the date of calibration.
- D. Manufacturer shall provide a one year warranty against manufacturing defects on Helical Pile and Bracket products. Any additional warranty provided by the Contractor shall be issued as an addendum to this specification.
- E. Work shall not begin until all the submittals have been received and reviewed by the Engineer. The Contractor shall allow the Engineer a reasonable number of days to review, comment, and return the submittal package after a complete set has been received. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

#### 1.6 SHIPPING, STORAGE, AND HANDLING

- A. All Helical Pile and Bracket Assemblies shall be free of structural defects and protected from damage. Store Helical Piles and Bracket Assemblies on wood pallets or supports to keep from contacting the ground. Damage to materials shall be cause for rejection.

### PART 2 - PRODUCTS

#### 2.1 HELICAL PILES AND BRACKETS

- A. Unless noted otherwise, it is the Contractor's Pile Design Professional's responsibility to select the appropriate size and type of Helical Piles and Brackets to support the design loads shown on the Drawings. These specifications and the Drawings provide minimum requirements to aid the Contractor in making appropriate materials selections. The size and number of helical bearing plates must be such that the Helical Piles achieve the appropriate torque and capacity in the soils at the site within the minimum and maximum length requirements (if any). Failure to achieve proper torque and capacity shall result in Contractor replacing Helical Piles as appropriate to support the required loads. All material replacements shall be acceptable to Engineer.
- B. The design strength of the helical bearing plates, shaft connections, Brackets, and the pile shaft itself shall be sufficient to support the design loads specified on the Drawings times appropriate service load factors. Designs shall meet requirements of the Building Code noted on the Drawings and ASTM specifications.
- C. All structural steel pile components shall be designed within the limits provided by the American Institute of Steel Construction (AISC) Specification for Structural Steel Buildings (AISC-360). Either Allowable Stress Design (ASD) or Load and Resistance



Factor Design (LRFD) are acceptable methods of analysis. Product testing in accordance with ICC-ES Acceptance Criteria 358 may also be considered as an acceptable means of establishing system capacities.

- D. Except where noted otherwise on the project Plans, each pile shall be designed to meet a corrosion service life of 50 years in accordance with ICC-ES AC358.
- E. The pile design shall take into account group efficiency from pile spacing, pile buckling potential, soil stratification, and strain compatibility issues.
- F. All Helical Piles shall be installed to the following criteria.
  - 1. Minimum Factors of Safety (unless noted otherwise):
    - a. A minimum factor of safety of 2.0 shall be used to determine the required ultimate capacity of the helical piles with regard to their interaction with soil and bedrock.
    - b. The ratio of required ultimate helical pile capacity to the total area of the helical blades shall not exceed the ultimate subsurface material bearing capacity provided by the geotechnical engineer.
    - c. A minimum factor of safety of 1.5 shall be used for all mechanical strengths.
    - d. A minimum factor of safety of 1.5 shall be used for the connection between the helical foundation and the structure.
  - 2. Central Shaft: The central shaft shall consist of a high strength structural steel tube meeting the requirements of ASTM A513. The central shafts are required to resist bending moments due to buckling.
  - 3. Helical Bearing Plates: One or more helical bearing plates shall be affixed to the central shaft. Helical bearing plates shall be attached to central shafts via fillet welds continuous on top and bottom and around the leading edges. Helical bearing plates shall be cold pressed into a near perfect helical shape that when affixed to the central shaft are perpendicular with the central shaft, of uniform pitch, and such that the leading and trailing edges are within 3/8 inch of parallel. Average helical pitch shall be within plus or minus 1/4 inch of the thickness of the helical bearing plate plus 3 inches.
  - 4. Corrosion Protection: Helical Piles and Brackets shall be hot-dip galvanized (per ASTM A123 or A153 as applicable).
  - 5. Shaft Connections: The Helical Pile shaft connections shall consist of an external sleeve connection or a welded connection. External sleeve connections shall be in-line, straight and rigid and shall have a maximum tolerable slack of 1/16-inch. Welded connections shall consist of a full penetration groove weld all-around the central shaft. Shaft connections shall have a flexural strength at least as great as the shaft itself.
  - 6. Bolts: Bolt holes through the external sleeve and central shaft shall have a diameter that is 1/16th inch greater than the bolt diameter. Bolts and nuts used to join Helical Pile sections at the shaft connections shall be zinc coated. All Helical Pile bolts shall be securely snug tightened.
  - 7. Plug Welds: Alternatively, external sleeve connections may be made using plug welds matching the diameter and number of bolt holes.

8. External sleeve: External sleeve Helical Pile shaft connections shall consist of a high strength structural steel tube outer sleeve meeting the requirements of ASTM A513. The outer sleeve shall be welded to the central shaft via a continuous fillet weld all-around. The fillet weld shall have a throat thickness equal to the external sleeve tube thickness.
  
- G. Helical Piles shall be fitted with a manufactured Bracket that facilitates connection to the structure. Brackets shall be rated for the design loads shown on the Drawings. Brackets shall be affixed to the end of Helical Piles via bolts, plug welds, or continuous penetration welds meeting the requirements for shaft connections given previously in these specifications.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Contractor shall take reasonable effort to locate all utilities and structures above and underground in the area of the Work, including contacting the Owner to coordinate private utility locations that may not be marked by a public utility location request. Contractor is responsible for protection of utilities and structures shown on the Drawings. Costs of avoiding, relocating, or repair of utilities not shown on Drawings shall be paid by Owner as extra work.
  
- B. Contractor shall review Drawings and soil borings in the Contract Documents to determine subsurface conditions for sizing and installation of Helical Piles. In addition, Contractor shall make a site visit to observe conditions prior to the start of Work.
  
- C. Contractor shall notify Engineer of any condition that would affect proper installation of Helical Piles immediately after the condition is revealed. Contractor shall halt installation work until the matter can be resolved upon mutual satisfaction of Contractor, Owner, and Engineer. Costs associated with construction delays, product substitutions, pile relocations, or other related costs shall be the responsibility of the Owner if the result of an unforeseen condition that could not be inferred by a reasonable Contractor from the Drawings and Construction Documents.
  
- D. If the number and size of helical bearing plates required for the project is not shown on Drawings, the Contractor shall have the option of performing subsurface tests using methods subject to the review and acceptance of the Owner. The data collected along with other information pertinent to the project site shall be used to determine the required helical bearing plate configuration.
  
- E. If excavation is required for proper installation of Helical Piles, Contractor shall make safe excavations in accordance with OSHA standards. All excavations greater than 20 feet in depth or not in strict accordance with OSHA standard details shall be designed by a registered design professional specializing in the design of excavations and shoring. The costs of all excavations, shoring, and related design shall be born by the Contractor unless noted otherwise in the Contract.

- F. Contractor shall notify the Inspector at least 24 hours prior to installation of Helical Piles to schedule quality assurance observations required on the Drawings or in the Specifications.

### 3.2 INSTALLATION EQUIPMENT

- A. Torque Motor: Helical Piles should be installed with high torque, low RPM torque motors, which allow the helical plates to advance with minimal soil disturbance. The torque motor shall be hydraulic power driven with clockwise and counter-clockwise rotation capability. The torque motor shall be adjustable with respect to revolutions per minute during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity equal to or greater than the minimum final installation torque required for the project. The connection between the torque motor and the installation rig shall have no more than two pivot hinges oriented 90 degrees from each other. Additional hinges promote wobbling and affect lateral capacity.
- B. Installation Equipment: The installation equipment shall be capable of applying adequate crowd and torque simultaneously to ensure normal advancement of the Helical Piles. The equipment shall be capable of maintaining proper alignment and position.
- C. Drive Tool: The connection between the torque motor and Helical Pile shall be in-line, straight, and rigid, and shall consist of a hexagonal, square, or round Kelly bar adapter and helical shaft socket. To ensure proper fit, the drive tool shall be manufactured by the Helical Pile manufacturer and used in accordance with the manufacturer's installation instructions.
- D. Connection Pins: The central shaft of the Helical Pile shall be attached to the drive tool by ASME SAE Grade 8 smooth tapered pins matching the number and diameter of the specified shaft connection bolts. The connection pins should be maintained in good condition and safe to operate at all times. The pins should be regularly inspected for wear and deformation. Pins should be replaced with identical pins when worn or damaged.
- E. Torque Indicator: A torque indicator shall be used to measure installation torque during installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling and shall be mounted in a fashion that is visible to both the installer and inspector. The torque indicator shall be capable of torque measurements with a sensitivity of 500 ft-lb or less. Torque indicators shall have been calibrated within 1-year prior to start of Work. Torque indicators that are an integral part of the installation equipment shall be calibrated on-site. Torque indicators that are mounted in-line with the installation tooling shall be calibrated either on-site or at an appropriately equipped test facility. Indicators that measure torque as a function of hydraulic pressure shall be re-calibrated following any maintenance performed on the torque motor. Torque

indicators shall be re-calibrated if, in the opinion of the Inspector, reasonable doubt exists as to the accuracy of the torque measurements.

### 3.3 INSTALLATION PROCEDURES

- A. Unless shown on the Drawings, the number and size of helical blades shall be determined by the Contractor's Pile Design Professional in order to achieve the required torque and tensile/bearing capacity for the soil conditions at the site. The ratio of design load to the total area of the helical bearing plates shall not exceed the Allowable Bearing Capacity.
- B. Connect the lead section to the Torque Motor using the Drive Tool and Connection Pins. Position and align the Lead Section at the location and to the inclination shown on the Drawings and crowd the pilot point into the soil. Advance the Lead Section and continue to add Extension Sections to achieve the Termination Criteria. All sections shall be advanced into the soil in a smooth, continuous manner at a rate of rotation between 10 and 40 revolutions per minute. Snug tight all coupling bolts.
- C. Constant axial force (crowd) shall be applied while rotating Helical Piles into the ground. The crowd applied shall be sufficient to ensure that the Helical Pile advances into the ground a distance equal to at least 80% of the blade pitch per revolution during normal advancement.
- D. The manufacturer's torsional strength rating of the Helical Pile shall not be exceeded during installation.
- E. Bolt hole elongation due to torsion of the shaft of a Helical Pile at the drive tool shall be limited to ¼ inch. Helical Piles with bolt hole damage exceeding this criterion shall be uninstalled, removed, and discarded.
- F. When the Termination Criteria of a Helical Pile is obtained, the Contractor shall adjust the elevation of the top end of the shaft to the elevation shown on the Drawings or as required. This adjustment may consist of cutting off the top of the shaft and drilling new holes to facilitate installation of Brackets to the orientation shown on the Drawings. Alternatively, installation may continue until the final elevation and orientation of the pre-drilled bolt holes are in alignment. Contractor shall not reverse the direction of torque and back-out the Helical Pile to obtain the final elevation.
- G. The Contractor shall install Brackets in accordance with Helical Pile manufacturer's details or as shown on the Drawings.
- H. All Helical Pile components including the shaft and Bracket shall be isolated from making a direct electrical contact with any concrete reinforcing bars or other non-galvanized metal objects since these contacts may alter corrosion rates.
- I. After installation, piles designed for tension shall be pre-tensioned if indicated on the Drawings.

### 3.4 TERMINATION CRITERIA

- A. Helical Piles shall be advanced until all of the following criteria are satisfied.
1. Axial capacity is verified by achieving the final installation torque as shown on the Drawings or as provided by the Pile Design Professional.
    - a. If multiple helices are used on a single helical pile, the required torque shall be maintained or exceeded for a distance of helical pile advancement of at least the aggregate total spacing between helices or to refusal. For example if a helical pile is used with three blades separated by 2 feet from each other, than the helical pile shall be advanced a total of 4 feet while maintaining or exceeding the required torque.
  2. Minimum depth is obtained. The minimum depth shall be as shown on the Drawings, as noted in the Geotechnical Report, or the depth at which the final installation torque is measured, whichever is greater. In addition, piles designed for tension shall be advanced until the average torque over the last three (3) feet equals or exceeds the required final installation torque.
- B. If the torsional strength rating of the Helical Pile and/or the maximum torque of the installation equipment has been reached or Augering occurs prior to achieving the minimum depth required, the Contractor shall have the following options:
1. Terminate the installation at the depth obtained subject to the review and acceptance of the Engineer.
  2. Remove the Helical Pile and install a new one with fewer and/or smaller diameter helical bearing plates or with dual cutting edge helical bearing plates. The new helical configuration shall be subject to review and acceptance of the Engineer.
  3. Remove the Helical Pile and pre-drill a 4-inch diameter pilot hole in the same location and reinstall the pile.
  4. If the obstruction is shallow, remove the Helical Pile and remove the obstruction by surface excavation. Backfill and compact the resulting excavation and reinstall the pile.
  5. Remove the Helical Pile and relocate 1-foot to either side of the installation location subject to the review and acceptance of Engineer.
  6. Reverse the direction of torque, back-out the Helical Pile a distance of 1 to 2 feet and attempt to reinstall by decreasing crowd and Augering through the obstruction.
  7. Remove the Helical Pile and sever the uppermost helical bearing plate from the Lead Section if more than one helical bearing plate is in use, or reshape the helical bearing plates to create a special tapered edge by cutting with a band saw. Reinstall the pile with revised helical bearing plate configuration.
- C. If the final installation torque is not achieved at the contract length, the Contractor shall have the following options:

1. Until the maximum depth is achieved (if any), install the Helical Pile deeper using additional Extension Sections.
2. Remove the Helical Pile and install a new one with additional and/or larger diameter helical bearing plates.
3. Decrease the rated load capacity of the Helical Pile and install additional Helical Piles. The rated capacity and additional unit location shall be subject to the review and acceptance of the Engineer.

### 3.5 ALLOWABLE TOLERANCES

- A. Helical Piles shall be installed as close to the specified installation and orientation angles as possible. Tolerance for departure from installation and orientation angles shall be +/- 2 degrees.
- B. Helical Piles and Bracket Assemblies shall be installed at the locations and to the elevations shown on the Plans. Tolerances for Bracket Assembly placement shall be +/- 1 inch in both directions perpendicular to the shaft and +/- 1/2 inch in a direction parallel with the shaft unless otherwise specified.

### 3.6 QUALITY ASSURANCE

- A. The Contractor shall provide the Engineer and Owner copies of installation records within 48 hours after each installation is completed. These installation records shall include, but are not limited to, the following information:
  1. Name of project and Contractor
  2. Name of Contractor's supervisor during installation
  3. Date and time of installation
  4. Name and model of installation equipment
  5. Type of torque indicator used
  6. Location of Helical Pile by grid location, diagram, or assigned identification number
  7. Type and configuration of Lead Section with length of shaft and number and size of helical bearing plates
  8. Type and configuration of Extension Sections with length and number and size of helical bearing plates, if any
  9. Installation duration and observations
  10. Total length installed
  11. Final elevation of top of shaft and cut-off length, if any
  12. Final plumbness or inclination of shaft
  13. Final installation torque
  14. Comments pertaining to interruptions, obstructions, or other relevant information
  15. Verified axial load capacity

- B. Unless specified otherwise on the Drawings or by local codes, the Inspector shall observe and document the first 10 Helical Pile installations and at least 10 percent of all remaining Helical Pile installations.

#### PART 4 - MEASUREMENT AND PAYMENT

##### 4.1 HELICAL PILES AND BRACKET ASSEMBLIES

- A. Per Unit: Payment will be at a per unit price based on assumed length noted below with one unit consisting of the labor, equipment, and materials required to furnish and install a Helical Pile and associated Bracket at the location and to the elevation, orientation, inclination, length, and capacity shown in the Drawings. In addition to this unit price provide a lineal foot cost to be added to or subtracted from this overall unit price based on the actual installed length.

- 1. Assumed Pile Length = 15'-0"

END OF SECTION 316613

## SECTION 316620 – RAMMED AGGREGATE PIERS

### 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.
- B. Division 31 for Site Work.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Work shall consist of designing, furnishing and installing Rammed Aggregate Pier foundations to the lines and grades designated on the project plans and as specified herein. The aggregate piers shall be constructed by either augering a cavity or driving a hollow mandrel to the design depth and vertically ramming lifts of aggregate using the specially designed tamper head and high-energy impact densification equipment to create the compacted aggregate pier. The Rammed Aggregate Pier elements shall be in a columnar-type configuration and shall be used to produce an intermediate foundation system for support of foundation loads.
  - 2. Work shall include all equipment, material, labor, and supervision to design and install Rammed Aggregate Pier elements. Design shall rely on subsurface information presented in the project geotechnical report. Layout of Rammed Aggregate Pier elements, spoil removal (as required), and subgrade preparation following aggregate pier installation shall be by the General Contractor
  - 3. The Rammed Aggregate Pier design and installation shall adhere to all methods and standards described in this Section.
  - 4. The designer of the aggregate pier system shall carry Errors and Omissions / Professional Liability Insurance with coverage of at least \$3 Million per occurrence and \$3 Million aggregate.

#### 1.3 APPROVED INSTALLERS

- A. The Rammed Aggregate Pier Installer (the Installer) shall be approved by the Engineer of Record prior to bid opening. Without exception, no alternate installer will be accepted unless approved by the Engineer of Record at least two (2) weeks prior to bid opening.
- B. Installers of Rammed Aggregate Pier foundation systems shall have a minimum of 5 years of experience with the installation of Rammed Aggregate Pier systems and shall have completed at least 50 projects.
- C. Installers licensed by the Geopier Foundation Company, Inc. ([www.geopier.com](http://www.geopier.com)) will be accepted as approved installer.



#### 1.4 REFERENCE STANDARDS

##### A. Design

1. "Control of Settlement and Uplift of Structures Using Short Aggregate Piers," by Evert C. Lawton (Assoc. Prof., Dept. of Civil Eng., Univ. of Utah), Nathaniel S. Fox (President, Geopier Foundation Co., Inc.), and Richard L. Handy (Distinguished Prof. Emeritus, Iowa State Univ., Dept. of Civil Eng.), reprinted from IN-SITU DEEP SOIL IMPROVEMENT, Proceedings of sessions sponsored by the Geotechnical Engineering Division/ASCE in conjunction with the ASCE National Convention held October 9-13, 1994, Atlanta, Georgia.
2. "Settlement of Structures Supported on Marginal or Inadequate Soils Stiffened with Short Aggregate Piers," by Evert C. Lawton and Nathaniel S. Fox. Geotechnical Special Publication No. 40: Vertical and Horizontal Deformations of Foundations and Embankments, ASCE, 1994, 962-974.
3. "Behavior of Geopier®-Supported Foundation Systems during Seismic Events," by Kord Wissmann, Evert C. Lawton, and Tom Farrell. Geopier Foundation Company, Inc. Blacksburg, VA, 1999.

##### B. Modulus Testing

1. ASTM D 1143 - Pile Load Test Procedures

##### C. Materials and Inspection

1. ASTM D 1241 - Aggregate Quality
2. ASTM D 422 - Gradation of Soils

#### 1.5 DESIGN REQUIREMENTS

- A. The design of the Rammed Aggregate Pier system shall be based on the service load bearing pressure and the allowable total and differential settlement criteria. The Rammed Aggregate Pier system shall be designed in accordance with generally-accepted engineering practice and the methods described in Section 1.4 of these Specifications.
- B. The Rammed Aggregate Pier elements shall be designed using a Rammed Aggregate Pier stiffness modulus to be verified by the results of the modulus test.
- C. The design shall meet the following criteria.
  1. Allowable Bearing Pressure for Footings supported by Rammed Aggregate Pier  
Reinforced Soils: 6000 psf
  2. Total Long-Term Settlement for Footings:  $\leq 1$  inch
  3. Long-Term Differential Settlement of Adjacent Footings:  $\leq 1/2$  inch

#### 1.6 SUBMITTALS

- A. Detailed design calculations, construction drawings indicating Rammed Aggregate Pier layout, and shop drawings; Prepared by the Rammed Aggregate Pier Designer (Designer), for review and approval by the Engineer of Record at least three weeks prior to the beginning of construction. A detailed explanation of the design parameters for settlement calculations shall be included in the design submittal.

- B. Drawings and Calculations shall be signed and sealed by the qualified professional engineer, registered in the State of the project, who was responsible for their preparation.
- C. Quality control test program for Rammed Aggregate Pier system.
- D. Modulus Test Reports – A modulus test shall be performed on a non-production Rammed Aggregate Pier by the Rammed Aggregate Pier Designer to verify the design assumptions. The Installer shall furnish a description of the installation equipment, installation records, complete test data, analysis of the test data and verification of the design parameter values based on the modulus test results. The report shall be prepared under direction of a Registered Professional Engineer.
- E. Daily Rammed Aggregate Pier Progress Reports – The Installer shall furnish a complete and accurate record of Rammed Aggregate Pier installation.
  - 1. Pier location, length, and diameter.
  - 2. Final elevations of the pier top and bottom.
  - 3. Type and size of installation equipment used
  - 4. Volume of aggregate used or number of lifts
  - 5. Densification forces during installation
  - 6. Documentation of any unusual subsurface conditions encountered.
  - 7. Soil and groundwater observations, if any.
  - 8. The results of any field Quality Control testing or deflection monitoring done.

#### 1.7 PROJECT CONDITIONS

- A. Existing Utilities: The General Contractor shall locate existing underground utilities before excavating for piers and if utilities are to remain in place, provide protection from damage during operations.
  - 1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.
- B. Project-Site Information: A geotechnical report has been prepared for this Project. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by the geotechnical engineer.
  - 1. The boring log and accompanying report are believed to be accurate; however, neither the Owner or Engineer of Record guarantees the information contained therein, nor do they guarantee the conditions indicated to exist at the locations of the test holes will prevail at other locations on the site.
- C. Survey Work: The General Contractor shall engage a qualified surveyor to perform surveys, layouts, and measurements for Rammed Aggregate Piers. Before excavating, lay out each Rammed Aggregate Pier to lines and levels required. Use survey stakes or similar means to mark the locations of Rammed Aggregate Pier elements.

## PART 2 - PRODUCTS

### 2.1 AGGREGATE

- A. Aggregate used by the Rammed Aggregate Pier Installer for pier construction shall be pre-approved by the Designer and shall demonstrate suitable performance during modulus testing. Typical aggregate consists of Type 1 Grade B in accordance with ASTM D-1241, No. 57 stone, recycled concrete or other graded aggregate approved by the Designer.
- B. Potable water or other suitable source shall be used to increase aggregate moisture content as needed for workability. The need for moisture conditioning aggregate shall be made by the aggregate pier system installer based on workability and/or dust control. The General Contractor shall provide such water to the installer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions under which Rammed Aggregate Piers are to be installed.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by pier operations.
- B. The General Contractor shall establish site subgrade within 6 inches of finish subgrade, or as approved by installer of the aggregate pier system.
- C. Site grades for Rammed Aggregate Pier installation shall be finished grade elevation to minimize Rammed Aggregate Pier installation depths. Ground elevations and finished floor elevations shall be provided to the Rammed Aggregate Pier Installer in sufficient detail to estimate installation depth elevations to within 3 inches.
- D. The General Contractor shall provide site access to the Installer, after earthwork in the area has been completed. A working surface shall be established and maintained by the General Contractor to provide wet weather protection of the subgrade and to provide access for efficient operation of the Rammed Aggregate Pier installation.
- E. Prior to, during and following Rammed Aggregate Pier installation, the General Contractor shall provide positive drainage to protect the site from wet weather and surface ponding of water.
- F. If spoils are generated by Rammed Aggregate Pier installation, the General Contractor shall remove spoil materials from the Rammed Aggregate Pier work area in a timely manner to prevent interruption of Rammed Aggregate Pier installation.

### 3.3 INSTALLATION

- A. The locations, size, and spacing of aggregate pier elements are described on the appropriate drawings or details. Any modifications in size and spacing of the aggregate pier element layout shall be approved by the system designer.
- B. Augered Rammed Aggregate Pier Systems
  1. Rammed Aggregate Pier system shall be pre-augered using mechanical drilling or excavation equipment.
  2. If cave-ins exceeding 10% of the lift volume occur during excavation such that the sidewalls of the hole are deemed to be unstable, steel casing shall be used to stabilize the cavity or a displacement Rammed Aggregate Pier system may be used.
  3. Aggregate shall be placed in the augered cavity in lift thicknesses as determined by the Rammed Aggregate Pier Designer.
  4. A specially-designed beveled tamper and high-energy impact densification apparatus shall be employed to densify the lifts of aggregate during installation. The apparatus shall apply direct downward impact energy to each lift of aggregate. Compaction equipment that induces horizontal vibratory energy is not permitted.
- C. Displacement Rammed Aggregate Pier Systems
  1. Displacement Rammed Aggregate Pier systems shall be constructed by advancing a specially designed mandrel with a minimum 15 ton static force augmented by dynamic vertical ramming energy to the full design depth. The hollow-shaft mandrel, filled with aggregate, is incrementally raised, permitting the aggregate to be released into the cavity, and then lowered by vertically advancing and/or ramming to densify the aggregate and force it laterally into the adjacent soil. The cycle of raising and lowering the mandrel is repeated to the top of pier elevation. The cycle distance shall be determined by the Rammed Aggregate Pier Designer.
  2. Special high-energy impact densification apparatus shall be employed to vertically densify the Rammed Aggregate Pier elements during installation of each constructed lift of aggregate.
  3. Densification shall be performed using a mandrel/tamper. The mandrel/tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation. Compaction equipment that induces horizontal vibratory energy (such as Vibroflot equipment) is not permitted.
  4. Downward crowd pressure shall be applied to the mandrel during installation.
- D. Excavation of Obstructions
  1. Should any obstruction, including but not limited to cobbles, boulders, timber, concrete, asphalt, large roots etc., be encountered which prevents placing the elements to the required depth, or causes the aggregate pier to drift from the required location, the obstruction shall be removed by the General Contractor. Additional aggregate pier elements shall be installed when required by the presence of obstacles.

2. Dense natural rock or weathered rock layers shall be deemed obstructions, and piers may be terminated short of design lengths on such materials.
- E. Plan Location and Elevation of Rammed Aggregate Pier Elements
1. The as-built center of each pier shall be within 6 inches of the locations indicated on the plans. Piers installed outside of the above tolerances and deemed not acceptable shall be rebuilt at no additional expense to the Owner.
  2. Rammed Aggregate Piers installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers, unless the Designer approves the condition or provides other remedial measures. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner, unless the cause of rejection is due to an obstruction or mislocation.
- F. The bottom of the pier excavation shall be rammed prior to the placement of aggregate. If wet, soft or sensitive soils are present, open graded aggregate shall be placed and rammed to stabilize the pier bottom and may serve as the initial pier lift.
- G. Casing for elevator jack shafts located within 10 feet horizontally of any aggregate element shall be installed prior to aggregate pier installation, and shall be grouted in-place for the full length of the casing.
- H. Acceptable constructed lift thickness shall be established by the aggregate pier Designer and confirmed by the aggregate pier installer for each lift installed.
- I. Required ramming time per lift, or acceptable terminal rammer deflection per blow, shall be established by the aggregate pier Designer, and shall be consistent with the time or deflection criteria used for the test pier construction.

### 3.4 UTILITY EXCAVATIONS

- A. The General Contractor shall coordinate all excavations made subsequent to Rammed Aggregate Pier installations so that excavations do not encroach on the piers as shown in the Rammed Aggregate Pier construction drawings. Protection of completed Rammed Aggregate Pier elements is the responsibility of the General Contractor. In the event that utility excavations are required in close proximity to the installed Rammed Aggregate Pier elements, the General Contractor shall contact the Rammed Aggregate Pier Designer immediately to develop construction solutions to minimize impacts on the installed Aggregate Pier elements.

### 3.5 FOOTING SUBGRADE PREPARATION

- A. Excavation and surface compaction of all footings shall be the responsibility of the General Contractor.
- B. Foundation excavations to expose the tops of Rammed Aggregate Pier elements shall be made in a workmanlike manner, and shall be protected until concrete placement, with procedures and equipment best suited to prevent softening of the matrix soil between and around the Rammed Aggregate Pier elements before pouring structural concrete, and achieving direct and firm contact between the dense, undisturbed Rammed Aggregate Pier elements and the concrete footing.

- C. Foundation excavations shall be constructed as follows:
1. Limit over-excavation below the bottom of the footing to 3-inches (including disturbance from the teeth of the excavation equipment).
  2. Compaction of surface soil and top of Rammed Aggregate Pier elements shall be prepared using a motorized impact compactor ("Wacker Packer," "Jumping Jack," or similar). Sled-type tamping devices shall not be used. Compaction shall be performed over the entire footing bottom to compact any loose surface soil and loose surface pier aggregate.
  3. Place footing concrete immediately after footing excavation is made and approved, preferably the same day as the excavation. Footing concrete must be placed on the same day if the footing is bearing on expansive or sensitive soils.
  4. If same day placement of footing concrete is not possible, place a minimum 3-inch thick lean concrete seal ("mud mat") immediately after the footing is excavated and approved or an alternative subsurface protection layer that may consist of a geotextile fabric and six inches of crushed stone to prevent softening or disturbance of the subgrade soils.
  5. Confirm that immediately before footing construction or placement of an alternate subgrade protection layer, the tops of all the Rammed Aggregate Pier elements exposed in each footing excavation have been inspected and recompacted as necessary with mechanical compaction equipment, and that the tops of any Rammed Aggregate Pier elements which may have been disturbed by footing excavation and related activity have been recompacted to a dry density equivalent to at least 95% of the maximum dry density obtainable by the modified Proctor method (ASTM D-1557).
- D. No excavations or drilled shafts (elevator, etc) shall be made after installation of Aggregate Pier elements within a horizontal distance of 10' from the edge of any pier, without the written approval of the aggregate pier installer.

### 3.6 FIELD QUALITY CONTROL BY RAMMED AGGREGATE PIER INSTALLER

#### A. CONTROL TECHNICIAN

1. The Rammed Aggregate Pier installer shall have a full-time, on-site Quality Control representative to verify and report all installation procedures. The Installer shall immediately report any unusual conditions encountered during installation to the Rammed Aggregate Pier Designer, the General Contractor, and to the Testing Agency.

#### B. RAMMED AGGREGATE PIER MODULUS TEST

1. As required by the Rammed Aggregate Pier Designer, a Rammed Aggregate Pier Modulus Test(s) will be performed at locations agreed upon by the Rammed Aggregate Pier Designer and the Testing Agency to verify or modify Rammed Aggregate Pier designs. Modulus Test Procedures shall utilize appropriate portions of ASTM D 1143 and ASTM D 1194, as outlined in the Rammed Aggregate Pier design submittal.

#### B. BOTTOM STABILIZATION TESTING (BST)/CROWD STABILIZATION TESTING (CST)

1. Bottom stabilization testing (BSTs) or Crowd stabilization testing (CSTs) shall be performed by the Control Technician during the installation of the modulus test pier. Additional testing as required by the Rammed Aggregate Pier Designer shall be performed on selected production Rammed Aggregate Pier elements to compare results with the modulus test pier.

3.7 FIELD QUALITY ASSURANCE BY CONTRACTOR

- A. The Testing Agency shall monitor the modulus test pier installation and testing. The Installer shall provide and install all dial indicators and other measuring devices.
- B. The Testing Agency shall monitor the installation of Rammed Aggregate Pier elements to verify that the production installation practices are similar to those used during the installation of the modulus test elements.
- C. The Testing Agency shall report any discrepancies to the Installer and General Contractor immediately.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove all soil and waste material, trash, and debris, and legally dispose of it off Owner's property.

3.9 PAYMENT

A. Method of Measurement

- 1. Measurement of the Rammed Aggregate Piers is on a lump sum basis.
- 2. Payment shall cover design, supply and installation of the Rammed Aggregate Pier system. Excavation of unsuitable materials, delays, re-engineering, and remobilization as documented and approved by the Owner or Engineer of Record, shall be paid for under separate pay items.

B. Basis of Payment

- 1. The accepted quantities of piers will be paid per approval, in-place aggregate-pier. Payment will be made under:

<u>Pay Item:</u>	<u>Pay Unit:</u>
Preparation of plans and specifications and installation of Rammed Aggregate Pier elements	\$____ Lump Sum
2. Unit prices shall be provided to account for:	
Additional Installed Piers (w/o remobilization)	\$____ Each
Add for Casing Holes	\$____/Linear Foot
Additional Mobilizations	\$____ Each
Additional Modulus or Uplift Load Tests	\$____ Each

END OF SECTION 316620

## SECTION 32 12 16 – BITUMINOUS CONCRETE PAVEMENT

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Asphalt paving for roadways.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Site Earthwork specification for subgrade and aggregate base requirements.
- B. Terms and conditions of construction as required by the Contractor's permit with the controlling agency. When conditions of the permit conflict with proposed work, the contractor shall notify the Engineer for correction prior to installation. Any non-compliant work performed by the Contractor shall be at the Contractor's expense.
- C. State Department of Transportation for pavement design mix specification as defined on the site drawings.
- D. INDOT Standard Specifications Section 402, latest edition.
- E. Asphalt Paving Publication AI MS-22, "Construction of Hot Mix Asphalt Pavements."
- F. Control of Site Work Specification.

#### 1.3 DELIVERABLES:

- A. Contractor must provide proof of certification by either the State Department of Transportation or controlling municipality for paving work.
- B. Record Drawings: Include size, material, depth of cover, location, and elevation of all improvements within the contract documents. Include details of underground structures and connections.
- C. Material certificates for the pavement design mix.
- D. Tack coat material.
- E. Passing test reports.



1.4 CONTROL OF WORK:

- A. Schedule tests and inspections with the Owner's Geotechnical Engineer and as required under the conditions of the permit. The finished paving will not be accepted or considered complete until all improvements pass the testing requirements of these specifications and the permitting authority.
- B. Comply with INDOT Standard Specifications latest edition, Section 402 for paving work.
- C. Comply with Asphalt Institute (AI) MS-22 "Construction of Hot Mix Asphalt Pavements".

PART 2 - PRODUCTS

2.1 AGGREGATE BASE:

- A. See the site drawings for material requirements. See the Earthwork Specification for subgrade compaction and installation requirements.

2.2 TACK COAT:

- A. Emulsified asphalt according to ASTM D 977.
- B. Minimum surface temperature of 60 deg F
- C. Apply uniformly to all exposed existing asphalt surfaces at point of contact with new paving at a rate of 0.10 gallons per square yard.

2.3 ASPHALT BASE COURSE:

- A. See the site drawings for the Department of Transportation design mix.
- B. Do not place asphalt until the surface temperature is a minimum of 40 deg F and rising at time of placement.
- C. Do not apply asphalt materials if the aggregate base shows signs of yielding or the subgrade is wet or excessively damp.
- D. Spread mix at minimum temperature of 250 deg F at a thickness according to the recommendations of the State Department of Transportation.
- E. Complete breakdown rolling and examine surface immediately after roller passes. Correct as required to comply with this section.
- F. Compaction shall conform to INDOT Standard Specifications latest edition, Section 402.15. Provide the minimum number of rollers and coverage. Begin compaction immediately after

the mixture has been spread and finished. Rollers shall not cause undue displacement, cracking, or shoving.

- G. In areas inaccessible to rollers, compact hot-mix paving with hot, tampers or vibratory--plate compactors in accordance with INDOT Standard Specifications latest edition, Section 408.03(d).
- H. Compact each course to within a tolerance of 1/2 inch in lifts not exceeding 2" total thickness. Surface smoothness as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas shall be within a tolerance of 1/4 inch.
- I. Complete finish rolling while the pavement is still warm.
- J. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- K. Frequency of testing: Coordinate with the Owner's Geotechnical Engineer to collect one sample of hot-mix asphalt material per lift to determine design mix properties.

#### 2.4 ASPHALT SURFACE COURSE:

- A. See the site drawings for the Department of Transportation design mix.
- B. Do not place asphalt until tack coat has fully cured, and the surface temperature is a minimum of 60 deg F and rising at time of placement.
- C. Spread mix at minimum temperature of 250 deg F at a thickness according to the recommendations of the State Department of Transportation.
- D. Complete breakdown rolling and examine surface immediately after roller passes. Correct as required to comply with this section.
- E. Compaction shall conform to INDOT Standard Specifications latest edition, Section 402.15. Provide the minimum number of rollers and coverage. Begin compaction immediately after the mixture has been spread and finished. Rollers shall not cause undue displacement, cracking, or shoving.
- F. In areas inaccessible to rollers, compact hot-mix paving with hot, tampers or vibratory--plate compactors in accordance with INDOT Standard Specifications latest edition, Section 408.03(d).
- G. Compact each course to within a tolerance of 1/4 inch in lifts not exceeding 2" total thickness. Surface smoothness as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas shall be within a tolerance of 1/8 inch.
- H. Complete finish rolling while the pavement is still warm.

- I. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened
- J. Frequency of testing: Coordinate with the Owner's Geotechnical Engineer to collect one sample of hot-mix asphalt material per lift to determine design mix properties.

2.5 PAVEMENT MARKING PAINT:

- A. Do not place pavement markings unless the surface temperature is between 50 deg F and 95 deg F.
- B. Pavement-Marking Paint shall be waterborne latex complying with FS TT-P-1952 with a minimum thickness of 15 mils. Apply on clean surface.

2.6 JOINTS:

- A. Tack coat all exposed joint surfaces. Offset and install joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."

END OF SECTION 32 12 16

## SECTION 32 13 13 – PORTLAND CEMENT CONCRETE PAVEMENT

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Concrete paving for site slabs on grade.
- B. Concrete paving for sidewalks.
- C. Concrete paving for roadways.
- D. Concrete for curb and gutter.
- E. Sealants for construction joints.
- F. Sealants for expansion joints.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Site Earthwork specification for subgrade and aggregate base requirements.
- B. Terms and conditions of construction as required by the Contractor's permit with the controlling agency. When conditions of the permit conflict with proposed work, the contractor shall notify the Engineer for correction prior to installation. Any non-compliant work performed by the Contractor shall be at the Contractor's expense.
- C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- D. CRSI's "Manual of Standard Practice"
- E. CRSI's "Placing Reinforcing Bars"
- F. Control of Site Work specification.

#### 1.3 DELIVERABLES:

- A. Record Drawings: Include size, material, depth of cover, location, and elevation of all improvements within the contract documents. Include details of underground structures and connections.
- B. Material certificates for the pavement design mix according to ACI 211.1 and ACI 301.
- C. Passing test reports.

- D. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- E. Submittal for hot applied joint sealant.
- F. Submittal for cold applied joint sealant.

1.4 CONTROL OF WORK:

- A. Schedule tests and inspections with the Owner's Geotechnical Engineer and as required under the conditions of the permit. The finished paving will not be accepted or considered complete until all improvements pass the testing requirements of these specifications and the permitting authority.

PART 2 - PRODUCTS

2.1 AGGREGATE BASE:

- A. See the site drawings for material requirements. See the Earthwork Specification for subgrade compaction and installation requirements.

2.2 CONCRETE MATERIALS:

- A. Provide ready mixed concrete according to ASTM C 94 with the following properties: 4000 psi at 28 day compressive strength, 0.45 maximum water to cement ratio, and a 4" maximum slump limit. Provide admixtures to establish an air content of 4.5 to 7.5% according to ASTM C 260
- B. Portland Cement: ASTM C 150, Type I or II. Aggregate: ASTM C 33, uniformly graded, from a single source.
- C. Water: ASTM C 94
- D. Provide a medium textured broom finish on all surfaces unless noted otherwise on the plans.
- E. Allowable Water-Reducing Admixture according to ASTM C 494, Type A
- F. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures
- G. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

### 2.3 CONSTRUCTION JOINTS:

- A. Place joints at the end of concrete pouring operations if more than 30 minutes has elapsed.
- B. Provide joint filler strips according to ASTM D 1751 or ASTM D 1752 and type SL Silicone Sealant complying with ASTM D 5893 for Type SL. Install per the manufacturer's recommendations and according to ASTM C 1193.
- C. Continue reinforcing steel through the construction joint and lap bars of a sufficient development length to assure a good bond with future concrete placement.

### 2.4 EXPANSION JOINTS:

- A. Place joints at the interface between new concrete pavement and: concrete curbs, site structures, building stoops, and at maximum intervals of 50 feet.
- B. Provide joint filler strips according to ASTM D 1751 or ASTM D 1752 and type SL Silicone Sealant complying with ASTM D 5893 for Type SL. Install per the manufacturer's recommendations and according to ASTM C 1193.
- C. Do not continue reinforcing steel through the expansion joint.

### 2.5 CONTRACTION JOINTS:

- A. Sawcut or hand tool contraction joints in the locations identified on the site drawings. The minimum depth of all joints shall be 25% of the total pavement thickness. Tooled joints shall be a minimum of 1/8" wide, with 1/4" radii. Sawcut joints shall be a minimum of 1/8". Joint sealants are not required at contraction joint locations.

### 2.6 CURING MATERIALS:

- A. Provide curing materials after initial placement of concrete. Acceptable methods include: Polyethylene sheeting according to ASTM C 171, burlap cloth according to AASHTO M 182, Class 2, and clear solvent according to ASTM C 309, Type 1, Class B.

### 2.7 CONCRETE PLACEMENT:

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces. Do not place concrete when the surface temperature is below 40 deg F.

- C. Install clean forms and apply a release agent prior to concrete placement. Use flexible forms for radii that are less than 100'. Allow forms to set for a minimum of 24 hrs after concrete placement before removal.
- D. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- E. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- F. Do not add water to concrete during delivery, at Project site, or during placement.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
- H. Cold-Weather Placement: Comply with ACI 306 R. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement. Do not use frozen materials or materials containing ice or snow. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- I. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F.
- J. Tolerance: Gap below 10-foot long, unlevelled straightedge not to exceed 1/8 inch. Comply with tolerances of ACI 117 and as follows: Thickness: Plus 3/8 inch, minus 1/4 inch. Elevation: 1/4 inch.

## 2.8 TESTING:

- A. Reports of compressive-strength tests shall include: concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- B. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.
- C. Frequency of testing: Coordinate with the Geotechnical Engineer to perform a minimum of one test per load delivered to the site.

END OF SECTION 32 13 13

SECTION 32 93 00 – SITE LANDSCAPING

PART 1 - GENERAL

1.1 WORK INCLUDES:

- A. Site Landscaping.

1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. All trees, shrubs and plants provided shall meet all applicable requirements of ANSI z60.1 "American Standard for Nursery Stock."
- B. Site Earthwork Specification.
- C. Control of Site Work specification.

1.3 CONTROL OF WORK:

- A. Remove or replace damage to paving, sidewalks, or other materials at no cost to the owner.
- B. Contractor shall protect all plant material during construction. Any material damaged during construction shall be treated, repaired or replaced by the contractor as directed by the architect.
- C. Trees and Shrubs shall be measured in accordance with ANSI z60.1. No pruning shall be performed to achieve the sizes required. Measure all tree calipers 6" above the ground. For height and width measurements of trees and shrubs use the main body of the plant for measurement. Provide plants according to measurements indicated. Plants larger in size than specified may be used when approved by the Landscape Architect.
- D. Contractor shall not substitute different plants or different varieties of the plant designated on the bid documents without the approval of the Architect. Any plant materials that are substituted by the contractor without the prior approval of the Architect shall be removed from the project site at the contractor's expense and replaced with the plants specified on the bid documents. If a discrepancy occurs between the Common Name and Botanical Name on the Plant Schedule, then the contractor shall ask the Architect to clarify the intended plant prior to any plants being purchased.
- E. The Architect has the right to inspect trees and shrubs at the place of growth or at the project site prior to planting, for compliance with requirements of genus, species, variety, size and quality. The Architect also has the right to inspect the plant materials condition of the root balls and root systems and check for insects, injuries or defects. The Architect has the right to reject any unsatisfactory or defective plant material at any time during the progress of the



work. The Contractor shall remove all rejected plant material from the site and submit new plant material for Architects approval.

- F. All care shall be taken to ensure healthy, vigorous shrubs and trees are delivered to the site. No plant material shall be dropped or bent during delivery, and protective coverings shall be used during transportation. Only handle balled and burlapped plants by the root ball. Plants will be rejected by Architect if in poor health and/or damaged during delivery.
- G. Plants shall have been grown in the same or colder climatic zone as this Project location, and in similar soil types.
- H. Only deliver plants to the site when planting is ready to begin. If a delay arises of more than 6 hours, move plants to a shaded protected site, and keep roots moist. Also, ensure the plants are protected from mechanical damage.
- I. If any conditions arise which would be harmful to any of the plants such as drainage problems, gravel filled planting holes or utility conflicts then the Architect shall be notified. Examine planting areas, test drainage of plant beds and pits by filling with water twice in succession. Notify Architect of conditions permitting water retention in the beds and pits for more than twenty-four (24) hours. Unsatisfactory conditions might require the plants to be relocated elsewhere on the site.
- J. Planting shall not commence until all unsatisfactory conditions are corrected.
- K. All plants shall be installed during the optimum planting season for each variety that is required.
- L. A one-year warranty shall be provided for all plant material. The one-year warranty shall start from the date of substantial completion. Plants will not be accepted unless they are alive and healthy. The Contractor shall replace plants which are dead, or in the opinion of the Architect, are in an unhealthy or unsightly condition, or have lost their natural shape due to dead branches, excessive pruning, or other causes, with same size and species originally installed.
- M. The Contractor will not be responsible for defects resulting from the direct result of owner negligence, abuse, lack of maintenance such as watering, if the Contractor was not under a maintenance agreement at the time, or unusual phenomena or incidents beyond the landscape installer's control which result from natural causes such as floods, lightning, storms, freezing rain, winds over 60 mph, fires or vandalism.
- N. Replacements shall be a plant of the same species and size as indicated on the plans. Contractor shall plant replacements in the next growing season, with a new warranty commencing on date of replacement at no cost to owner.

## PART 2 - PRODUCTS

- A. If a discrepancy is found between the quantities shown on the plant list and on the planting plan, then the planting plan shall take precedence.

## 2.1 TREE AND SHRUB MATERIAL

- A. See the site Landscape Plan for material selection and specifications.
  - 1. All trees and shrubs provided shall be nursery grown with a healthy root system and meet the requirements of ANSI z60.1. All trees and shrubs shall be provided in the sizes as indicated on the plans.
  - 2. Trees and shrubs shall be healthy and free of disease, insects, and defects or disfigurements. No tree leader shoots shall be cut or broken. Plants that do not comply with these standards shall be rejected by the Architect.
  - 3. Tree and Shrub Pruning - Standard horticulture practice shall be used to prune shrubs and trees. Prune only dead or injured branches, and maintain the plants required height or spread. Do not prune the trees leader. Shrub size indicated on the plant list is the size required after pruning.

## 2.2 PLANTS

- A. See the site Landscape Plan for material selection and specifications.
  - 1. Provide healthy plants in removable containers in the sizes as indicated on the plans. Plants that do not comply with these standards shall be rejected by the architect.

## 2.3 TOPSOIL

- A. See Site Earthwork Specification #31 20 00 for topsoil information.

## 2.4 FERTILIZER

- A. Provide a slow-release granular fertilizer. Fifty percent of the fertilizer shall be derived from organic sources with the composition of 20 percent nitrogen, 10% phosphorus, and 10% potassium by weight. Fertilize trees and shrubs in accordance to manufacturer's recommendations.

## 2.5 MULCHES

- A. The mulching material shall consist of organic shredded hardwood mulch, which is free from any weeds or harmful materials, and is suitable for use around plant materials.
- B. The mulch shall be 3 inches in depth and level with adjacent surfaces. No mulch shall be placed directly against trunks or stems of any plant material.
- C. Mulch within twenty-four (24) hours after planting. Spread uniform thickness of three (3) inches unless otherwise shown on the Construction Documents. Keep mulch out of crowns of

shrubs and away from the root flare of trees, and off buildings, sidewalks, light standards and other structures.

## 2.6 WEED CONTROL

- A. To control weed growth apply an herbicide such as Teflan or approved equal prior to planting to all plant beds. Ensure that the herbicide is safe to use around plant materials specified. Any damage to plant material from the herbicide will be the contractor's responsibility to replace.

## 2.7 WRAPPING AND GUYING MATERIALS

- A. Trunk Wrapping: Contractor shall not wrap tree trunks without the approval of the Architect.
- B. Stakes: Galvanized steel fence post with pointed end and plate removed.
- C. Cable: Non-corrosive #10 double strand wire of sufficient strength to withstand wind pressure and resultant movement of the plant.
- D. Plant Protector: Five-ply new nylon-reinforced rubber garden hose.

## 2.8 ANTI-TRANSPIRANT SPRAY

- A. All trees and shrubs when moved and in full leaf shall be sprayed with anti-transpirant spray before moving at the nursery and again 2 weeks later after planting. Spray the entire plant which includes trunks, branches, stems, twigs, and foliage with adequate film. Spray not only the tops of the leaves, but also the bottom.

## 2.9 WATER

- A. Provide uniform coverage which will not cause erosion or damage to finished surfaces. Water the area sufficiently to penetrate planting bed to a depth of four (4) inches.

## PART 3 - EXECUTION

### 3.1 PREPARATION OF PLANTING PITS AND BEDS

- A. Plant Pits: Refer to the Shrub and Perennial Planting Details in the Construction Documents.
- B. Beds for shrub masses, ornamental grasses, hedges, and perennials shall be entirely excavated edge to edge and backfilled with backfill mixture. They shall not be treated as individual planting pits.
- C. Remove all sticks, stones, roots, and other objectionable materials larger than one inch in diameter following tilling operations.

### 3.2 LAYOUT

- A. Plant material shall be laid out according to the Construction Documents. If Contractor does not follow the intended placement and spacing of the plant materials it will be at the Contractors cost to relocate said plants.

### 3.3 PLANTING

- A. Setting Plants: Handle balled and burlapped and container-grown plants by ball or container. Set plants and hold in plumb position until sufficient pit backfill has been firmly placed around roots or ball. Set plants in relation to surrounding grade so that they are even with the depth at which they were grown in nursery, collecting field, or container.
- B. Place fertilizer prior to backfilling. Groundcover plant shall be planted after mulch is in place. Avoid contaminating mulch with planting soil.
- C. Balled and Burlapped Plants and Container Trees: Identify the proper depth for planting. In addition to the following information, plant trees per the Tree Planting Details in the Construction Documents. Lift the tree by the root ball and never by the trunk. Cleanly cut off broken or frayed roots. Straighten plant material in hole. Place planting mixture around the ball and carefully compact to avoid injury to the roots and to fill the voids. After backfilling planting pit approximately two-thirds full, add water and allow planting mixture to settle. After water has been absorbed, fill the planting pit with planting mixture and tamp light to grade. Replace planting stock if ball is cracked or broken before or during planting operations.
- D. No Augers shall be used to dig tree or shrub planting holes.
- E. Contractor shall refer to the Planting Details located on the Construction Documents for additional planting instructions.

### 3.4 SUPPORT

- A. Support plants vertically with plant protector-wrapped guy wires and stakes as indicated on the Construction Documents. Bracing shall be removed by the Contractor at the end of the guarantee period.

END OF SECTION 32 93 00

## SECTION 33 05 00 - SITE UTILITY PIPING

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Underground utility piping from 5' outside building structures as identified on the site plans.
- B. Sanitary sewer piping materials.
- C. Storm sewer piping materials.
- D. Water Main piping materials.
- E. Materials shall be neatly stored on site. Excavated material shall be neatly stockpiled if not immediately removed from the site. Streets, driveways, and sidewalks shall be kept clear and open.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Storm Drainage System Specification.
- B. Sanitary Sewer System Specification.
- C. Water Distribution System Specification.
- D. Site Earthwork Specification.
- E. Site Landscaping.

### PART 2 - SEWER PIPING – See site drawings for allowable pipe materials.

#### 2.1 FLEXIBLE GRAVITY SEWER PIPE:

- A. Install piping per the flexible pipe utility trench detail on the site drawings for bedding and backfill requirements.
  - 1. ASTM D 3034-97 SDR-35 PVC 15" and smaller.
    - a. Provide slip-on joints with rubber gasket or mechanical joints.
    - b. Join pipe with gaskets according to ASTM F 477 for elastomeric seals.
    - c. Install according to ASTM D 2321.

2. ASTM F 405 High Density Polyethylene (HDPE) for pipe 10" and smaller
  - a. Join pipe with gaskets according to ASTM F 477 elastomeric seals.
  - b. Install according to ASTM D 2321.
3. ASTM F 667 High Density Polyethylene (HDPE) for pipe larger than 10"
  - a. Join pipe with gaskets according to ASTM F 477 elastomeric seals.
  - b. Install according to ASTM D 2321.

## 2.2 RIGID GRAVITY SEWER PIPE:

- A. Install piping per the rigid pipe utility trench detail on the site drawings for bedding and backfill requirements.
  1. ASTM C 76, Class III, Wall B, Reinforced Concrete Pipe
    - a. Slip-on joints with rubber compression gasket or mechanical joints
    - b. Round Pipe and Fittings: ASTM C 443, rubber gaskets.
    - c. Elliptical Pipe: ASTM C 877, Type I, Sealing Bands.
    - d. Arch Pipe: ASTM C 877, Type I, Sealing Bands. Install according to ACPA's "Concrete Pipe Installation Manual."

## 2.3 SUBDRAINAGE PIPING

- A. ASTM F 405 Corrugated, perforated Polyethylene Pipe and fittings with coupled joints.
- B. Join PE pipe and fittings with couplings for soiltight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321 and the Corrugated Pipe Associations "Recommendation Installation Practices for Corrugated Polyethylene Pipe and Fittings".

## 2.4 STORM DRAINAGE FITTINGS

- A. Storm drainage fittings shall be of the same material and classification as the main line. Provide adapters as necessary to adjust from the main line fitting to the branch line material.
- B. Inserta-Tees for branch lines are acceptable provided:
  1. The main line is 12" nominal pipe size or larger.

2. The branch line extends from the main at no greater than 45 degree slope from horizontal.
3. The protrusion into the main line does not exceed 1".

PART 3 - WATER DISTRIBUTION PIPING – See site drawings for allowable pipe materials.

3.1 PVC PIPE AND FITTINGS

- A. AWWA pressure class 150 C900 PVC, SDR 18 with push on joints according to ASTM D 3139 and socket fittings. The material shall conform to ASTM D 1784, Class 12454-B.
- B. Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 and ASTM D 3139 and pipe manufacturer's written instructions.
- C. Install according to AWWA M23 and ASTM F 645.
- D. Pressure and leak test plastic piping according to AWWA C605-94.
- E. Provide testing only after all restraints have hardened.

3.2 PE PIPING:

- A. ASTM D3035 / F714 pressure class 200 pipe with fittings according to AWWA C901 / C906. Materials to be in accordance with ASTM D3350.
- B. Install according to ASTM D 2774 and ASTM F 645.
- C. All HDPE for water line piping shall have a blue stripe installed by the manufacturer during the pipe forming process. All HDPE for force main piping shall have a green stripe installed by the manufacturer during the pipe forming process. The pipe in either case shall have multiple stripes so as to be viewed from any angle along the pipe.
- D. HDPE shall be SDR 9 when the product is to be installed by the directional drill method.
- E. TESTING IN THE TRENCH (procedure taken from PPI Technical Report TR-31 by the Plastic Pipe Institute)
  1. Fill the pipeline with water after it has been laid; bleed off any trapped air. Subject the lowest element in the system to a test pressure that is 1.5 times the design pressure, and check for any leakage. When, in the opinion of the engineer, local conditions require that the trenches be backfilled immediately after the pipe has been laid, apply the pressure test after backfilling has been completed but not sooner than a time which will allow sufficient curing of any concrete that may have been used.

2. The test procedures consist of two steps; the initial expansion and the test phase. When test pressure is applied to a water filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system hourly intervals for 3 hours to maintain the test pressure. After 4 hours, initial expansion should be complete, and the actual test can start.
3. When the test is to begin, the pipe is full of water and is subjected to a constant pressure of 1.5 times the system design pressure. The test phase should not exceed 3 hours, after which time any water deficiency must be replaced and measured. Add and measure the amount of make-up water required to return to the test pressure and compare this to the maximum allowance in the table below.
4. Under no circumstances shall the total time under test exceed 8 hours at 1.5 times the system pressure rating. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the test section shall be permitted to "relax" for 8 hours prior to the next test sequence.
5. Air testing is not recommended. Additional safety precautions may be required.

ALLOWANCE FOR EXPANSION UNDER TEST PRESSURE								
NOMINAL PIPE SIZE	U.S. GALS/100 FT. OF PIPE				NOMINAL PIPE SIZE	U.S. GALS/100 FT. OF PIPE		
	1 HOUR	2 HOURS	3 HOURS			1 HOUR	2 HOURS	3 HOURS
2"	0.08	0.12	0.15		20"	2.80	5.50	8.00

END OF SECTION 33 05 00



## SECTION 33 11 16 – SITE WATER DISTRIBUTION

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Domestic water and fire protection facilities from the Public main to 5' outside building structures as shown on the Site Plans.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. The Indiana Department of Environmental Management rules and regulations.
- B. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
- C. Terms and conditions of construction as required by the Contractor's permit with the controlling agency. When conditions of the permit conflict with proposed work, the contractor shall notify the Engineer for correction prior to installation. Any non-compliant work performed by the Contractor shall be at the Contractor's expense.
- D. Site Earthwork specification for excavation and backfill requirements.
- E. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. Control of Site Work Specification.

#### 1.3 DELIVERABLES:

- A. Product Data for the following: piping, fittings, valves and accessories, water meters and accessories, fire hydrants, blow off hydrants, post indicator valves and accessories.
- B. Record Drawings: Contractor shall provide a marked-up set of drawings to the owner. Include size, material, depth of cover, location, and elevation of all improvements within the contract documents. Include details of underground structures and connections. Identify any items that deviate from the contract documents including but not limited to: underground utilities, finish grades, substitutions if approved, detail modification, etc.
- C. Progress Reports: Soil conditions encountered, work completed, etc.
- D. Passing test reports for the entire water distribution system.

1.4 CONTROL OF WORK:

- A. Clean any debris that may accumulate within the water distribution system as a result of construction operations, including new and existing water piping and structures. Flush piping as required to purge the piping system.
- B. Cap the end of exposed piping during installation to minimize infiltration of material into the piping system.
- C. Inspect the distribution system and replace defective piping and structures using new materials, and repeat inspections until defects are within allowances specified. Re-inspect and repeat procedure until results meet specifications.
- D. Do not enclose, cover, or put the water distribution system into service before final inspection and approval by the local utility owner.
- E. Schedule tests and inspections with the utility owner as required under the conditions of the permit, and this section. The water distribution system will not be accepted or considered complete until all improvements pass the testing requirements of the local utility owner, and a copy of all passing tests are provided to the Owner's Agent.
- F. Protect piping from damage. Do not store PVC piping and fittings in direct sunlight.

PART 2 - PRODUCTS

2.1 WATER DISTRIBUTION PIPING:

- A. See site plans for allowable pipe materials.
- B. Install piping from the water service connection point to 5' outside the face of building. Connect to the building water system of sizes and in locations indicated. Site contractor shall be responsible for making the final connection to the building system, including any drop piping and fittings required to match invert elevations.
- C. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants and other installation requirements. Maintain a swab in line and pull past each joint as it is completed.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Bury piping with depth of cover over top at least 60 inches.
- F. Protect stored piping, fittings, and specialties from moisture and dirt, and elevate above grade.

2.2 VALVES:

- A. Resilient-Seated gate valve, ductile-iron body, bonnet and gate; resilient seats, bronze stem and stem nut, with mechanical joints and conforming to AWWA C509. Provide interior coating according to AWWA C550. All valves and fittings shall have a minimum working pressure of 200 psig. Install valve nut extension if valve is installed deeper than 60" cover.

2.3 VALVE BOXES:

- A. Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5-inch- diameter barrel. Install valve box and valve nut extensions if valve is installed deeper than 60" cover.

2.4 ANCHORAGE INSTALLATION

- A. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports. For water lines 12" and smaller, restrain joints and fittings in accordance with the manufacturer's recommended restraint lengths or the controlling municipality specifications, whichever is more restrictive. Submit calculations for required restraint length to Engineer for water lines larger than 12".
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches.
- C. Provide anchorage for PVC Water-Service Piping according to AWWA M23.
- D. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

2.5 INDICATOR POSTS:

- A. Use UL/FM, nonrising-stem gate valves for installation with indicator posts and provide electronic monitoring switch on post indicator. Coordinate work with building fire protection drawings

2.6 WATER METERS:

- A. Contractor shall pay all required fees and Install according to the Utility Owner's requirements.

2.7 IDENTIFICATION

- A. Install continuous underground detectable warning tape for all plastic pipe during backfilling of trench for underground water-service piping. Locate below finished grade, directly over

pipng. In addition, attach a continuous green sheathed solid conductor copper/copper clad steel wire line (minimum #12 AWG) directly to the plastic pipe.

- B. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap.
- C. Test conductors for continuity. Conductors shall be installed to ground level at each valve box.

#### 2.8 LIVE TAP 3" AND LARGER:

- A. Tap existing water main according to requirements of water utility company and according to MSS SP-60. Provide gate valve and valve box as shown on the site drawings.

### PART 3 - TESTING AND DISINFECTION

#### 3.1 CLEANING:

- A. Clean and disinfect all public and private water distribution piping according to the Utility Owner requirements, and according to AWWA C651-99. Provide temporary testing connections as required by the permitting authority and to effectively complete disinfection requirements.
- B. Fill the distribution system with a water and chlorine solution containing at least 50 ppm of chlorine. isolate and allow to stand for 24 hours.
- C. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand as required.
- D. After standing time, flush with clean, potable water until no chlorine remains in water.
- E. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- F. Prepare reports of purging and disinfecting activities.

#### 3.2 WATER DISTRIBUTION TESTING:

- A. Provide testing as required by the Indiana Department of Environmental Management, Indiana State Department of Health, and water utility Owner. In the absence of published standards, see site utility piping section for specific testing requirements.

END OF SECTION 33 11 16

## SECTION 33 31 14 - SANITARY SEWER SYSTEM

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Sanitary sewerage 5' outside building structures as shown on the Site Plans.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. The Indiana Department of Environmental Management rules and regulations.
- B. The Utility Owner Standards and Specifications.
- C. Terms and conditions of construction as required by the Contractor's permit with the controlling agency. When conditions of the permit conflict with proposed work, the contractor shall notify the Engineer for correction prior to installation. Any non-compliant work performed by the Contractor shall be at the Contractor's expense.
- D. Site Earthwork specification for excavation and backfill requirements.
- E. Control of Site Work Specification.

#### 1.3 DELIVERABLES:

- A. Submittals for: piping, fittings, precast manholes, casting frames and covers.
- B. Record Drawings: Include size, material, depth of cover, location, and elevation of all improvements within the contract documents. Include details of underground structures and connections.

#### 1.4 CONTROL OF WORK:

- A. Clean any debris that may accumulate within the sanitary sewer system as a result of construction operations, including new and existing sewer piping and structures. Flush piping as required to purge the piping system.
- B. Cap the end of exposed piping during installation to minimize infiltration of material into the piping system.
- C. Inspect interior of piping to determine whether line displacement or other damage has occurred throughout the construction process. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

- D. Replace defective piping and structures using new materials, and repeat inspections until defects are within allowances specified. Re-inspect and repeat procedure until results meet specifications.
- E. Do not enclose, cover, or put the sanitary sewer into service before final inspection and approval by the local utility owner.
- F. Schedule tests and inspections with the utility owner as required under the conditions of the permit, and this section. The sanitary sewer system will not be accepted or considered complete until all improvements pass the testing requirements of the local utility owner, and a copy of all passing tests are provided to the Owner's Agent.
- G. Protect piping from damage. Do not store PVC piping and fittings in direct sunlight.

## PART 2 - PRODUCTS

- 2.1 GRAVITY PIPE: See the site utility piping specification for material specifications, and the site drawings for allowable pipe materials.
  - A. Install piping from the sewer outlet point to 5' outside the face of building according to the site drawings. The site contractor shall be responsible for making the final connection to the building sewer, including any drop piping required to match invert elevations.
  - B. Use jointing materials and methods defined in the site utility piping specification.
- 2.2 PRECAST DRAINAGE STRUCTURES:
  - A. All structures shall be precast concrete according to ASTM C 478. Provide preformed flexible joint sealant per ASTM C 990 or rubber gasket joints per ASTM C 443 and ASTM C 891.
  - B. Grade Rings: Set structure depth to include two 6" thick reinforced concrete rings that are compatible with the specified castings.
  - C. Steps: Include steps that are placed in alignment with the access hole opening and extend from the bottom of the structure to the top of the structure. Place each step at 12" intervals and provide a slip resistant surface on each step.
  - D. Provide resilient boot according to ASTM C 923 to connect the sewer piping to the precast drainage structure.
  - E. Concrete for Channels and Benches: Portland cement design mix, 3000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
  - F. See Site Earthwork specification for backfill requirements.

2.3 CLEANOUTS:

- A. Install piping so cleanouts open in direction of flow in sewer pipe. Set cleanout frames and covers as shown on the site drawings.

2.4 TAP CONNECTIONS:

- A. Connect to existing sewer main according to the conditions of the sewer tapping permit.

PART 3 - INSTALLATION

3.1 GRAVITY PIPE TESTING:

- A. Test to be performed 30 days after installation.
- B. Flexible piping shall allow passage of a cylinder that is no smaller than 95% of the pipe inside diameter.
- C. Any piping that is damaged shall be removed and re-installed before approval.
- D. Air test plastic pipe according to ASTM F1417-92: "Standard Test Method for Installation Acceptance of plastic gravity sewer lines using Low-Pressure Air".
- E. Test PVC Piping according to AWWA M23, "Testing and Maintenance" Chapter.

3.2 MANHOLE STRUCTURE TESTING:

- A. Perform vacuum test on all manholes according to ASTM C1244-93 "Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure Test".

END OF SECTION 33 31 14

## SECTION 33 41 00 - STORM DRAINAGE SYSTEM

### PART 1 - GENERAL

#### 1.1 WORK INCLUDES:

- A. Storm drainage 5' outside building structures as shown on the Site Plans.
- B. Subdrainage.

#### 1.2 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Local storm water review agency standards and specifications.
- B. Terms and conditions of construction as required by the Contractor's permit with the controlling agency. When conditions of the permit conflict with proposed work, the contractor shall notify the Engineer for correction prior to installation. Any non-compliant work performed by the Contractor shall be at the Contractor's expense.
- C. Site Earthwork specification for excavation and backfill requirements.
- D. Control of Site Work Specification.

#### 1.3 DELIVERABLES:

- A. Product Data for the following: piping, fittings, cleanouts, precast concrete manholes, and casting frames and covers.
- B. Record Drawings: Include size, material, depth of cover, location, and elevation of all improvements within the contract documents. Include details of underground structures and connections.
- C. Progress Reports: Soil conditions encountered, work completed, etc.
- D. Passing test reports for the entire storm sewer system.
- E. Geotextile fabric data for subdrainage.

#### 1.4 CONTROL OF WORK:

- A. Clean any debris that may accumulate within the storm drainage system as a result of construction operations, including new and existing water piping and structures. Flush piping as required to purge the piping system.



- B. Cap the end of exposed piping during installation to minimize infiltration of material into the piping system.
- C. Inspect interior of piping to determine whether line displacement or other damage has occurred throughout the construction process. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
- D. Replace defective piping and structures using new materials, and repeat inspections until defects are within allowances specified. Re-inspect and repeat procedure until results meet specifications.
- E. Do not enclose, cover, or put the storm sewer into service before final inspection and approval by the local utility owner.
- F. Schedule tests and inspections with the utility owner as required under the conditions of the permit, and this section. The storm drainage system will not be accepted or considered complete until all improvements pass the testing requirements of the local utility owner, and a copy of all passing tests are provided to the Owner's Agent.
- G. Protect piping from damage. Do not store PVC piping and fittings in direct sunlight.

## PART 2 - PRODUCTS

### 2.1 GRAVITY PIPE:

- A. See the site utility piping specification for material specifications, and the site drawings for allowable pipe materials.
- B. Install piping from the sewer outlet point to 5' outside the face of building according to the site drawings. The site contractor shall be responsible for making the final connection to the building sewer, including any drop piping required to match invert elevations.
- C. Use jointing materials and methods defined in the site utility piping specification.

### 2.2 SUBDRAINAGE:

- A. See the site drawings for allowable pipe materials and the utility piping specification for jointing methods.
- B. Lay perforated pipe with perforations down.
- C. Drainage fabric: Polypropylene nonwoven geotextile filter that will allow a hydraulic flow rate of 110 gallon per minute per square foot when tested according to ASTM D 4491.

2.3 DRAINAGE FILL:

- A. Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate, Size No. 57, with 100 percent passing 1-1/2-inch sieve and not more than 5 percent passing No. 8 sieve.

2.4 PRECAST DRAINAGE STRUCTURES:

- A. All structures shall be precast concrete according to ASTM C 478. Provide preformed flexible joint sealants per ASTM C 990 or rubber gasket joints per ASTM C 443 and ASTM C 891.
- B. Grade Rings: Set structure depth to include two 6" thick reinforced concrete rings that are compatible with the specified castings.
- C. Steps: Include steps that are placed in alignment with the access hole opening and extend from the bottom of the structure to the top of the structure. Place each step at 12" intervals and provide a slip resistant surface on each step.
- D. Concrete for Channels and Benches: Portland cement design mix, 3000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
- E. See Site Earthwork specification for backfill requirements.

2.5 CLEANOUTS:

- A. Install piping so cleanouts open in direction of flow in sewer pipe. Set cleanout frames and covers as shown on drawings.

2.6 TAP CONNECTIONS:

- A. Connect to existing sewer main according to the conditions of the sewer tapping permit.
- B. Pressure and leak test concrete piping according to AWWA C603-90.

END OF SECTION 33 41 00