

PROJECT MANUAL

Sanibel Fire and Rescue Station 172

100% Construction Documents

VOLUME 1 of 2
Divisions 01 through 14

PREPARED FOR: Sanibel Fire and Rescue District

ISSUED: January 5, 2024

COMMISSION NO.: 2023820



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PROCUREMENT AND CONTRACTING
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To the best of the Architects knowledge the Plans and Specifications comply with the applicable minimum building codes and the applicable fire-safety standards as determined by the local authority in accordance with this section and 633 Florida Statutes.

END OF SECTION 00 04 00

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SECTION 00 05 00
ASBESTOS STATEMENT

To the best of the Architects knowledge these Contract Documents do not contain any asbestos containing materials intended for use in construction.

END OF SECTION 00 05 00

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PART 1 - GENERAL

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, is available for viewing as appended to this Document.

END OF SECTION 00 31 32

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GEOTECHNICAL ENGINEERING SERVICES REPORT

Velocity Project Number: 23-303

Project:

Sanibel Fire Station 172
5171 Sanibel Captiva Road
Sanibel, Lee County, Florida
Strap #: 18-46-22-T1-00002.0030

Client:

Mr. Chris Jackson
Sanibel Fire & Rescue District
2351 Palm Ridge Road
Sanibel Island, FL 33957

Date: August 25, 2023

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FIGURES

Figure 1 Project Location Plan

Figure 2 Boring Location Plan

BORING LOGS





Mr. Chris Jackson
Sanibel Fire & Rescue District
2351 Palm Ridge Road
Sanibel Island, FL 33957
(239) 472-5525
cjackson@sanibelfire.com

August 25, 2023

Subject: Geotechnical Engineering Services Report
Sanibel Fire Station 172
5171 Sanibel Captiva Road
Sanibel, Lee County, Florida
Strap #: 18-46-22-T1-00002.0030
Velocity Project Number: 23-303

Dear Mr. Jackson:

Velocity Engineering Services, LLC (Velocity) is pleased to submit this Geotechnical Engineering Services Report for the project referenced above. It has been our pleasure to work with you on this project.

1.0 INTRODUCTION

1.1 Project Description

Velocity understands that the proposed project will consist of the demolition of the existing fire station building and the construction of a new fire station headquarters and associated parking areas at the subject site. The client requested a geotechnical exploration program consisting of 6 test borings within/near the proposed fire station footprint to assist with planning for the project.

Velocity was provided with architectural plans with pre-selected boring locations, 2 pages, dated 08/28/23 by Schenkel Shultz Architecture. Additionally, Mr. Paul Moerschel, P.E. with TRC Worldwide Engineering, informed Velocity that maximum structural loads for the project are on the order of 180 kips for columns and 6 kips per foot for walls, and that approximately 5 feet of structural fill will be necessary within the building footprint to obtain the proposed building pad elevation. No other plans or construction details were available to Velocity at the time of this report.

Based on FEMA's National Flood Hazard Map, Velocity understands that the subject site is located within an "AE" flood zone.

1.2 Purpose & Scope of Services

The purpose of this exploration program was to evaluate the subsurface soil and groundwater conditions relative to the foundation support of the new fire station headquarters. Velocity therefore performed the following scope of services:

- ✓ Obtaining the necessary drilling permit, obtaining utility locates from Sunshine 811, and mobilizing a drill rig and crew to the site.
- ✓ Locating the test borings based on measured or estimated distances from existing structures and/or GPS coordinates.
- ✓ Performing six (6) Standard Penetration Test (SPT) borings (B-1 through B-6) to depths of forty (40) feet below the ground surface (BGS) within/near the footprint of the proposed fire station headquarters at locations pre-selected by the client.
- ✓ Grouting the test borings in accordance with regulatory requirements.
- ✓ Visually classifying the soil samples recovered from the test borings.
- ✓ Performing engineering analyses and preparing a Geotechnical Report for the project.

2.0 METHODOLOGY & FINDINGS

2.1 Site Features

The project site is a commercial parcel with an existing fire station facility. The site is generally level. The site is bordered by Bowmans Beach Road to the southwest and northwest, Sanibel Captiva Road to the northeast, single-family residences to the southeast.

The approximate site location is depicted in Figure 1, Project Location Plan.

2.2 Field Exploration Program

The test borings were performed in general accordance with ASTM D1586 “*Standard Test Method for Standard Penetration Test (SPT) and Split Barrel Sampling of Soils*”. This procedure uses a 140 pound hammer with a 30 inch drop to drive a 2 inch (outside) diameter hollow tube called a “split-spoon”. The number of hammer blows required to drive the split-spoon 12 inches is called the “N Value” and is an indication of the relative density of the soil(s). The split-spoon also captures samples of the soil(s) so they can be retrieved.

The approximate boring locations are depicted in Figure 2, Boring Location Plan.

2.3 Laboratory Examination

The soil samples retrieved during the field exploration program were visually examined in general accordance with ASTM D2488 “*Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*”. Each soil sample was classified in general accordance with the Unified Soil Classification System (USCS), modified as necessary to describe typical southwest Florida soils. Additional laboratory testing was not included in our scope of services, nor was it deemed necessary at this time.

The soil samples will be retained at Velocity’s office for 30 days from the date of this report. The samples will then be disposed of unless other arrangements, such as the client taking possession of them or Velocity retaining them beyond this date, have been agreed upon in writing.



2.4 Subsurface Soil Conditions

The subsurface soil conditions at the site generally consist of very loose to dense sand (SP), sand with silt (SP-SM), silty sand (SM), shell (SH) and weathered limestone (WLS) and hard limestone (LS) from the existing ground surface to the boring termination depths of approximately 40 feet BGS. Detailed records of each boring are attached to this report.

2.5 Groundwater

At the time of our field exploration program, the groundwater depth was measured at approximately 4.0 feet below the existing ground surface in the test borings. The groundwater measurements were obtained prior to initiation of mud rotary drilling.

Fluctuation in groundwater depths should be anticipated due to seasonal changes, local rainfall, surface water runoff, tidal influences, and other site-specific considerations. Ponding of storm water should be anticipated after heavy rain events. These groundwater depths and possible fluctuations should be considered when planning any excavations at the site. Dewatering may be required to facilitate the proposed construction.

3.0 EVALUATION & RECOMMENDATIONS

3.1 Building Foundations

The evaluation of foundation options is generally governed by 2 primary considerations, bearing capacity and settlement. Bearing capacity is the soil's ability to support the foundation load without experiencing a plunging failure. The selected foundation must be able to provide adequate bearing capacity within an acceptable range of settlement.

Based upon the project description and the subsurface conditions detailed herein, Velocity recommends supporting the proposed structure on a shallow foundation system in accordance with Section 3.2 of this report. These recommendations are contingent upon site preparation being performed in accordance with the specifications presented in Section 3.4 of this report.

3.2 Shallow Foundation Systems

An allowable soil bearing pressure of 2,500 psf may be used for shallow spread footing foundation design. Isolated column footings should have a minimum dimension of 24 inches and should bear at a depth of at least 24 inches below the lowest adjacent grade. Continuous wall footings should have a minimum width of 18 inches and should bear at a depth of at least 18 inches below the lowest adjacent grade. Settlement is projected to be less than 1 inch total and 1/2 inch differential.

3.3 Ground Floor Slab(s)

Ground floor slabs may be designed as traditionally reinforced concrete slabs-on-grade using a modulus of subgrade reaction ("K") of 150 pci. The ground floor slabs-on-grade should be structurally separated from all foundations, walls, and columns unless a monolithic "thickened edge" slab foundation is utilized. If a monolithic "thickened edge" slab is utilized, it should be properly reinforced to resist the bending moments that will occur due to the loading differences between the thickened foundation elements and the remainder of the slab.



A moisture vapor barrier should be placed beneath the ground floor slab-on-grade to minimize vapor intrusion in accordance with the Florida Building Code. Care should be taken to ensure that all seams, penetrations, and punctures in the barrier are properly sealed prior to the slab being poured.

3.4 Site Preparation

The building pad should be stripped and cleared of all organic material, roots, topsoil, and any other deleterious materials to a distance of at least 5 feet beyond the building limits. The stripped surface should be proof rolled and tested for compaction prior to any structural fill being placed. Structural fill may then be placed in lifts of not more than 12 inches and each lift should be compacted and tested prior to placement of the next lift.

Velocity recommends the following compaction requirements for this project. The specified compaction percentages are based upon the maximum dry density as determined by a “modified proctor test” in accordance with ASTM D1557 “*Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))*”.

- ✓ Proof Roll.....95%
- ✓ Structural Fill95%
- ✓ Bottom of Footings95%

All density testing should be performed in accordance with ASTM D6938 “*Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*”. Tests should be performed to a depth of 12 inches below the surface being tested, or the thickness of the soil layer if thinner than 12 inches, unless specified otherwise. Any areas not in compliance with the compaction requirements should be reworked and retested prior to placement of the next lift of fill. The following minimum testing frequencies are recommended:

- ✓ Building Pad Proof Roll & Fill 1 test per 2,500 sq.ft. (minimum 4) per lift
- ✓ Isolated Column Footings 1 test per footing
- ✓ Continuous Wall Footings 1 test per each 50 lineal feet
- ✓ Paved Areas..... 1 test per 5,000 sq.ft. (minimum 4) per lift

All structural fill material placed should be well graded and conform to the following requirements:

- ✓ Fines Content per ASTM D1140..... 12% maximum
- ✓ Organic Content per ASTM D2974..... 5% maximum
- ✓ Plasticity per ASTM D4318..... Non Plastic
- ✓ Maximum Particle Size..... 2 inches

Using vibratory compaction equipment at the site may disturb nearby structures. We recommend that vibration levels reaching any nearby structures be monitored during any operations utilizing vibratory equipment.



4.0 LIMITATIONS

4.1 Unanticipated Conditions

Velocity cannot be responsible for any unanticipated conditions that may be discovered on the site that were not encountered in our test borings. However, should any such unanticipated conditions be discovered, Velocity should be notified of them immediately in writing so that we may observe them and review their impact upon our recommendations presented herein.

If any of the project details stated herein are modified or changed, Velocity must be notified in writing so that we may review the applicability of our recommendations.

4.2 Boring Logs & Figures

The soil and groundwater conditions shown in the boring logs and reported herein reflect the conditions at the specific boring locations at the time of our exploration only. Conditions will vary across the site and will also vary with time. Soil layer transitions depicted on the boring logs should be considered approximate and variations in depth should be anticipated. The boring locations indicated were not surveyed and should be considered approximate.

4.3 Reliance

This report has been prepared for the exclusive use of the client, the project owner, and the design team for the indicated project only. No other parties are entitled to rely upon this report. Contractors should not rely upon this report for preparation of their bids and should perform their own investigations to confirm any details that may impact their bids. This report should not be relied upon to plan any other project at this site, or the same project at any other site.

4.4 Standard of Care

These geotechnical engineering services have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the location where the Work was performed. No other warranty, expressed or implied, is made including, without limitation, any warranty of fitness for a particular purpose other than those expressly stated herein.

4.5 Reproduction

No portion of this report should be reproduced or used unless the entire report is reproduced in full.

4.6 Out of Scope Considerations

The depths of the test borings performed herein were limited to the depths to which the anticipated foundation loads are likely to influence. Evaluation of potential hazards at deeper depths, such as karst (sinkhole) activity, is beyond the scope of this investigation.

The following items are considered out of scope considerations and have not been evaluated by Velocity: examination or testing of the soil samples recovered for chemical contamination or other environmental hazards; determination or evaluation of the seasonal high water table; and constructability review.



5.0 CLOSING & CERTIFICATION

We appreciate the opportunity to be of service to you on this project. Please do not hesitate to contact us if you have any questions or if we may further assist you.

Sincerely,

Velocity Engineering Services, LLC
12821 Commerce Lakes Drive, Suite 7
Fort Myers, FL 33913
FL DBPR LN 30362

Felipe Compean, P.E.
Geotechnical Manager



This item has been digitally signed and sealed by

Digitally signed by
Felipe Compean
Date: 2023-08-25 11:
38:54

on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

A handwritten signature in blue ink, appearing to read 'Daniel Dewey'.

Daniel Dewey, E.I.
Staff Engineer



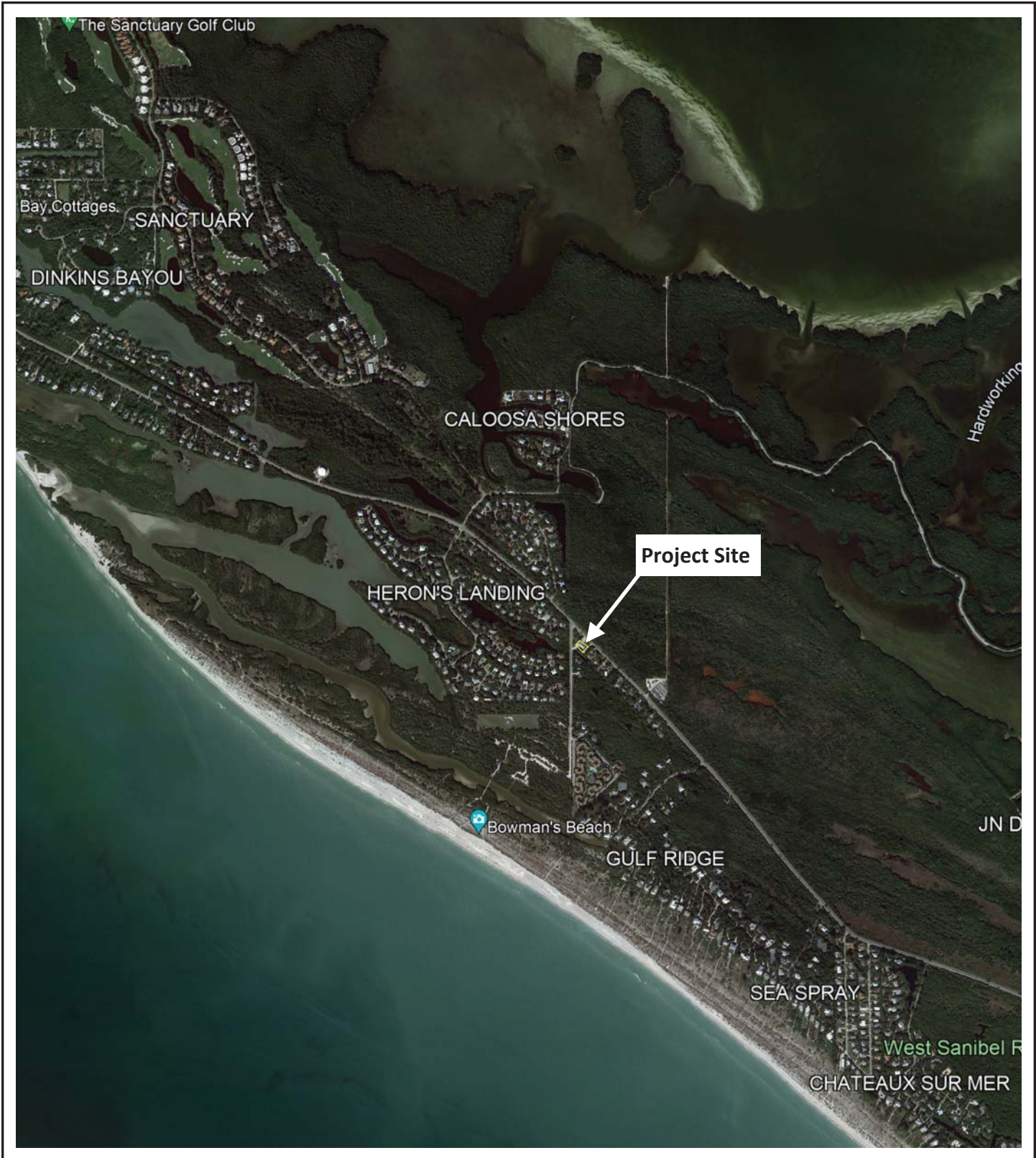


FIGURE 1 — PROJECT LOCATION PLAN

Sanibel Fire Station 172
5171 Sanibel Captiva Road
Sanibel, Lee County, Florida
Velocity Project Number: 23-303

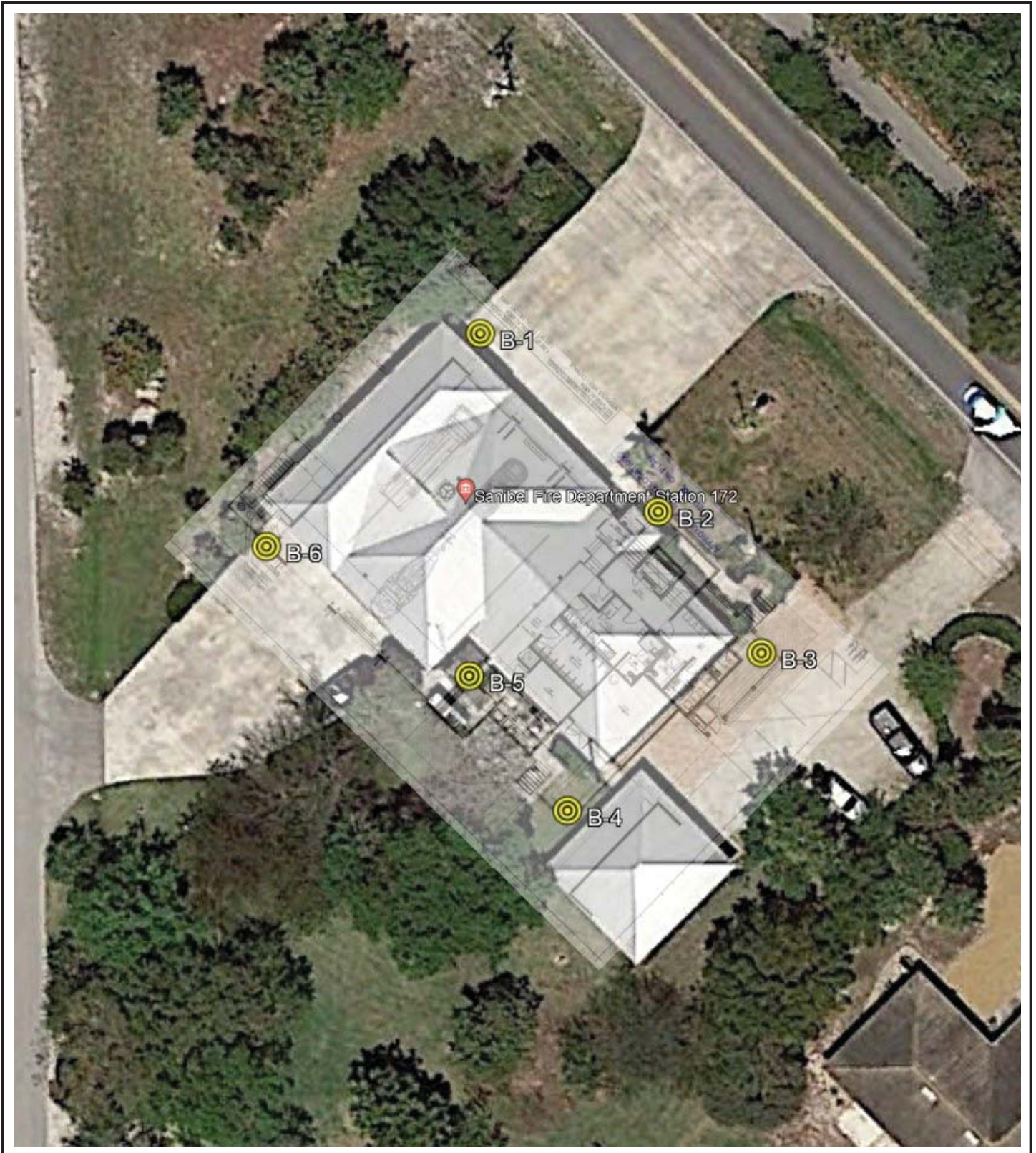


FIGURE 2 — BORING LOCATION PLAN



Sanibel Fire Station 172
5171 Sanibel Captiva Road
Sanibel, Lee County, Florida
Velocity Project Number: 23-303



KEY TO BORING LOGS

Major Division		Group Symbols	Typical Names
COARSE-GRAINED SOILS (50% of the material retained on No. 200 sieve)	Gravels (>50% retained on No. 4 sieve)	Clean Gravel	GW Well-graded gravels, gravel-sand mixtures, little or no fines
		Gravel w/Fines	GP Poorly-graded gravels, gravel-sand mixtures, little or no fines
			GM Silty gravels, gravel-sand-silt mixtures
		GC Clayey gravels, gravel-sand-silt mixtures	
	Sands (<50% passes No. 4 sieve)	Clean Sands	SW Well-graded sands, gravelly sands, little or no fines
		Sand w/ Fines	SP Poorly-graded sands, gravelly sands, little or no fines
			SM Silty sands, sand-silt mixtures
		SC Clayey sands, sand clay mixtures	
FINE-GRAINED SOILS (>50% of the material passes No. 200 sieve)	Sils and Clays (Liquid limit < 60)	ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
		CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
		OL Organic silts and organic silty clays of low plasticity	
	Sils and Clays (Liquid limit > 60)	MH Inorganic silts micaceous or distomaceous fine sandy or silty soils, organic silts	
		CH Inorganic clays of high plasticity, fat clays	
		OH Organic clays of medium to high plasticity, organic silts	
Highly Organic Soils	PT	Peat and other highly organic soils	
Limestones	LS	Limestone layer	
	WLS	Weathered and/or deteriorated limestone	

DENSITY of SANDS, GRAVELS, and WEATHERED LIMESTONE	
<u>N Value</u>	<u>Density</u>
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
50+	Very Dense

CONSISTENCY of SILTS & CLAYS	
<u>N Value</u>	<u>Density</u>
0-2	Very Soft
3-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
30+	Hard

HARDNESS OF LIMESTONE	
<u>N Value</u>	<u>Density</u>
50-99	Soft
100+	Hard

PROPORTIONS	
<u>Content</u>	<u>Description</u>
0-10%	With a Trace
10-25%	With Some
25-50%	With
*Recovery is 100% unless noted otherwise	

ORGANIC SOIL PROPORTIONS	
<u>Organic Content</u>	<u>Description</u>
0-2%	With a Trace of Organics
2-5%	With Some Organics
5-20%	With Organics / Peat
20-100%	Highly Organic / Peat

ABBREVIATIONS			
WT	Water table at time of boring	Moisture	Moisture Content per ASTM D2216
HA	Boring advanced using Hand Auger	-200	% passing #200 sieve per ASTM D1140
~	Approximated N value due to refusal	Organics	Organic Content per ASTM D2974
		LL, PL, PI	Atterberg Limits per ASTM D4318



BORING LOG NUMBER: B-1

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/8/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

0		N/A			CONCRETE	7 inches of concrete
		5	12		SAND WITH SILT (SP-SM) Medium Dense	Brown with a trace of shell
		7				
		8				
		7	12			Gray to tan with shell
		6				
		6				
		5				
WT		3			SAND (SP)	Tan with shell
		5	13			
5		8			Medium Dense	
		7				Tan with shell
		7				
		10	22			
		12				
		9				
		10				Tan with sand
		10	23		SHELL (SH)	
10		13			Medium Dense	
		12				
		10	29		SAND (SP)	Gray with some shell
		15			Medium Dense	
15		14				
		7	10		SAND WITH SILT (SP-SM)	Gray with a trace of shell
		5			Loose	
20		5				
		5	10		SILTY SAND (SM)	Gray with a trace of shell
		6				
25		4			Loose	
		3	5			Gray with shell
		3				
30		2				



BORING LOG NUMBER: B-1

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/8/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

30					SILTY SAND (SM) Loose	
						Hard drilling from 32 to 38.5 feet
	X	50/1"	100+		LIMESTONE (LS) Hard	Gray
35						
	X	6 6 4	10		WEATHERED LIMESTONE (WLS) Loose	Gray
40						Boring terminated at 40 feet
45						
50						
55						
60						



BORING LOG NUMBER: B-2

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/8/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

0		8			<p>SAND (SP)</p> <p>Loose to Medium Dense</p>	Brown with some rock and shell
		7	12			Brown with shell
		5				
		3				
		3	7			
		4				
		4				
WT		3				
		5	15			Tan with shell
5		10				
		7				
		5				
		9	24		Tan with shell	
		15				
		14				
		7				
		12	26		Tan with sand	
		14				
10		13				
					<p>SHELL (SH)</p> <p>Medium Dense</p>	Tan with sand
		13	24		Tan with sand	
		15				
15		9				
					<p>SAND (SP)</p> <p>Loose to Medium Dense</p>	Light gray with a trace of shell
		7	14		Gray	
		7				
20		7				
					<p>SAND WITH SILT (SP-SM)</p> <p>Very Loose</p>	Gray
		3	8		Gray with a trace of shell	
		4				
25		4				
					<p>SAND WITH SILT (SP-SM)</p> <p>Very Loose</p>	Gray with a trace of shell
		1	3		Gray with a trace of shell	
		2				
30		1				



BORING LOG NUMBER: B-2

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/8/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

30					SAND WITH SILT (SP-SM) Very Loose	
					WEATHERED LIMESTONE (WLS)	Gray
	X	10 50/1"	100+			Hard drilling from 34 to 38 feet
35					LIMESTONE (LS) Hard	
					WEATHERED LIMESTONE (WLS) Medium Dense	Gray
	X	5 5 8	13			Boring terminated at 40 feet
40						
45						
50						
55						
60						



BORING LOG NUMBER: B-3

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/9/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

0	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">3 8 7 7</p> <p style="text-align: center;">15</p> </div>	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">6 7 7 8</p> <p style="text-align: center;">14</p> </div>	<p>SAND (SP)</p> <p>Medium Dense to Dense</p>	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">4 5 9 7</p> <p style="text-align: center;">14</p> </div>	<p>Gray to tan with rock and a trace of shell</p> <p>Tan with a trace of shell</p> <p>Tan with shell</p> <p>Tan with shell</p> <p>Tan with shell</p> <p>Gray with a trace of shell</p>		
WT	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">10 17 20 19</p> <p style="text-align: center;">37</p> </div>	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">8 14 17 18</p> <p style="text-align: center;">31</p> </div>					
5	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">9 17 17</p> <p style="text-align: center;">34</p> </div>	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">3 3 7</p> <p style="text-align: center;">10</p> </div>		<p>SAND WITH SILT (SP-SM)</p> <p>Loose</p>		<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">2 2 1</p> <p style="text-align: center;">3</p> </div>	<p>Gray with some shell</p> <p>Gray with some shell</p>
10	<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">2 2 2</p> <p style="text-align: center;">4</p> </div>	<p>SILTY SAND (SM)</p> <p>Very Loose</p>				<div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center;">2 2 2</p> <p style="text-align: center;">4</p> </div>	
15							
20							
25							
30							



BORING LOG NUMBER: B-3

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/9/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

30					SILTY SAND (SM) Very Loose	
	X	50/3"	100+		LIMESTONE (LS) Hard	Hard drilling from 33 to 36 feet Gray
35					WEATHERED LIMESTONE (WLS) Medium Dense	Gray
	X	10 8 12	20			
40						Boring terminated at 40 feet
45						
50						
55						
60						



BORING LOG NUMBER: B-4

PROJECT: Sanibel Fire Station 172
 PROJECT No.: 23-303 DATE: 8/7/23 GROUNDWATER: 4.0 ft
 NOTES: Loss of circulation of the drilling fluid from the ground surface to 40 feet

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

0		3			SAND (SP)	Brown with shell and a trace of root
		1	2			Brown with shell
		1				
		3				
		3	6			
		4				
		2				
		4				
WT		6				
5		8	18			
		10				
		10				
		7				
		15	31			
		16				
		15				
		9				
		12	27			
		15				
10		15				
					Very Loose to Dense	
		14				
		17	33			Gray with a trace of shell
15		16				
					SAND WITH SILT (SP-SM)	
		5				Gray with a trace of shell
		3	10			
20		7			Loose	
		1				Gray with a trace of shell
		2	4			
25		2			SILTY SAND (SM)	
					Very Loose	
		3				Gray with some shell
		2	4			
30		2				



BORING LOG NUMBER: B-4

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303 DATE: 8/7/23 GROUNDWATER: 4.0 ft

NOTES: Loss of circulation of the drilling fluid from the ground surface to 40 feet

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

30					SILTY SAND (SM) Very Loose	
						Hard drilling from 32 to 38 feet
	X	50/3"	100+		LIMESTONE (LS) Hard	Gray
35						
	X	2 2 2	4		WEATHERED LIMESTONE (WLS) Very Loose	Gray
40						Boring terminated at 40 feet
45						
50						
55						
60						



BORING LOG NUMBER: B-5

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/8/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

0		2	6		SAND (SP) Very Loose to Loose	Brown with some rock		
		3						
		3						
		1	3			Brown with shell and a trace of root		
		1						
		2						
		2						
WT		3	8			SHELL (SH) Loose	Tan with sand	
		4						
		8						
		7	29			SAND (SP) Medium Dense	Tan with shell	
		13						
		16						
		19					Tan with shell	
		9	27					
		12						
		15						
10		15						
		12	28				Tan with a trace of shell	
		13						
		15						
15								
		5	12			SAND WITH SILT (SP-SM) Medium Dense	Gray with a trace of shell	
		5						
		7						
20								
		6	12				Gray with a trace of shell	
		7						
		5						
25								
		1	3		SILTY SAND (SM) Very Loose	Gray with shell		
		1						
		2						
30								



BORING LOG NUMBER: B-5

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/8/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

30					SILTY SAND (SM) Very Loose	
						Hard drilling from 32 to 37 feet
	X	50/2"	100+		LIMESTONE (LS) Hard	Gray
35						
	X	10 8 5	13		WEATHERED LIMESTONE (WLS) Medium Dense	Gray
40						Boring terminated at 40 feet
45						
50						
55						
60						



BORING LOG NUMBER: B-6

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/7/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

0					CONCRETE	6 inches of concrete
			20		SAND (SP) Medium Dense	Brown with traces of rock and shell
			4		SHELL (SH) Very Loose	Tan with sand
WT			21		SAND (SP) Medium Dense to Dense	Tan with shell
5			31			Tan with shell
			26			Tan with shell
			30			Gray
15			14		SILTY SAND (SM) Very Loose to Medium Dense	Gray
20			9			Gray with a trace of shell
25			4			Gray with some shell
30						



BORING LOG NUMBER: B-6

PROJECT: Sanibel Fire Station 172

PROJECT No.: 23-303

DATE: 8/7/23

GROUNDWATER: 4.0 ft

NOTES:

DEPTH (FEET) & Water Table	SAMPLE	BLOWS / 6"	"N" VALUE BLOWS / FT.	SYMBOL	SOIL DESCRIPTION	NOTES
----------------------------	--------	------------	-----------------------	--------	------------------	-------

30					SILTY SAND (SM) Very Loose to Medium Dense	
35	X 50/5"		100+		LIMESTONE (LS) Hard	Gray Hard drilling from 33.5 to 37 feet
40	X 7 15 5		20		WEATHERED LIMESTONE (WLS) Medium Dense	Gray
45						Boring terminated at 40 feet
50						
55						
60						

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Division 01

General Requirements

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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:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Phased construction.
 - 4. Work performed by Owner.
 - 5. Owner-furnished/Contractor-installed (OFCI) products.
 - 6. Contractor's use of site and premises.
 - 7. Work restrictions.
 - 8. Specification and Drawing conventions.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

- A. Project Identification: Sanibel Fire and Rescue Station 172.
 - 1. Project Location: Sanibel, FL.
- B. Owner: Sanibel Fire and Rescue District.
- C. Architect: SchenkelShultz Architecture.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.6 PHASED CONSTRUCTION

- A. Construct the Work in One phase.

1.7 WORK PERFORMED BY OWNER

- A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.8 WORK UNDER OWNER'S SEPARATE CONTRACTS

- A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

1.9 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:

1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect, with Contractor present, delivered items.
 - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

- B. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

1.10 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.11 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
 - 2. Maintain list of approved screened personnel with Owner's representative.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

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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 administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1 – Training Roof make-up.

1. Base Bid: Structural concrete slab, with insulation, cover board, KEE roofing membrane with walk pads covering the entire roofing surface.
2. Alternate: Structural Concrete, underside of concrete insulated with Foamed in Place Closed Cell insulation. Top of Structural slab to be sloped to internal drainage with concrete topping. Finish shall be Siplast Terapro, Liquid applied traffic Waterproofing System PMMA quartz aggregate topping. Provide Traffic Coating Manufacturers weathertightness warranty of 20 years.

END OF SECTION 01 23 00

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 administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form that is part of web-based Project management software acceptable to Architect.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

- e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 14 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 14 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

- B. Substitutions for Convenience: Not allowed unless otherwise noted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

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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 administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on web-based Project management software.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use form provided as part of web-based Project management software.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form provided as part of web-based Project management software.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on form provided as part of web-based Project management software.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on form provided as part of web-based Project management software. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on form provided as part of web-based Project management software. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

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- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

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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 administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 01 10 00 "Summary."

- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

- a. Project name and location.
- b. Owner's name.
- c. Owner's Project number.

- d. Name of Architect.
 - e. Architect's Project number.
 - f. Contractor's name and address.
 - g. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.
 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
 8. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
 9. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 10. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 11. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling one percent of the Contract Sum and subcontract amount.
 12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the 20th of the month. The period covered by each Application for Payment is one month, ending on the 30th.
 - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
 - 1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

- G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction conference.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 77 00 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

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- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.
 6. AIA Document G706A.
 7. AIA Document G707.
 8. Evidence that claims have been settled.
 9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 10. Final liquidated damages settlement statement.
 11. Proof that taxes, fees, and similar obligations are paid.
 12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

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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 administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Web-based Project management software package.
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination of Multiple Contracts: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.

- b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
 1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
 2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
 3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
 4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
 5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
 6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
 7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.
- D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
 1. File Preparation Format:
 - a. Same digital data software program, version, and operating system as original Drawings.
 - b. Revit, Version 2020, Civil Engineering Drawings are in Autocad, operating in Microsoft Windows operating system.

2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. BIM File Incorporation: Incorporate Contractor's coordination drawing files into BIM established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Revit 2020, Civil Engineering Drawings are in Autocad.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Owner name.
 3. Owner's Project number.
 4. Name of Architect.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
 - 1. Attachments shall be electronic files in PDF format.

- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 15 days of receipt of the RFI response.

- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project management software. Software log with not less than the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number, including RFIs that were returned without action or withdrawn.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM Model will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in Revit 2020.
 4. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
 - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.
 5. The following digital data files will be furnished for each appropriate discipline:
 - a. Floor plans.
 - b. Reflected ceiling plans.
- B. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project management software includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
 2. Provide up to seven Project management software user licenses for use of Owner, Architect, and Architect's consultants.
 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

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

1.9 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 30 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.
 - u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.

- w. Parking availability.
 - x. Office, work, and storage areas.
 - y. Equipment deliveries and priorities.
 - z. First aid.
 - aa. Security.
 - bb. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts.
 - l. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:

- 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.

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- 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Status of RFIs.
 - 15) Proposal Requests.
 - 16) Change Orders.
 - 17) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

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 administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Unusual event reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file.
 2. PDF file.
- B. Startup construction schedule.
1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 3. Total Float Report: List of activities sorted in ascending order of total float.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at weekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.

- K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including interim milestones.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review submittal requirements and procedures.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for Project closeout and Owner startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 - 1. Use scheduling component of Project management software package, for current Windows operating system.
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion and Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 4. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 6. Commissioning Time: Include no fewer than 30 days for commissioning.
 7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.

- c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
- a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- H. Contractor's Construction Schedule Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Final Completion percentage for each activity.

- I. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

- A. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 CPM SCHEDULE REQUIREMENTS

- A. Prepare network diagrams using AON (activity-on-node) format.
- B. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 14 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.

- b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Commissioning.
 - k. Punch list and Final Completion.
 - l. Activities occurring following Final Completion.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
 5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 1 percent of the Contract Sum.
 - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
 - b. Total cost assigned to activities shall equal the total Contract Sum.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.10 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction or Work Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on

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and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

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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 administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
 - 4. Final Completion construction photographs.
 - 5. Preconstruction video recordings.
 - 6. Periodic construction video recordings.
 - 7. Construction webcam.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in web-based Project management software site:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- C. Video Recordings: Submit video recordings within seven days of recording.
 - 1. Submit video recordings by uploading to web-based Project management software site. Include copy of key plan indicating each video's location and direction.
 - 2. Identification: With each submittal, provide the following information on web-based Project management software site:

- a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
3. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in three-ring binders. Provide label on front and spine. Include a cover sheet with label information. Include name of Project and date of video recording on each page.
- D. Time-Lapse Video: Submit time-lapse sequence video recordings within 3 days of recording.
1. Submit time-lapse sequence video recordings monthly by uploading to web-based Project management software site.
 2. Identification: For each recording, provide the following information on web-based Project management software site:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date(s) and time(s) video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.
- B. Construction Webcam Service Provider: A firm specializing in providing photographic equipment, web-based software, and related services for construction projects, with a record of providing satisfactory services similar to those required for Project.

1.5 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode with vibration-reduction technology. Provide supplemental lighting in low light levels or backlit conditions.
- C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- D. Metadata: Record accurate date and time and GPS location data from camera.

- E. File Names: Name media files with date and Project area and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Underslab services.
 - 3. Piping.
 - 4. Electrical conduit.
 - 5. Waterproofing and weather-resistant barriers.
- E. Periodic Construction Photographs: Take 50 photographs monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Time-Lapse Sequence Construction Photographs: Take 20 photographs as indicated, to show status of construction and progress since last photographs were taken.
 - 1. Frequency: Take photographs weekly, on the same day each week.
 - 2. Vantage Points: Following suggestions by Architect and Contractor, photographer shall select vantage points. During each of the following construction phases, take not less than two of the required shots from same vantage point each time, to create a time-lapse sequence as follows:
 - a. Commencement of the Work, through completion of subgrade construction.
 - b. Above-grade structural framing.
 - c. Exterior building enclosure.
 - d. Interior Work, through date of Substantial Completion.
- G. Final Completion Construction Photographs: Take 100 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

- H. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
1. Three days' notice will be given, where feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs shall be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

1.7 CONSTRUCTION VIDEO RECORDINGS

- A. Preconstruction Video Recording: Before starting construction, record video recording of Project site and surrounding properties from different vantage points, as directed by Architect.

1.8 CONSTRUCTION WEBCAM

- A. Webcam: Provide one fixed-location camera(s) with weatherproof housing, mounted to provide unobstructed view of construction site from location approved by Architect, with the following characteristics:
1. Static view.
 2. Capable of producing minimum 12 megapixel images.
 3. Provide pole mount, power supply, active high-speed data connection to service provider's network, and static public IP address for each camera.
- B. Live Streaming Images: Provide web-accessible image of current site image, updated at 15-minute intervals when construction is underway.
- C. Web-Based Interface: Provide online interface to allow viewing of each high-definition digital still image captured and stored during construction, from the Internet.
1. Access Control: Provide password-protected access for Project team administered by Contractor, providing current image access and archival image access by date and time, with images downloadable to viewer's device.
 2. Software: Provide responsive software interface for use on computer, tablet, and mobile screens with accompanying iPhone/iPad app and Android apps.
 3. Storage: Maintain images on the website for reference during entire construction period, and for not less than 30 days after Final Completion. Provide sufficient memory on remote server to store all Project images.
 4. Online Interface: Provide website interface with Project and client information and logos, calendar-based navigation interface for selecting images, and pan and zoom capability within high-definition images.
 5. Forward and Reverse: Provide capability to browse through images, moving forward and backward in time by individual image and by day.

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6. Slideshow: Provide capability to automatically display current images from sites when there are three or more cameras used.
 7. Time-Lapse: Provide capability for online display of project time-lapse.
 8. Dashboard: Provide capability to view thumbnails of all cameras on one screen.
 9. Weather: Provide corresponding weather data for each image captured.
 10. Provide public viewer open access.
- D. Maintain cameras and web-based access in good working order, according to web-based construction photographic documentation service provider's written instructions until Final Completion. Provide for service of cameras and related networking devices and software.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 33

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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:
 - 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals.

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."

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect 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 Schedule: 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 Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required 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 dates for purchasing.
- h. Scheduled date of fabrication.
- i. Scheduled dates for installation.
- j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect, will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
 2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
 3. Paper: Prepare submittals in paper form and deliver to Architect.
- 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 submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve 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 14 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 14 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 days for review of each submittal. Submittal will be returned through Architect, before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- D. 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.
- E. 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.
- F. 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.

1.7 SUBMITTAL REQUIREMENTS

- A. 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 unsuitable 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 that show 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 Shop Drawings, and before or concurrently with Samples.
- B. 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. Paper 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.
 - a. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
 3. BIM Incorporation: Incorporate Contractor's Shop Drawing files into BIM established for Project.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
 6. 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.
 7. 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 one 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.

8. 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. Mark up and retain one returned Sample set as a project record Sample.
 - 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.
- D. 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.
- E. 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.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
 1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
 2. 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.
 3. 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.
 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.

5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. 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 substrate preparation and primers required.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 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 insufficient 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 file paper copies 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.

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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.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.
- 1.9 CONTRACTOR'S REVIEW
- A. Action Submittals 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. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project management software. Include 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.
1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.
- 1.10 ARCHITECT'S REVIEW
- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.
1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
 2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
 3. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate 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. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

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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 administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
 - 1. Mockups are used for one or more of the following:

- a. Verify selections made under Sample submittals.
 - b. Demonstrate aesthetic effects.
 - c. Demonstrate the qualities of products and workmanship.
 - d. Demonstrate successful installation of interfaces between components and systems.
 - e. Perform preconstruction testing to determine system performance.
2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 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 Statement: Submit a statement 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

- A. Mockup Shop Drawings:
 - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager does not have other Project responsibilities.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.

- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, telephone number, and email address of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement of whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.

- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement of whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
 - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:
 - 1. Provide test specimens representative of proposed products and construction.
 - 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
 5. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 6. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed unless otherwise indicated.

1.11 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Payment for these services will be made from testing and inspection allowances specified in Section 01 21 00 "Allowances," as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.

4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

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 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.

30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASSP - American Society of Safety Professionals (The); www.assp.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
50. CDA - Copper Development Association; www.copper.org.
51. CE - Conformite Europeenne; www.ec.europa.eu/growth/single-market/ce-marking.
52. CEA - Canadian Electricity Association; www.electricity.ca.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.compositepanel.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa-group.org.
65. CSI - Construction Specifications Institute (The); www.csiresources.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTA - Consumer Technology Association; www.cta.tech.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
72. DHI - Door and Hardware Institute; www.dhi.org.
73. ECA - Electronic Components Association; (See ECIA).
74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. ECIA - Electronic Components Industry Association; www.ecianow.org.
76. EIA - Electronic Industries Alliance; (See TIA).

77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
80. ESTA - Entertainment Services and Technology Association; (See PLASA).
81. ETL - Intertek (See Intertek); www.intertek.com.
82. EVO - Efficiency Valuation Organization; www.evo-world.org.
83. FCI - Fluid Controls Institute; www.fluidcontrolsintitute.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmglobal.com.
87. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
88. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridarroof.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GANA - Glass Association of North America; (See NGA).
93. GS - Green Seal; www.greenseal.org.
94. HI - Hydraulic Institute; www.pumps.org.
95. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
96. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
98. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
99. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
100. IAS - International Accreditation Service; www.iasonline.org.
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Association; www.theicpa.com.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
113. II - Infocomm International; (See AVIXA).
114. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.com.
115. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
116. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
117. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
118. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISO - International Organization for Standardization; www.iso.org.
120. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
121. ITU - International Telecommunication Union; www.itu.int.
122. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
123. LMA - Laminating Materials Association; (See CPA).
124. LPI - Lightning Protection Institute; www.lightning.org.
125. MBMA - Metal Building Manufacturers Association; www.mbma.com.
126. MCA - Metal Construction Association; www.metalconstruction.org.

127. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
128. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
129. MHIA - Material Handling Industry of America; www.mhia.org.
130. MIA - Marble Institute of America; (See NSI).
131. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
132. MPI - Master Painters Institute; www.paintinfo.com.
133. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
134. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
135. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
136. NADCA - National Air Duct Cleaners Association; www.nadca.com.
137. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
138. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
139. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
140. NBI - New Buildings Institute; www.newbuildings.org.
141. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
142. NCMA - National Concrete Masonry Association; www.ncma.org.
143. NEBB - National Environmental Balancing Bureau; www.nebb.org.
144. NECA - National Electrical Contractors Association; www.necanet.org.
145. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
146. NEMA - National Electrical Manufacturers Association; www.nema.org.
147. NETA - InterNational Electrical Testing Association; www.netaworld.org.
148. NFHS - National Federation of State High School Associations; www.nfhs.org.
149. NFPA - National Fire Protection Association; www.nfpa.org.
150. NFPA - NFPA International; (See NFPA).
151. NFRC - National Fenestration Rating Council; www.nfrc.org.
152. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
153. NHLA - National Hardwood Lumber Association; www.nhla.com.
154. NLGA - National Lumber Grades Authority; www.nlga.org.
155. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
156. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
157. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
159. NSF - NSF International; www.nsf.org.
160. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
161. NSPE - National Society of Professional Engineers; www.nspe.org.
162. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
163. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
164. NWFA - National Wood Flooring Association; www.nwfa.org.
165. NWRA - National Waste & Recycling Association; www.wasterecycling.org.
166. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
167. PDI - Plumbing & Drainage Institute; www.pdionline.org.
168. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
169. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
170. RFCI - Resilient Floor Covering Institute; www.rfci.com.
171. RIS - Redwood Inspection Service; www.redwoodinspection.com.
172. SAE - SAE International; www.sae.org.
173. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
174. SDI - Steel Deck Institute; www.sdi.org.
175. SDI - Steel Door Institute; www.steeldoor.org.
176. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.

177. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
 178. SIA - Security Industry Association; www.siaonline.org.
 179. SJI - Steel Joist Institute; www.steeljoist.org.
 180. SMA - Screen Manufacturers Association; www.smainfo.org.
 181. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
 182. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
 183. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
 184. SPIB - Southern Pine Inspection Bureau; www.spib.org.
 185. SPRI - Single Ply Roofing Industry; www.spri.org.
 186. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
 187. SSINA - Specialty Steel Industry of North America; www.ssina.com.
 188. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
 189. STI - Steel Tank Institute; www.steeltank.com.
 190. SWI - Steel Window Institute; www.steelwindows.com.
 191. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
 192. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
 193. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
 194. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
 195. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
 196. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
 197. TMS - The Masonry Society; www.masonrysociety.org.
 198. TPI - Truss Plate Institute; www.tpinst.org.
 199. TPI - Turfgrass Producers International; www.turfgrassod.org.
 200. TRI - Tile Roofing Institute; www.tilerroofing.org.
 201. UL - Underwriters Laboratories Inc.; www.ul.com.
 202. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
 203. USAV - USA Volleyball; www.usavolleyball.org.
 204. USGBC - U.S. Green Building Council; www.usgbc.org.
 205. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
 206. WA - Wallcoverings Association; www.wallcoverings.org.
 207. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
 208. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
 209. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 210. WI - Woodwork Institute; www.wicnet.org.
 211. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
 2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 3. ICC - International Code Council; www.iccsafe.org.
 4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.

2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.

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2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/Main-Page.aspx.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

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 temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.

- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.

- G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of the Owner.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
 - 6. Indicate locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails.

2.2 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
1. Locate facilities to limit site disturbance as specified in Section 01 10 00 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.
- F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.
 - 1. Provide additional telephone lines for the following:
 - a. Provide one telephone line(s) for Owner's use.
 - 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.

- K. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
 - 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
 - 2. Utilize designated area within existing building for temporary field offices.
 - 3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 31 20 00 "Earth Moving."
 - 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 - 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 32 12 16 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- F. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

2. Remove snow and ice as required to minimize accumulations.
- H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touch up signs, so they are legible at all times.
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.

6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

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3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

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 administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."
- F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Resolution of Compatibility Disputes between Multiple Contractors:
 - a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

- C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.
- B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.

- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
 - 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 01 33 00 "Submittal Procedures."
 - 1. Form of Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
 - 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.
- D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

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 general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner's portion of the Work.
 - 6. Coordination of Owner-installed products.
 - 7. Progress cleaning.
 - 8. Starting and adjusting.
 - 9. Protection of installed construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
 - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Layout Conference: Conduct conference at Project site.
1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
 - a. Contractor's superintendent.
 - b. Professional surveyor Contractor's personnel responsible for performing Project surveying and layout.
 - c. Professional surveyor responsible for performing site survey serving as basis for Project design.
 2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
 3. Review requirements for including layouts on Shop Drawings and other submittals.
 4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certified Surveys: Submit two copies signed by land surveyor.
- C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.
- D. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 CLOSEOUT SUBMITTALS

- A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.7 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Section 01 40 00 "Quality Requirements."
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb, and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
1. Comply with Section 01 77 00 "Closeout Procedures" for repairing or removing and replacing defective Work.
- 3.6 CUTTING AND PATCHING
- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Site Access: Provide access to Project site for Owner's construction personnel.
1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
 2. Refer to Section 01 10 00 "Summary" for other requirements for Owner-furnished, Contractor-installed products
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.

- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

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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 administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- C. Recycle: Recovery construction waste for subsequent processing in preparation for reuse.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, construction waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- B. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there were no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include transportation and tipping fees and cost of collection containers and handling for each type of waste.
 3. Total cost of disposal (with no waste management).
 4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in transportation and tipping fees by donating materials.
 7. Savings in transportation and tipping fees that are avoided.
 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
1. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.
 - k. Electrical conduit.

- I. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Wood pallets.
 - 8) Plastic pails.

- m. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:
 - 1) Paper.
 - 2) Aluminum cans.
 - 3) Glass containers.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."

- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Section 32 93 00 "Plants" for use of clean sawdust as organic mulch.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

- a. Comply with requirements in Section 32 93 00 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

D. Paint: Seal containers and store by type.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

- 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
- 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.

C. Burning: Do not burn waste materials.

END OF SECTION 01 74 19

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 administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.

1.3 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 5. Submit testing, adjusting, and balancing records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 01 29 00 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
 5. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first, listed by room or space number.
 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.

- e. Page number.
- 4. Submit list of incomplete items in the following format:
 - a. MS Excel Electronic File: Architect, will return annotated file.
 - b. PDF Electronic File: Architect, will return annotated file.
 - c. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.10 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit by uploading to web-based project software site.
- D. Warranties in Paper Form:
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
 - i. Vacuum and mop concrete.
 - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - l. Remove labels that are not permanent.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - r. Clean strainers.
 - s. Leave Project clean and ready for occupancy.

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- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations required by Section 01 73 00 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 01 77 00

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 administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Architect.
 - 7. Name and contact information for Commissioning Authority.
 - 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
 - D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."
- 1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL
- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 1.8 EMERGENCY MANUALS
- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
 - B. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
 - C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.

- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.
- 1.11 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

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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 administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned Record Prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
 - c. Final Submittal:
 - 1) Submit Record Digital Data Files of Record Digital Data File plots.
 - 2) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction and Work Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file.
 - 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.

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100% Construction Documents

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

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 administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
 - 2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 01 78 23 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.

- l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning.
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

2. Owner will furnish an instructor to describe Owner's operational philosophy.
 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
1. Schedule training with Owner, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode with vibration reduction technology.
1. Submit video recordings by uploading to web-based Project software site.
 2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
 3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. Email address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.

- b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
- 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone or while dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 01 79 00

Division 03
Concrete

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 3 Specification Sections, apply to this Section.

1.2 WORK INCLUDES:

- A. All formwork for concrete as described in this section, indicated on the drawings or required by other sections of these specifications. Openings for other affected work. Form accessories and stripping forms.

1.3 QUALITY ASSURANCE:

- A. Codes and Standards
 - 1. Formwork shall comply with the provisions of ACI 347 "Recommended Practice for Concrete Formwork".
 - 2. ACI "Formwork for Concrete" and Specifications for Structural Concrete for Buildings.
 - 3. PSI - "Construction and Industrial Plywood".
- B. The Contractor is solely responsible for the design, construction and performance of the formwork. The engineer's examination of formwork plans and shoring operations shall in no way relieve the contractor of this responsibility.

1.4 SUBMITTALS:

- A. Submit shop drawings prepared and designed by an engineer registered in the state of Florida, for record purposes showing layout of shoring, sections and unusual details in accordance with the General Conditions of the Contract for construction. Submit sufficient information for full description of capacity.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Forms
 - 1. Wood
 - a. For concrete below grade, use standard grade or better boards & planks; or use 3/4" minimum thickness exterior type plywood, Grade B/B, Class I, PS-1.

- b. For exposed concrete surfaces use 3/4" minimum thickness exterior type plywood, Grade B/B, Class I, sanded both sides, PS-1.
 2. Steel
 - a. Steel forms shall be of such thickness that they shall remain true to shape. Metal forms which do not present a smooth surface or do not properly align shall not be used.
 3. Column/Pier Forms
 - a. For round columns/piers use fiberglass forms.
 - b. Form Oil:
 4. The inside of the forms shall be coated with a non-staining form oil, such as:
 - a. Magic-Kote by Symons Manufacturing Company, Des Plaines, Illinois;
 - b. Form-coat by Concrete Service Company, Philadelphia, Pennsylvania.
 - c. Eucoslip by Euclid Chemical Company.
 - d. Or approved equal.
- B. Form Ties:
 1. Form ties shall be snap-in form tie with a 1-inch minimum break off depth from the face of the concrete. Maximum depth into each face of wall limited to 1-1/2".
 2. Ties shall be removed after forms are removed and holes shall then be filled with mortar that matches the adjacent surfaces.
 3. Provide stainless steel form ties for all exterior surfaces exposed to view.

Approved Manufacturers
 - a. Dayton "Sure-Grip"
 - b. Hechman "Snapties"
 - c. Richmond "Snap-Tys"
 - d. Or approved equal
- C. Anchors
 1. Zinc-coated dovetail slots (oriented vertically) shall be located at 3 feet - 0 inches on center horizontally wherever concrete surfaces adjoin masonry. Where concrete masonry (CMU) abuts columns, provide dovetail slot at centerline of adjoining CMU.
 2. Approved Manufacturers
 - a. Hechman Number 100 Standard, 24 gauge
 - b. Hohman & Barnard, Inc., Number 305
 - c. Wire Products Company, Number F-17
 - d. DAS-STD by Gateway Building Products

PART 3 - EXECUTION

3.1 GENERAL:

- A. Forms, bracing, and supports shall be designed and constructed to withstand the pressure of freshly placed concrete. Temperatures of the concrete at time of placing, effects of vibration, speed of placement, the height of plastic concrete and similar factors shall be considered in the design. Concrete surfaces that are to be exposed shall be free of misalignment, unsightly bulges, offsets or ledges.
- B. Forms shall conform to the shape, lines, grades and dimensions of the concrete as called for on the drawings. Joints in forms shall be horizontal and vertical and shall be tightly fitted to prevent leakage of mortar. All vertical surfaces shall be formed.
- C. Removable sections shall be provided at sufficient intervals at the base of walls and columns to allow cleaning and inspection before concrete is placed. All open joints, holes or other blemishes shall be filled to provide a blemish free surface.
- D. Forms for concrete floor slabs shall have sufficient strength and stiffness to prevent sagging or deflection while subjected to the usual construction loads. Walking on forms will not be permitted. Planks (2 in. thick) shall be distributed over the forms to prevent abuse. Wheeling of concrete or other materials directly over the forms will not be permitted. Runways above the top of the finished concrete shall be required throughout the construction period. Runways shall not rest on the reinforcing steel.
- E. Embedded structural steel shapes meant to provide support for other structural elements shall be bolted to the formwork to maintain accurate positioning. Wiring or nailing will not be permitted.
- F. 3/4 inch by 3/4" chamfer strips shall be placed in the corners of forms to produce beveled edges on all permanently exposed surfaces. Corners which abut masonry walls shall not be chamfered.
- G. Forms shall be checked just prior to placing concrete and tightened as required to produce flush surfaces.
- H. Provisions shall be made for chases, offsets, openings, depressions, curbs and bulkheads.
- I. Camber formwork to compensate for anticipated deflections in the formwork due to weight of forms and wet concrete, and/or any additional camber as shown on the drawings.
- J. Floors have not been designed to carry the construction loads of the floor above. Contractor must design and furnish necessary shoring and reshoring to support the loads.
- K. The shores and supports for the formwork shall have ample strength to support all applied loads without settlement. Provide positive means of adjustment (wedges or jacks) for shores to take up any settlement during placement.
- L. Sills, if any, shall rest on solid ground, free from frost. Studs, walls, and bracing shall be dimension stock of sizes as required by form design. Dimensions of centering, bracing, etc. shall be in accordance with "ACI Recommended Practices for Concrete Formwork" (ACI 347).
- M. Sleeves, Reglets, Inserts and Conduits: After forms are erected and before reinforcement is placed, all sleeves, reglets and inserts for mechanical trades must be set in place by the trade involved. Other sleeves, anchors, inserts, anchor bolts, specialties and similar items embedded in the concrete shall be furnished, accurately located as shown and set by the Contractor. In

general, electric conduits shall be placed within the middle one-third of the thickness of the concrete in which it is embedded.

- N. Before placing reinforcement or concrete the surface of the form shall be coated with approved non-staining form oil to prevent bond with the concrete surface.
- O. Reinforcements shall be adjusted to fit the sleeves, inserts, and openings, using additional bars where required around openings.

3.2 BULKHEADS:

- A. Place bulkheads where end of days work requires a joint in a wall, beam or slab. Reinforcing steel shall extend through the bulkhead. All joints shall be keyed for 2 of the member thickness unless directed otherwise by the Engineer. Location of bulkhead must be approved by the Engineer.

3.3 REMOVAL OF FORMS:

- A. Forms shall not be removed from concrete surfaces until the following minimum requirements are met.
 - 1. Formwork for concrete slabs, beams, columns and walls may be removed at the discretion of the Contractor, IF it can be proven that the concrete has met sufficient strength (3,000 psi) to resist the applied loads (i.e. through modified mixes to meet minimum strengths earlier, etc.). Strength shall be determined by tests on cylinders site-cured under the same conditions as the work in question.

3.4 RESHORING:

- A. When reshoring is permitted or required, the operations shall be planned in advance and shall be subject to approval. While reshoring is under way, no live load shall be permitted on the new construction.
- B. In no case during reshoring shall concrete in beam, slab, column or any other structural member be subjected to combined dead and construction loads in excess of the loads permitted by the Engineer for the developed concrete strength at the time of reshoring. Reshores shall be placed as soon as possible after stripping operations are complete but in no case later than the end of the working day on which stripping occurs. Reshores shall be tightened to carry their required loads without over stressing the construction. Reshores shall remain in place until testing representative of the concrete being supported have reached the specified strength or the strength specified in the contract documents for removal of reshores.
- C. Floors supporting shores under newly placed concrete shall have their original supporting shores left in place or shall be reshored. The reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one half of the capacity of the shoring system above. The reshores shall be located directly under a shore position above unless other locations are acceptable

3.5 REUSE OF FORMS:

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

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

3.6 VAPOR BARRIER:

- A. Before laying of sheet, subgrade must be smoothed eliminating any protrusions that may cause damage or rupturing of film.

- B. Use widest practical widths; lapping where required shall be a Z-lock not less than 6 inches wide with top lap placed in the direction of the spreading of the concrete and underneath the reinforcing mesh prior to pouring.

END OF SECTION 03 10 00

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PART 1 - GENERAL

1.1 REFERENCE:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 3 Specification Sections, apply to this Section.

1.2 WORK INCLUDES:

- A. Provide concrete, concrete masonry unit and precast concrete reinforcement as shown on the drawings, required by these specifications or necessary for proper completion of the work.

1.3 SUBMITTALS:

- A. Shop drawings showing all bar sizes, supports, fabrication dimensions and location for placing of the reinforcing in accordance with the General Conditions of the Contractor for construction shall be submitted for approval. Approval shall be obtained prior to fabrication.
- B. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, diagrams of bent bars, and arrangements of concrete reinforcement.

1.4 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with the provisions of the most recent edition of the following codes, specifications and standards, except as otherwise shown or specified.
 - 1. ACI 301 - Guidelines for Structural Concrete for Building.
 - 2. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 3. ANSI/ASTM A83 - Cold Drawn Steel Wire for Concrete Reinforcement.
 - 4. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
 - 5. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - 6. ANSI/AWS D1.4 - Structural Welding Code Reinforcing Steel.
 - 7. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 8. ASTM A616 - Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 9. ASTM A617 - Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 10. CRSI - Manual of Practice.
 - 11. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.

12. CRSI 65 - Recommended Practice for Placing Bar Supports, Guidelines and Nomenclature.
13. No foreign steel shall be used.

PART 2 - PRODUCTS

2.1 MATERIAL:

- A. Reinforcing Bars shall be rolled from new billet steel, Grade 60 and deformed in accordance with ASTM A615, for bars numbers 3 to number 18.
- B. Welded wire fabric shall be ASTM A185, welded steel wire fabric. The yield strength of the steel wire shall not be less than 60,000 pounds per square inch and shall be epoxy coated conforming to ASTM A776 81.
- C. Bar Supports and Spacers
 1. For unexposed concrete, bar supports and spacers shall be manufactured of standard brights basic wire upturned legs.
 2. For concrete which will be exposed to view from the underside upon completion of the structures, use plastic capped bar supports and spacers.
 3. For slabs on grade, use bolsters with runners where base will not support chair legs.
 4. Do not use wood, brick or other non-specified material.
- D. Tie wire: Federal specifications QQ-W-461 Annealed Steel, 16 ga. galvanized minimum.
- E. Welded electrodes: AWS A5.1, Low Hydrogen, E70 Series.
- F. Welded Inserts: Provide wedge inserts for the support of brick ledger angles. Wedge inserts shall be placed at 4'-0" o.c. unless drawings indicate a more restrictive spacing. Provide the F-7 wedge insert and 3/4" diameter askew bolt, nut and washers as manufactured by Dayton Superior, 10101 C General Drive, Orlando, Florida, or equal.

Wedge inserts and 3/4" diameter bolts to be deemed equal shall submit test information documenting an ultimate capacity of at least 8,500 pounds when the shelf angle is loaded 2-1/4" from the face of concrete, with the bottom of the insert 1-1/2" clear from the beam bottom, for concrete strength of 5,000 psi.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Cleaning and storage reinforcement: Steel reinforcement at the time concrete is placed shall be free from heavy rust, scale or other coating that will destroy or reduce the bond.
- B. All reinforcing steel shall be stored in neat piles at the site clear of the ground in such a manner that all bars can be readily identified when required.

- C. Excessive form oil on the reinforcing shall be removed by washing the reinforcing with kerosene. Exercise due care that no smoking or welding is permitted in the area of cleaning. Provide fire extinguisher at cleaning site.
- D. Supports for reinforcing steel: All reinforcing steel shall be rigidly supported, accurately located and held in position by the use of proper reinforcing steel supports, spacers and accessories before the concrete placement begins.
- E. The legs of all reinforcing supports shall be bent to form a foot so that the side and not the end of leg rods bears on the form.
- F. Metal reinforcement shall be protected by the thickness of the concrete indicated on the drawings.
- G. Do not use bar supports or reinforcing as support for concrete runways or construction loads.
- H. Placing tolerances: Clear distance to formed surfaces: +/- 1/4 inch. Minimum spacing between bars: -1/4 inch:
 - 1. Top Bars in Slabs or Beams:
 - Members 8" or less in depth: +/- 1/4 inch
 - Members 8" to 24" in depth: +/- 1/4 inch
 - Members 24" or greater in depth: +/- 1/2 inch
 - 2. Crosswire of Slabs or Beams: Spaced evenly within 2 inches.
 - 3. Lengthwise of Member: +/- 2 inches
- I. Bending details: Typical bending and placing diagrams are shown on the drawings. For parts not shown, bending details and lengths shall conform to the requirements of the ACI Building Code 318 and "Manual of Standard Practice for Detailing Reinforced Concrete Structures" ACI 315.
- J. Bends for stirrups and ties shall be made around a pin having the diameter no less than 1-1/2 inches for number 3, and 2 inches for number 4.
- K. Bends for other bars shall be made around a pin having a diameter not less than six bar diameters for number 3 to number 6, 8 bar diameters for number 9, number 10 and number 11, 10 bar diameters for number 14 and number 18.
- L. All bars shall be bent cold. Heating of bars will not be allowed.

3.2 SPECIAL REINFORCING REQUIREMENTS:

- A. Where walls or other items are shown as built integrally with other section, but are placed as separate pours, key and dowels must be provided. Dowels shall be the same size and at the same spacing as reinforcing.
- B. Main reinforcing bars shall not be spliced unless so noted on the drawings or approved by the Architect/Engineer.
- C. Provide electrically welded wire fabric, ASTM A-185 reinforcing in all concrete slabs on ground unless shown otherwise. Sizing to be in accordance with those shown on the drawings.

- D. Provide corner bars of same size and spacing as main reinforcement at all intersections and corners.
- E. Where openings occur in walls, or slabs, provide two number 5 bars at all sides and extending at least two feet beyond the corners and two number 5 bars at least three feet long diagonally across each re-entrant corner.
- F. Unless permitted by an Inspector employed by the Owner reinforcement shall not be bent after being embedded in hardened concrete.

3.3 INSPECTION OF REINFORCEMENT:

- A. Reinforcing placement must be checked by an Inspector employed by the Owner before any concrete is placed. Any corrections shall be made before concrete is placed.
- B. Placement of reinforcing shall occur in such sequence that the Inspector has sufficient time to inspect the correctness of the reinforcing within the placement area and retains the right to require necessary revisions be made before concrete is placed.
- C. The Contractor shall notify the Inspector at least 24 hours in advance of concrete placement for a particular portion of the structure.
- D. Galvanized wire ties of double loop and tightly fastened to secure the proper spacing of rods and ties are required.

3.4 LAP SPLICING:

- A. Welded wire fabric shall be overlapped wherever successive mats or rolls are continuous such that the overlap measured between outermost cross wires is not less than one wire spacing plus 2 inches.
- B. Longitudinal (continuous) footing reinforcing: Class B.
- C. Beam Reinforcing: Class B.
- D. Column Reinforcing: Class B Offset lap splices.
- E. Column/footing dowels: Class B
- F. Masonry vertical reinforcing: Class B.
- G. Splices not included above: Class B.

END OF SECTION 03 20 00

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall construct all joints in concrete at the locations shown on the Drawings. Joints required in concrete structures are of various types and will be permitted only where shown on the Drawings, unless specifically accepted by the Engineer.
- B. Construction joints, expansion joints, contraction joints and control joints shall be provided at the locations shown and formed in accordance with the details shown on the Drawings and described in these specifications. This includes necessary joint sealants required at walkways and stairways of the structure.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to or exceed the applicable requirements of the following documents to the extent that the provisions therein are not in conflict with the requirements of this Section.
 - 1. Federal Specifications:
 - TT-S-00227E(3) – Sealing Compound, Elastomeric Type, Multi-component (For Caulking, Sealing, And Glazing Buildings And Other Structures).
 - 2. U.S. Army Corps of Engineers Standard Specifications
CRD-C572
 - 3. Commercial Standards:
 - ASTM C 920 - Specification for Elastomeric Joint Sealants.
 - ASTM D 624 - Test Method for Rubber Property --Tear resistance.
 - ASTM D 638 - Test Method for Tensile Properties of Plastics.
 - ASTM D 746 - Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - ASTM D 747 - Test Method for Apparent Bending Modules of Plastics by Means of a Cantilever Beam.
 - ASTM D 1752 - Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - ASTM D 2240 – Test Method for Rubber Property – Durometer Hardness.
 - ASTM D 2240 - Test Method for Rubber Property -- Durometer Hardness.

1.3 TYPES OF JOINTS:

- A. Construction Joints:

When fresh concrete is placed against a hardened concrete surface, the joint between the two pours is called construction joint.
- B. Contraction Joints:

Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the first pour, which shall be coated with a bond breaker. The slab reinforcement shall be stopped 4-8 inches from the joint; which is provided with a sleeve-type dowel, to allow shrinkage of the concrete of the second pour. Sealant groove shall also be provided when specified on the Drawings.

C. Expansion Joints:

To allow the concrete to expand freely, a space is provided between the two pours, the joint shall be formed as detailed on the Drawings. This space is obtained by placing a preformed joint filler against the first pour, which acts as a form for the second pour. Premolded expansion joint material shall be installed with the edge at the indicated distance below or back from finished concrete surface, and shall have a slightly tapered, dressed, and oiled wood strip secured to or placed at the edge thereof during concrete placement, which shall later be removed to form space for sealing material. The space so formed shall be filled with a joint sealant material as specified herein.

D. Control Joints:

The function of the control joint is to provide a weaker plane in the concrete, where shrinkage cracks will probably occur. A groove, of the shape and dimensions shown on the Drawing, is formed or saw-cut in the concrete. This groove shall be filled with a joint sealant.

1.4 SUBMITTALS

A. Joint Sealant: Prior to ordering the sealant material, the Contractor shall submit to the Engineer for the Engineer's review, sufficient data to show general compliance with the requirements of the Contract Documents.

B. Product data sheets of all materials proposed under this section

C. Shipping Certification:

The Contractor shall provide written certification from the manufacturer as an integral part of the shipping form, to show that all of the material shipped to this project meets or exceeds the physical property requirements of the Contract Documents. Contractor certificates are not acceptable.

D. The Contractor shall submit placement Shop Drawings showing the location and type of all joints for each structure.

1.5 QUALITY ASSURANCE/WARRANTY

A. Sealants: The Contractor shall provide a two-year written guarantee of the joint sealant installation against faulty and/or incompatible materials and workmanship, together with a statement that it agrees to repair or replace, to the satisfaction of the Owner at no additional cost to the Owner, any such defective areas which become evident within said two-year guarantee period.

PART 2 - PRODUCTS

2.1 JOINT SEALANT

A. Joint sealant shall be polyurethane polymer designed for bonding to concrete which is continuously submerged in water.

B. Joint sealant material shall meet the following requirements:

Work Life	45 - 90 minutes
Time to Reach	20 Shore " A
Hardness	24 hours, maximum(at 77 °F, 200 gr quantity)
Ultimate Hardness	30 - 40 Shore "A"
Tensile Strength	250 psi, minimum
Ultimate Elongation	400 percent, minimum

Tear Resistance (Die C ASTM D 624)	75 pounds per inch of thickness, minimum
Color	As Selected by Owner

- C. All polyurethane sealants for joints in concrete shall conform to the following requirements:
1. Sealant shall be 2-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ANSIIASTM C 920 or Federal Specification TT-S-00227 E(3) for 2-part material, as applicable.
 2. For vertical joints and overhead horizontal joints, only "non-sag" compounds shall be used; all such compounds shall conform to the requirements of ANSIIASTM C 920 Class B, or Federal Specification TT-S-0027 E(3), Type II.
 3. For plane horizontal joints, the self-leveling compounds which meet the requirements of ANSIIASTM C 920 Class A, or Federal Specification TT-S-0027 E(3), Type I shall be used. For joints subject to either pedestrian or vehicular traffic, a compound providing non-tracking characteristics, and having a Shore "A" hardness range of 25 to 35, shall be used.
 4. Primer materials, if recommended by the sealant manufacturer, shall conform to the printed recommendations of the sealant manufacturer.
- D. All sealants, wherever shown on the Drawings.
- E. Primers utilized for application of joint sealants shall be approved materials for the sealant manufacturer selected.

2.5 PREFORMED JOINT FILLER

- A. Preformed joint filler material shall be of the preformed non- extruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth is ASTM D 1752 for Type I, except as otherwise specified herein.

2.6 BACKER ROD

- A. Backer rod shall be an extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant material used and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at 8 psi. The rod shall be 1/8-inch larger in diameter than the joint width except that a one-inch diameter rod shall be used for a 3/4-inch wide joint.

2.7 BOND BREAKER

- A. Bond breaker shall be Super Bond Breaker as manufactured by Burke Company, San Mateo, California; Hunt Process 225-TU as manufactured by Hunt Process Co., Santa Fe Springs CA; Select Cure CRB as manufactured by Select Products Co., Upland, CA; or equal. It shall contain a fugitive dye so that areas of application will be readily distinguishable.

PART 3 EXECUTION

3.1 GENERAL

- A. Joint Location: Construction joints, and other types of joints, shall be provided where shown on the Drawings. The location of all joints, of any type, shall be submitted for review by the Engineer.
- B. Joint Preparation: Special care shall be used in preparing concrete surfaces at joints where bonding between two sections of concrete is required. Unless otherwise shown on the Drawings, such

bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of Section entitled "Cast-in-Place Concrete."

- C. Sealant application shall be in accordance with the manufacturer's printed instructions. The surfaces of the groove for the sealant shall not be coated.
- D. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant prior to application. All sealant shall cure at least 7 days before the structure is filled with water.
- E. All sealant shall be installed by a competent waterproofing specialty contractor who has a successful record of performance in similar installations. Before work is commenced, the crew doing the Work shall be instructed as to the proper method of application by a representative of the sealant manufacturer.
- F. Thorough, uniform mixing of 2-part, catalyst-cured materials is essential; special care shall be taken to properly mix the sealer before its application. Before any sealer is placed, the Contractor shall arrange to have the crew doing the Work carefully instructed as to the proper method of mixing and application by a representative of the sealant manufacturer.
- G. Any joint sealant which, after the manufacturer's recommended curing time for the job conditions of the Work hereunder, fails to fully and properly cure shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured or partially cured sealant and primer, and shall be re-sealed with the specified joint sealant. All costs of such removal, joint treatment, re-sealing, and appurtenant work shall be at the expense of the Contractor.

END OF SECTION 03 29 00

PART 1 - GENERAL

1.1 REFERENCE:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 3 Specification Sections, apply to this Section.

1.2 WORK INCLUDES:

- A. All labor and materials required for cast-in-place concrete shown on the drawings or specified herein. Concrete bases and pads for mechanical and electrical equipment, coordinate with respective disciplines. Concrete for grouting of concrete unit masonry.

1.3 QUALITY ASSURANCE:

A. Codes and Standards

- 1. Comply with the provisions of the most recent edition of the following codes, specifications and standards, except as otherwise shown or specified.
 - a. ACI 318 "Building Code Requirements for Reinforced Concrete."
 - b. ACI 301 "Specifications for Structural Concrete for Buildings."
 - c. ACI 302 "Recommended Practice for Concrete Floor or Slab Construction."
 - d. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
 - e. ACI 305 "Recommended Practice for Hot Weather Concreting."
 - f. ACI 307 "Recommended Practice for Cold Weather Concreting."
 - g. ACI 309 "Recommended Practice for Consolidation of Concrete."
 - h. CRSI Manual of Standard Practice
 - i. CRSI Placing Reinforcing Bars
 - j. ASTM C31 "Making and Curing Concrete Compression and Flexure Strength Test Specimens in Field."
 - k. ASTM C33 "Concrete Aggregates"
 - l. ASTM C39 "Compressive Strength of Molded Concrete Cylinders."
 - m. ASTM C42 "Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."
 - n. ASTM C94 "Ready-Mixed Concrete"
 - o. ASTM C143 "Slump of Portland Cement Concrete."
 - p. ASTM C150 "Portland Cement."
 - q. ASTM C172 "Sampling Fresh Concrete"

1.4 QUALITY CONTROL:

- A. Do not commence placement of concrete until mix designs have been approved by the Engineer. Any concrete work which does not conform to the specified requirements, including strength, tolerance and finishes shall be corrected by the Contractor at his expense and as directed by the Engineer.

1.5 DIMENSIONAL TOLERANCE FOR FORMED SURFACES:

- A. Variation from plumb:
 - 1. In the lines and surfaces of columns, piers, walls and in arises:
 - a. In any 10 ft. of length: 1/4 in.
 - 2. Exposed corner columns, control-joint grooves, and other conspicuous lines:

- a. In any 20 ft. of length: 1/4 in.
- B. Variation from the level or from the grades specified in the contract documents:
 - 1. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores:
 - a. In any 10 ft. of length: 1/4 in.
 - 2. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
 - a. In any bay or in 20 ft. length: 1/4 in.
- C. Variation of the linear building lines from established position in plan and related position of columns, walls, and partitions:
 - 1. In any bay: 1/4 in.
- D. Variation in the sizes and location of sleeves, floor openings, and wall openings: +1/4 in.
- E. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls: $\pm 1/4$ in.
- F. Footings
 - 1. Variations in dimensions in plan: $\pm 1/4$ in.
 - 2. Misplacement or eccentricity: Percent of the footing width in the direction of misplacement but not more than 2.0 in.
 - 3. Thickness:
 - a. Decrease in specified thickness: 5%
 - b. Increase in specified thickness: No limit
- G. Variation in steps:
 - 1. In a flight of stairs:
 - a. Rise: +1/8 in.
 - b. Tread: +1/8 in.
 - 2. In consecutive steps:
 - a. Rise: +1/8 in.
 - b. Tread: +1/8 in.
- H. NOTE: Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

1.6 SUBMITTALS:

- A. Concrete Mix Report
 - 1. For each proposed concrete mix, submit two copies of the test report mix. Submit report at least 15 days prior to start of concrete pouring.
- B. Material Certificates
 - 1. Provide material certificates signed by material manufacturer certifying that each material complies with the specified requirements.
- C. Test Reports
 - 1. Submit results of all compression, slump and air content tests performed during mix design and throughout the duration of the project as required by the Specifications.
 - 2. Submit sieve analysis of coarse and fine aggregate intended for use in the project.
 - 3. Submit a copy of State Certification that the concrete batching and weighing equipment has been inspected and approved.
 - 4. Submit letters from the cement and aggregate suppliers certifying that furnished material meet appropriate ASTM standards.

1.7 TESTING:

- A. Concrete shall be sampled and tested for Quality Control during placement of concrete.
- B. Failure to detect defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate Engineer for final acceptance.
- C. Required Sampling and Testing
 - 1. Samples for strength tests of each concrete mix shall be taken no less than once a day or no less than once for each 50 cu. yd. of concrete.
 - 2. If the total volume of concrete is such that the frequency of testing required above would provide less than five strength tests for a given mix, tests shall be made from at least five randomly selected batches.
 - 3. Secure composite samples in accordance with ASTM C172.
 - 4. Mold and cure five specimens from each sample in accordance with ASTM C31.
 - 5. Samples for test shall be taken at the 1/4 and 3/4 points of the load mixer.
 - 6. Cure specimens under laboratory conditions except as follows:
 - i. When in the opinion of the Engineer there is a possibility of the surrounding air temperature falling below 40°F he may require additional specimens to be cured under job conditions.
 - ii. In hot weather periods or periods of low humidity the Engineer may require additional specimens to be cured under job conditions.
 - 7. Test specimens in accordance with ASTM C39.
 - i. Test one specimen at 3 days.
 - ii. Test one specimen at 7 days.
 - iii. Test two specimens at 28 days for acceptance. This test of two specimens constitutes one strength test. The results of the strength test shall be the average of the strengths of the two specimens tested.
 - iv. Hold one specimen for future use if test does not comply at 28 days.
 - v. Determine slump of the concrete sample for each strength test and whenever consistency appears to vary using ASTM C143.
 - vi. Determine air content for each strength test in accordance with either ASTM C231, ASTM C173, or ASTM C138.
 - vii. Determine temperature of concrete sample for each strength test.
- D. Evaluation of Test Results
 - 1. For evaluation each specified concrete mix shall be represented by at least five strength tests.
- E. The strength level of the concrete will be considered satisfactory if both of the following requirements are met.
 - 1. The average of all sets of three consecutive strength tests (average of two cylinders) exceeds specified strength.
 - 2. No individual strength test (average of two cylinders) falls below the specified strength by 500 psi.
- F. If the strength level does not meet the above requirements, the Engineer shall consider the concrete to be deficient and shall have the right to reject the work or require load tests on the structure in the areas the tests represent at no cost to the Owner.
- G. Report tests results in writing to the Engineer and the Contractor on the same day that tests are made. Reports of compressive strength tests shall contain:
 - 1. Project identification name and number.
 - 2. Date of concrete placement

3. Name of Contractor.
4. Name of Concrete Supplier and Truck Number.
5. Name of Concrete Testing Service.
6. Concrete type and class.
7. Location of concrete batch in the structure.
8. Design compressive strength at 28 days.
9. Slump.
10. Air Content.
11. Concrete temperature.
12. Concrete mix identification number.
13. Compressive breaking strength.
14. Type of break for both 7-day tests and 28-day tests.

1.8 TESTING SERVICES:

- A. The Contractor will employ an independent testing laboratory meeting the requirements of ASTM E329 and approved by the Engineer to perform the following services:
 1. Sample concrete at placement and make slump, air content, temperature and compression tests as described above.
 2. Report test results to the Engineer.
- B. Contractor Responsibilities
 1. Pay for additional testing and inspection of materials or concrete occasioned by their failure by test of inspection to meet specification requirements.
 2. Provide the necessary testing services for the qualification of proposed materials and the establishment of mix designs, and for any other testing services required by the Contractor.
 3. Furnish any necessary labor to assist the designated testing agency in obtaining and handling samples.
 4. Advise the testing agency sufficiently in advance of operations to allow for completion of tests.
 5. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test specimens as required by ASTM C31.
 6. The use of Testing Services shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIAL:

- A. Portland Cement
 1. ASTM C150, Type I (for minor, non-structural elements) and Type II.
- B. Aggregate
 1. ASTM C33 and as herein specified.
 - i. Provide aggregates from a single source for all exposed concrete.
 2. Fine Aggregate: Clean, sharp natural sand free from loam, clay, lumps or other deleterious substance.
 3. Coarse Aggregate: For Normal Weight Concrete: Comply with ASTM C33 size #57. Clean, uncoated, processed aggregate of crushed stone or washed gravel containing no clay, mud, loam or foreign matter. Use of pit or bank run gravel is not permitted. Aggregate shall meet ASTM C33 Size No. 56 or 57.
 - i. Where the Contractor elects to place concrete by pumping he shall provide a pump with sufficient capacity to place this size of aggregate.

- C. Water:
1. Water shall be fresh and potable. Water shall be obtained from city water system. The Contractor shall pay for the quantity of water used during construction and also furnish, install and maintain a water meter if required by the Water Department.
- D. Air-Entraining Admixtures – ASTM C260
1. "Darex" by Grace
 2. "SikaAer" by Sika Chemical Co.
 3. "MB-AE" by BASF
 4. "Air-Mix" by Euclid
- E. Water Reducing Admixture – ASTM C494 Type A
1. "MasterSet R 300" by BASF
 2. "WRDA/HYCOL" by Grace
 3. "Plastocrete 161" by Sika
 4. "Eucon WR-75" by Euclid
- F. High Range Water Reducing Admixture (Superplasticizer) – Admixtures shall meet the requirements of ASTM C494 Type F and shall contain no chloride ions.
1. Acceptable products:
 - i. "WRDA 19" by W.R. Grace
 - ii. "Sikament" by Sika
 2. Dosage and use of any mix containing this admixture shall be in strict accordance with the manufacturer's direction and only with the written permission of the Engineer.
 3. A representative of the admixture manufacturer shall be present to observe the products use and to assure that it is being used in accordance with the manufacturer's directions.
- G. Water Reducing/Retarding Admixture – Shall comply with ASTM C494 Type D.
1. Acceptable products:
 - i. "Daratard 17" by W.R. Grace
 - ii. "Masterset R 100" by BASF
 - iii. "Plastocrete 161" by Sika
- H. Calcium Chloride – Do not use calcium chloride in any concrete.
- I. Concrete Color Admixtures
1. "Colorcrete" by Euclid
 2. "Liquid Integral Color" by Euclid
 3. Integral Colors by Huntsman (Formerly Davis Colors)
 4. "Chromix" by L.M. Scofield d.b.a. Sika
- J. Integral Concrete Waterproofing – Shall be Anti-Hydro by Anti-Hydro Company or approved equal.
- K. Shrinkage Reducing Admixture – Shall be Conex by Euclid Chemical. Dosage of 4% by weight of cementitious as noted on plan

PART 3 - RELATED MATERIALS

3.1 VAPOR BARRIER:

- A. Refer to Specification Section 031000.

3.2.1 PERFORMED JOINT FILLERS:

SANIBEL FIRE AND RESCUE STATION 172
100% Construction Documents

- A. Provide preformed strips, non-staining, non-extruding and resilient bituminous type complying with ASTM D1751.B. Thickness to be as indicated on drawings. If no thickness is indicated use 1/2".

3.3 WATERPROOF SHEET FOR CURING:

- A. Conform to ASTM C171.
- B. Polyethylene film thickness shall be at least 4 mils.

3.4 MEMBRANE CURING COMPOUND:

- A. Refer to Division 03 Section "Concrete Finishes."

3.5 CURING/SEALING COMPOUND:

- A. Refer to Division 03 Section "Concrete Finishes."

3.6 BONDING AGENT (EPOXY TYPE) ASTM C881:

- A. "Sikadur Hi-Mod" by Sika
- B. "Thiopoxy" by Grace
- C. "Epoxy #452" by Euclid

3.7 NON-SHRINK, NON-METALLIC GROUT:

- A. "Five Star Grout" by Five Star
- B. "NS Grout" by Euclid
- C. "MasterFlow 713" by BASF

PART 4 - EXECUTION

4.1. GENERAL

A. Proportioning

1. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each class of concrete required, complying with the latest edition of ACI 211.1.
2. Contractor shall provide all testing services for approval of mixes.
3. The Contractor shall furnish the Engineer for approval a mix design for each class of concrete at least 15 days prior to start of work.

B. Report to Include

1. Total weight of water, cement, coarse aggregate fine aggregate and admixtures to be used.

C. Slump.

D. Percent of Air.

1. Results of Compression Test for 6 cylinders cast and broken 7, 14 and 28 days.

2. Grain size curves for both aggregates.
- E. Do not begin production until mixes have been approved by Engineer.
 - F. When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301-72. Strength data for establishing standard deviation will be considered suitable if the concrete production facility has certified records consisting of at least 30 consecutive tests in one group or the statistical average for 2 groups totaling 30 or more tests, representing similar materials and project conditions.
 - G. The proper proportions of cement, aggregate and water to obtain the required strength shall be determined from ACI 211.1 "Recommended Practice for Selection Proportions for Normal and Heavy Weight Concrete".
 1. Strength requirements shall be as shown on the structural drawings.
 2. In all cases, not more than 6 gallons of water per each sack of cement will be allowed.
 3. Unit weight for normal weight concrete shall be 150 pcf + 5%.
 4. Air content for mixes requiring air entrainment shall be 3.5% + 1.5%.
 5. Slump at the point of placement shall be not less than 4" and not more than 6".
 6. Water/cement ratio not to exceed 0.45 by weight.
 - H. Concrete containing a high range water-reducing admixture (superplasticizer) shall have an initial slump of 1-1/2 to 2 inches and a final slump not to exceed 8 inches after addition of the admixture.
 - I. Mix design adjustments may be requested by the Contractor when characteristics of material, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as approved by the Engineer. Laboratory test data for revised mix and designs and strength results must be submitted to and accepted by the Engineer before using it in the work.
 - J. Ready-Mix Concrete shall be mixed and delivered in accordance with ASTM C94, "Specifications for Ready-Mix Concrete" and shall meet other applicable requirements of this Section.
- 4.2 AIR-ENTRAINING ADMIXTURE:
- A. Add air-entraining admixture in accordance with manufacturer's recommendations.

4.3 WATER REDUCING ADMIXTURE

- A. Use water-reducing admixtures in all concrete and in strict compliance with the manufacturer's directions.
- B. Admixture to increase cement dispersion, or provide increased workability for low-slump concrete, any be used at the Contractor's option subject to the Engineer's acceptance.
- C. The reduced water content shall be taken into account when proportioning mixes.

4.4 SHRINKAGE COMPENSATING ADMIXTURE

- A. Shrinkage compensating concrete shall have 6% dose by weight of Euclid CONEX additive.

4.5 MIXING

- A. Unless otherwise approved by the Engineer use ready mix concrete conforming to ASTM C494.
- B. Place concrete no more than 90 minutes after initial mixing.
- C. Tempering: All concrete shall be placed within 1-1/2 hours after introduction of water to the mix. Under no conditions may additional water be added that will exceed the quantity of water called for in the design mix. Submit time stamped batching tickets on delivery of concrete to job site. All concrete where the quantity of water has exceeded the design mix will be removed and replaced with proper concrete at no cost to the Owner.
- D. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
 - 1. When the air temperature is between 85 degrees Fahrenheit and 90 degrees Fahrenheit reduce the mixing and delivery time from 1-1/2 hours to 75 minutes, and when the air temperature is over 90 degrees Fahrenheit, reduce the mixing and delivery time to 60 minutes.

4.6 PLACING CONCRETE

- A. Pre-Placement Inspection
 - 1. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts and contractors to permit the installation of their work; cooperate with other trades in setting such work, as required.
 - 2. The Contractor shall notify the Inspector at least 24 hours in advance of concrete placement for a particular portion of the building. Placement of reinforcing shall occur in such sequence that the Inspector has sufficient time to inspect the correctness of the reinforcing within placement area & retains the right to require necessary revisions be made before concrete is placed.
- B. Placement
 - 1. Clean out all chips, saw dust, dirt and other foreign matter from forms and assure that inside of forms are free of frost. Remove any dirt, debris, and water from trenches and other

excavations. Remove any dirt, debris and mud from tops of footings or pile caps before pouring walls.

2. Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints.
3. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified.
4. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
5. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding or tamping. Use vibrators designed to operate with vibratory element submerged in concrete.
6. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Do not insert vibrators into lower layers of concrete that have begun to set. Limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
7. Dropping the concrete a distance of more than 6 feet or depositing a large quantity at any point and running or working it along the forms will not be permitted. An "elephant trunk" shall be used for all wall pours, which are over 6 feet high.

C. Cold Weather Placing

1. Protect concrete work from physical damage or reduced strength, which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
2. When air temperature has fallen to or is expected to fall below 40 degrees Fahrenheit, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 55 degrees Fahrenheit, and not more than 80 degrees Fahrenheit at point of placement.
3. Do not use frozen material or material containing ice or snow.
4. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
5. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.

D. Hot Weather Placing

1. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees Fahrenheit. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature, provided the water equivalent of the ice is calculated to the total

amount of mixing water.

3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperatures immediately before embedment in concrete.
4. Wet forms thoroughly before placing concrete.
5. Do not use retarding admixtures without the written approval of the Engineer.
6. Place concrete in column forms before beam and slab steel is in place. Place column concrete in not more than 36 inch lifts before vibrating.
7. Slabs and Beams: Thoroughly clean beam and slab forms after placing column concrete. Do not place concrete in roof or wall beams or slabs until concrete in columns have been in place at least 4 hours. Place concrete for slabs and beams continuously in layers not over 12 inches deep. Arrange the work so that the joints will be located at points indicated.
8. Place slabs on fill carefully to avoid damage to vapor barrier.

E. Compaction

1. Compact concrete in layers by internal vibrating equipment, supplemented by hand rodding and tamping as required. Do not use vibrators to move the concrete laterally inside the forms.
2. Internal vibrators should maintain a speed of at least 5,000 impulses per minute when submerged in concrete (at least one spare vibrator in working condition should be maintained at the site at all times).
3. Limit duration of vibration to the time necessary to produce satisfactory consolidation without causing segregation, but in no case more than 15 seconds per square foot of exposed surface. Move vibrator constantly and place in each specific spot only once.

F. Placing Concrete Slabs

1. Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.
2. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Bring slab surfaces to the correct level with a straight-edge and strike-off. Use bull floats and darbies to smooth the surface, leaving it free of humps or hollows.
4. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.
5. Concrete to be placed on grade shall be placed over 15-mil polyethylene film.
 - a. This film shall be laid continuously and in as large of pieces as possible.
 - b. Any holes or perforations caused by pipes, conduits, ducts and general construction activity shall be securely taped to make the film vapor tight.
6. Floor slabs shall be level or pitched to drains as required.

7. All top of slab elevations shall be determined by the use of preset runners supported at the proper elevation.
- G. Joints
1. Construction Joints
 - a. Construction joints not shown on the drawings shall be located so as not to impair the strength and appearance of the structure, and at locations approved by the Engineer.
 - b. Provide keyways at least 1-1/2 inches deep in all construction joints in walls and slabs. Accepted bulkheads designed for this purpose may be used in slabs
 - c. Place construction joints perpendicular to main reinforcement.
 - d. Roughened construction joints where indicated on the drawings shall be clean, free of laitance and intentionally roughened to a full amplitude of 1/4 inch by raking. Remove laitance entirely by high pressure water blasting.
 - e. Continue all reinforcement across construction joints. Welded wire fabric in slabs on grade may stop at those joints, which are shown on the drawings.
 2. Isolation Joints in Slabs-on-Grade
 - a. Locate where indicated or detailed on Drawings to points of contact between the slabs on ground and vertical surfaces, such as foundations, curbs, etc.
 - b. Install preformed joint filler according to manufacturer's recommendations. Filler shall be closely fitted to wall faces and to slab edges.
 - c. Reinforcement shall not extend through isolation joints.
 3. Weakened-Plane (Control) Joints
 - a. Locate where required and as indicated on the drawings.
 - b. Form weakened-plane joints in fresh concrete by grooving top portion with a recommended jointing tool and finishing edges with an edger.
 - c. If joints are saw-cut cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw; and cutting shall be completed before shrinkage stresses become sufficient to project cracking.
 - d. Form or cut joints to a depth of 1/3 of slab or wall thickness.
- H. Expansion Joints
1. Locate as shown on drawings.

2. Joints in on-grade walkways maximum at 20 feet o.c., at every change in thickness, direction and at center line of drives. Score and tool between expansion joints in equal bays at not over 5 feet o.c.
3. Joints shall be straight and smooth. They shall have hardened before fresh concrete is deposited against them.

I. Other Embedded Items

1. All sleeves, inserts, anchors, and embedded items required for adjoining work shall be placed prior to concreting.
2. All Contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

4.7 FINISHES

Refer to Division 03 Section "Concrete Finishes."

4.8 CONCRETE CURING AND PROTECTION

Refer to Division 03 Section "Concrete Finishes."

4.9 FLOOR HARDENER

- A. Those areas noted to receive floor hardener shall be treated with materials as specified and in accordance with manufacturer's directions.
- B. Concrete shall be cured using waterproof sheet material or continuously wet burlap as described above. No curing or sealing compound may be applied to areas to receive hardener.

4.10 PATCHING CONCRETE

- A. Any concrete work not formed as shown on the drawings or which for any reason is out of alignment or level, or shows defective surfaces, shall be considered as not conforming with the intent of the specifications and shall be removed unless the Engineer grant permission to patch a defective area.
- B. Immediately after removing the forms, all concrete surfaces shall be inspected. Any pockets showing unsolidified materials, or any other defective areas permitted by the Engineer to be patched, and all holes and honeycombed areas shall be patched before the concrete is thoroughly dry. The patching shall be made of the same material and of the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and white cement shall be substituted for a part of the dry Portland cement to match color of surrounding concrete. A patch repair mortar such as Sika Sikaquick 2500 may be used. Contractor is required to demonstrate the methods and materials to be used to fill voids to ensure water tightness.
- C. The mortar shall be thoroughly compacted into place and screened off so as to leave the patch slightly higher than the surrounding surface. It shall be left undisturbed for a period of one to two hours to permit shrinkage before being finally finished. Patches shall be finished in such a manner and texture as to match the adjoining surface.
- D. Patches shall be bonded with a re-wettable bonding agent.

4.11 EPOXY MORTAR REPAIR

- A. The areas to be patched shall have all loose, unsound concrete removed and then cleaned by sandblasting, vacuumed and/or blown clean with oil-free compressed air. The sound concrete remaining shall then be scrubbed with the epoxy binder only (without aggregate) just prior to the placement of the epoxy mortar.
 - B. The epoxy mortar shall be mixed and placed in accordance with the manufacturer's printed instructions. Such instructions shall be supplied to the Contractor by the supplier of the epoxy system.
- B. Do not apply mortar in layers greater than 1" thick. Maximum thickness for outdoor applications is 1/2".

4.12 EPOXY GROUTING OF BOLTS AND REINFORCING BARS

- A. Drill holes in concrete 1/4" larger than the diameter of the bolt or bar and to the depth required. Holes to be blown free of dust and to be dry prior to placing epoxy grout.
- B. Use epoxy grout in accordance with these specifications and the manufacturers directions.
- C. Fill hole 1/3 with epoxy grout, insert bolt or bar and move up and down several times while filling hole.
- D. No load shall be applied to the bar or bolt for at least 24 hours.

4.13 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in place construction. Provide other miscellaneous concrete filling shown or required to complete the work. Contractor is required to demonstrate the methods and materials to be used to fill voids to ensure water tightness.
- B. Equipment Bases and Foundation: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment with a template at correct elevations, complying with certified diagrams or templates of the manufacturer furnishing machines and equipment.

END OF SECTION 03 30 00

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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. Trowel applied, cementitious based flooring overlay.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Convene not less than one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's installation instructions and manufacturer's warranty requirements. Require attendance of those directly affecting work of this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's technical data, installation instructions, and recommendations for each flooring component required.
- B. Samples for Initial Selection: For each type of exposed finish required.
- C. Samples for Verification: For each flooring system required and for each color and texture specified, 6 inches square, applied to a rigid backing by Installer for this Project.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each flooring component.
- C. Material Test Reports: For each flooring system, by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
1. Engage an installer who is certified in writing by the manufacturer as qualified to apply flooring systems indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Apply full-thickness mockups on 96-inch-square floor area selected by Architect.
 - a. Include 96-inch length of integral cove base with inside and outside corner.
 2. Simulate finished lighting conditions for Architect's review of mockups.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in manufacturer's original, unopened packaging with identification labels intact and in sizes to suit project. All materials will be in new and unopened containers, shipped directly from manufacturer or manufacturer approved distribution center. Upon arrival, materials shall be inspected for physical damage or freezing. Questionable materials shall not be used.
- B. Installer shall be provided with a storage area for all components. The area shall be maintained between 60° and 85° and out of direct sunlight. All materials shall be stored in a dry location and protected from weather and other damage in accordance with material safety data sheets.

1.9 FIELD CONDITIONS

- A. Environmental Limitations
1. Temperature range 50-90 degrees with no rain forecast for 48 hours after application.
 2. Close area to traffic during application and for time period after application as recommended by manufacturer.
 3. The ambient air and surface temperature shall be a minimum of 45° F and a maximum of 100° F and shall remain so for at least 24 hours.
 4. Adjacent areas and materials shall be protected from damage, drops, and spills
 5. The Elite Crete Systems materials shall be protected by permanent or temporary means from weather and other damage, prior to, during, and immediately after application. Care must be taken to prevent condensation and/or heat build-up when using a tarp or plastic as protection.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flammability: Self-extinguishing according to ASTM D 635.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain flooring materials, from single source from single manufacturer.

2.3 MATERIALS – EPX-1

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - 1. Base Coat: Thin-Finish Pre-Mixed Overlay, (color integrated with PCC – portion control colorant).
 - 2. Body Texture Coat: Thin-finish pre-mixed overlay (color integrated with PCC – portion control colorant).
 - 3. Top Coat: Spartic-all RM clear Polyaspartic.

2.4 MIXING

- A. Site mix materials: Mixing shall be done in a clean mixing container with a clean mixing blade by a variable speed drill. Mix to achieve specified characteristics in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that concrete sub-floor surfaces are clean, dry, unfrozen, do not contain petroleum by-products, or other compounds detrimental to overlay material bond to substrate.

3.2 PREPARATION

- A. Any existing surface coatings or flooring materials will be required to be removed. Mechanically grind or shot blast all surfaces to receive coating to a clean sound surface with a minimum CSP 3 surface profile. Exterior bare concrete surfaces can be pressure washed using 4000 psi pressure washer and a turbo tip.
- B. Remove sub-floor ridges and bumps from new or existing concrete substrates. Fill low spots, cracks, joints, holes, and other defects with approved filler.
- C. Concrete Substrates: Provide structurally sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with cementitious overlay flooring.

3.3 INSTALLATION

- A. For skim coat, add 7 to 8 quarts of clean cool water to mixing container then add in 55 lb. bag of THIN-FINISH. Mix thoroughly until completely mixed with no clumps. Add color to the water before mixing if a color integral coat is desired. Apply cementitious base coat per manufacturer's recommendations with a squeegee. Spread rate should be approximately 225 to 300 SF per bag at a depth of 1/32".
- B. For wood texture coat, add 6 to 7 quarts of clean cool water to mixing container then add 55 lb. bag of THIN-FINISH. Add color to the water before mixing if a color integral coat is desired. Mix thoroughly until completely mixed with no clumps. Apply per manufacturer's recommendations and apply using a hand trowel to achieve the wood look texture. Coverage rate will vary on texture, but typically 175 to 225 SF per bag.
- C. Use Ultra-Stone™ Antiquing Stain mixed with PCC Colorant in the chosen color and apply with a pump sprayer to provide main stain color and antiquing accent color.
- D. Seal with Spartic All – RM Polyaspartic sealer. Mix 2 parts B with 1 part A for 2 minutes and apply with a 3/8" shed resistant nap roller cover. Spread rate will be approximately 150-200 SF per gallon. 2 coats may be required.

3.4 CLEAN UP

- A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
- B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION

- A. Freshly applied material should be protected from dampness, condensation and water for at least 72 hrs.
- B. Beware of air flow and changes in air flow. Introduction of dust, debris, and particles, etc. may result in surface imperfections and other defects.
- C. Follow manufacturer's written recommendation with respect to cure, wait time and return to service

END OF SECTION 03 54 00

PART 1 - GENERAL

1.1 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 3 Specification Sections, apply to this Section.
- B. Forming, mixing, and placing of concrete.

PART 2 – PRODUCTS

2.1 SEALER:

- A. Sealer shall be wax free, resin free and varnish free compound, which seals and hardens the concrete surface. Approved "Guardian Clear Bond".

2.2 ABRASIVE AGGREGATE:

- A. Abrasive Aggregate shall be applied at all non-slip, pedestrian bearing exposed concrete slabs (such as walkways and landings).
- B. Abrasive Aggregate shall be aluminum oxide or emery graded from particles retained on a #50 mesh screen to particles passed by a 1/8" screen.

PART 3 – EXECUTION

3.1 PATCHING:

- A. Concrete which is not formed as shown on the plans, or for any reason is out of alignment or level or shows a defective surface shall be considered as not conforming with the intent of these specifications and shall be removed from the job by the Contractor, at his expense, unless the Engineer grants permission to patch the defective area, which shall be done in accordance with the following procedure. Permission to patch any such area shall not be considered a waiver of the Engineer's right to require complete removal of the defective work if the patching does not, in his opinion, satisfactorily restore the quality and appearance of the surface. Contractor is required to demonstrate the methods and materials to be used to fill voids to ensure water tightness.
- B. When patching is authorized by the Engineer, it shall be performed in accordance with the provisions of Paragraph 37, "Patching" of the Architectural Concrete Specifications, published by the Portland Cement Association, current edition.

3.2 FINISHES ON FORMED SURFACE:

- A. Upon completion of patching, surfaces of concrete shall be finished as follows:
 - 1. Unexposed concrete shall be left rough.
 - 2. Common Finish:
 - a. Confine common finish to exposed concrete surfaces in mechanical, electrical, and utility spaces, and areas shown or noted in finish schedule.
 - b. Strip forms at earliest time permitted by provisions of "Concrete Section". Strip

- only those forms on area which can be immediately finished.
- c. Product common finish by filling smoothly all the holes and honeycomb areas and knocking off and evening up burrs.
3. Smooth Rubbed Finish:
- a. Provide smooth rubbed finished on vertical interior concrete exposed in the finish work, as indicated on finish schedule not to receive special textured concrete.
 - b. Produce smooth rubbed finish as follows: Mix 1 part Portland cement and 1-1/2 parts with sufficient water to produce a grout having the consistency of thick paint. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout with brushes or a spray gun uniformly, completely filling air bubbles and holes. Immediately after applying the grout, float the surface with a cork or other suitable float, scouring the wall vigorously. While the grout is still plastic, the surface shall be finished with a sponge rubber float removing all excess grout. This finishing shall be done at the time when grout will not pulled from holes or depressions. Next allow the surface to dry thoroughly, then rub it vigorously with dry burlap to completely remove any dried grout. There shall be no visible film of grout remaining after this rubbing. The entire cleaning operation for any area must be completed the day it is started. No grout shall be left on the wall overnight. After an area has been grout cleaned, if any slightly dark spots or streaks remain they shall be wiped off lightly with a fine abrasive hone without using water but the rubbing with the hone shall not be sufficient to change the texture of the concrete. This final operation shall be included as a part of the smooth rubbed finish.
4. Non-Slip Broom Finish: Apply non-slip broom finish to exposed exterior concrete platforms, parking area slabs, steps and ramps, and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.3 UNFINISHED STRUCTURAL SLABS:

- A. Treat surfaces of structural slabs, not finished as walking surfaces or as support for resilient floor coverings as required by their intended use.
 1. Screed surfaces intended to receive cement setting beds for other materials to true planes and scraped free of laitance or scum immediately thereafter, and roughen mechanically for bond as soon as they bear the weight of workmen. Scrub surfaces to receive setting beds before placing setting and broom a thin, neat cement grout onto the surface a short distance ahead of the fill.

3.4 MONOLITHIC CEMENT FINISH:

- A. Apply to the surface of concrete floor slabs as follows:
 1. Floors scheduled to receive resilient flooring, carpets, and all other floors, stairs, platforms or slabs scheduled or shown on the drawings to have steel troweled cement finish.
 2. Screed floor slabs to an even surface by the use of straight edge grade to obtain floor level within specified tolerances after initial deflection under dead load. This means that slab is to be screeded at center span to a rise equal to specified camber of forms, i.e., +/- 0 at columns and + value at center span to attain floor slab level within the specified

tolerances after removal of forms. Float concrete with a wood float in a manner which will compact it and produce a surface free from depressions or inequalities of any kind. Floors shall be flat and level to meet FF and FL requirements as specified in section 03300 except where drains occur in which case the floors shall be pitched to the drains as indicated on the drawings. After the concrete has hardened sufficiently to prevent fine materials from working to the top and allowed to stand until all water sheen has disappeared, steel trowel surface. Perform final troweling after the concrete is so hard that no mortar accumulates on the trowel and a ringing sound is produced as the trowel is drawn over the surface. The drying of the surface moisture before troweling must proceed naturally and must not be hastened by the dusting on of dry sand or cement. Perform patching required to bring slabs to specified tolerances using latex or epoxy modified Portland cement.

3.5 SEALER:

- A. All interior slabs which serve as the finish floor shall be covered with one coat of liquid sealer compatible with curing compound specified in "Concrete" section. Liquid sealer shall be applied in accordance with the manufacturer's recommendations immediately before releasing the building to the Owner.

END OF SECTION 03 60 00

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Division 04

Masonry

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PART 1 - GENERAL

0.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of unit masonry as shown on the Drawings and specified herein.
- B. Work installed under this Section, but materials or products furnished under the following Divisions or Sections:
 - 1. Anchor bolts, steel plates, and steel lintels; refer to Division 5.
 - a. Installation of lintels in masonry walls shall be included under the Work of this Section.
- C. Cooperate with other trades requiring items of equipment or services to be installed within or in conjunction with Unit Masonry Work.
- D. Other Materials provided and installed by this Section:
 - 1. Masonry cleaners

0.2 SUBMITTALS

- A. Test report from independent laboratory showing result of efflorescent test conducted per ASTM C67 for each provided face brick type.
- B. Upon regular presentation within past 6 months of representative units by approved manufacturer, a test report from an independent laboratory showing resultant weight, compressive strength (based on net area), and water absorption properties, as well as adherence to standards where so specified, for:

Name of Manufacturer
Date of Manufacture of Test Specimen
Dimension Measurements (in.)
Calculated Gross Area (sq.in.)
Calculated Net Area (sq.in.)
Total Load (lbs.)
Net Unit Load (psi)
Sample Weight (lbs.)
Dry Weight (lbs.)
Wet Weight (lbs.)
Immersed Weight (lbs.)
Density (pcf)
Moisture Content (%)
Absorption (%)

- C. Letter from approved manufacturer certifying that provided units will meet or exceed qualities of tested representative units for:
 - 1. Each proposed type of concrete masonry unit.
- D. Mock-up panels as erected on site grounds are only samples required.
- F. A test report from an independent testing laboratory showing compressive strength of concrete masonry prisms constructed from the concrete masonry units and mortar to be used in the masonry work for:
 - 1. Each proposed type and size of concrete masonry unit.
- G. Submit minutes from preinstallation conference.
- H. Fire-rated CMU certification.
- I. Submit written masonry inspection reports as specified in 1.3.C herein.

0.3 QUALITY ASSURANCE

- A. Standards: Comply with the provisions of the following in accordance with the Florida Building Code, except as otherwise shown or specified.
 - 1. ACI 530/ASCE 5/TMS 402-02 Building Code Requirements for Masonry Structures
 - 2. ACI 530.1/ASCE 6/TMS 602-02 Specifications for Masonry Structures
 - 3. NCMA-TEK 70A Concrete Masonry Prism Strength.
 - 4. NCMA-TEK 132
 - 5. NCMA-TEK 23A Grouting for Concrete Masonry Walls.
 - 6. NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry.
 - 7. ASTM C140 Standard Methods of Sampling and Testing Concrete Masonry Units.
 - 8. Comply with all NCMA-TEK Standards.
- B. Changes in the source or brand of masonry materials during construction will require resubmission and re-testing at the Contractor's expense.
- C. Concrete Masonry Inspection
 - 1. Provide Masonry inspection for masonry elements where it is imperative that construction produces elements which can attain high design strengths. These masonry elements include, but are not limited to, grout filled CMU walls, CMU bearing walls, and grout filled and vertically reinforced CMU walls.
 - 2. Submit written reports for each section of wall inspected to include:
 - a. Project identification name and number.
 - b. Name of Masonry Contractor.
 - c. Name of inspecting service.
 - d. Date of report.

- e. Specific location of work inspected.
 - f. Horizontal joint reinforcing size, type, spacing, and lap.
 - g. Preparation of cores and cavities to be grouted. Inspect every core and cavity.
 - h. Vertical reinforcing centering clip size, type, spacing, and proper alignment.
 - i. Size spacing and lap of vertical reinforcing and installation in centering clips.
 - j. Installation and vibration of grout in cores and cavities.
 - k. Remarks as to general conditions pertinent to the strength and quality of the masonry work.
3. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
 4. The masonry inspection agency shall be selected prior to the pre-masonry conference and shall have the inspector who will inspect this project attend the conference.
- D. Fire Performance Characteristic: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means acceptable to authorities having jurisdiction.

0.4 TESTS OF CONCRETE MASONRY PRISMS

- A. For grout filled and reinforced or un-reinforced concrete masonry wall construction tests for the compressive strength of prisms as described in ASTM E 447.
 1. Provide a minimum of one set of 3 masonry prisms for testing per each 5000 square feet of masonry wall construction as required on the Structural Masonry Plan in the Drawings.
- B. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of Testing service, name of material suppliers, specific location where masonry represented by the prism is used, test results, and values specified in the referenced specification. Indicate whether or not tested prism is acceptable for intended use.
- C. If the compressive strength tests fail to meet, the minimum requirements specified, the concrete masonry represented by such tests shall be considered deficient in strength.
- D. Deficient masonry construction shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the Engineer without additional cost to the Owner.

0.5 MASONRY INSPECTION

- A. The Contractor for the Work of this Section is responsible for all masonry inspections and

reports as specified herein.

- B. Provide masonry construction inspection of all concrete masonry walls to ensure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements which must be constructed to attain high design strengths, such as, but not limited to, vertically reinforced grouted CMU walls, grouted CMU wall, and load-bearing CMU walls.
- C. Qualification of Inspection Agency: Refer to Division 1 requirements.
- D. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
- E. The individual or individuals who will perform the masonry inspection shall be present for the Pre-masonry Conference.
- F. The masonry inspector shall prepare a written report or reports for each day of inspection.
- G. The masonry inspector shall be present and observe all grouting operations in walls requiring inspection. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to ensure its conformance to the contract Documents and that grouting may proceed. Periodically, the masonry inspector shall be present during the placing of masonry units and reinforcement. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

0.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

0.7 PROJECT CONDITIONS

- A. Protect partially complete masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane at least 2 foot down both sides of walls and anchor securely in place.

- B. Protect partially complete masonry walls against wind damage by bracing as required until support of walls is integral with the building structure.
- C. Protect masonry against freezing when the temperature of the surrounding air is 40 degrees F and falling. Heat materials and provide temporary protection of complete portions of masonry work. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes of Brick and Tile Construction by the Brick Institute of America (BIA).
- D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.
- E. Hot-Weather Construction: Comply with referenced unit masonry standard.

PART 1 - PRODUCTS

1.1 MATERIALS, GENERAL

- A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

1.2 MASONRY UNITS

- A. Obtain masonry units from one manufacturer for uniform texture and color for each kind required, for each continuous area and visually related areas.
- B. Concrete Masonry Units (CMU):
 - 1. Manufacturer: Shall be member of the National Concrete Masonry Association.
 - 2. Size: Manufacturer's standard units with face dimensions of 15-5/8 by 7-5/8 inches (actual), 15-5/8 inches by 3-5/8 inches (actual), 7-5/8 inches by 7-5/8 inches.
 - 3. Special Shapes: Provide, where shown and where required, lintels, inside and outside corners, jambs, sash, control joints, headers, bond beams, bullnoses, and other special conditions.
 - a. Provide bullnose corners at all exposed external corners (except at heads), and sills.
 - b. Not required at exterior columns, planters, and seat walls.

4. Hollow Load-Bearing (HL) CMU: Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 1900 psi on the net section. ($f'm = 1500$ psi)
5. Solid Loadbearing CMU (Solid CMU): Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 1900 psi on the net section. ($f'm = 1500$ psi)
6. Medium Weight Units: ASTM C33 concrete aggregates for a net weight between 105 pounds and 125 pounds per cu. ft. Strength shall be as indicated above.
7. Normal Weight Units: ASTM C33 concrete aggregates for a dry net weight of not less than 125 pounds per cu. ft. Strength shall be as indicated above.
8. Curing: Cure units in a non-moisture controlled atmosphere to comply with ASTM C90, Type II.
9. Exposed Face: Manufacturer's standard color and texture. Smooth (Sand) face. No open textured block will be accepted.
10. All exterior CMU, fluted and smooth, shall contain integral color from L.M. Scofield, as selected by Engineer and integral water repellent additive, "Dry-Block" by W.R. Grace; or Engineer approved equal. Integral water repellent additive shall be as specified herein.
11. Where CMU walls are indicated as fire-rated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means as acceptable to authorities having jurisdiction.
12. Fire Rated CMU shall meet requirements of the UL 618 and may be lightweight block manufactured with 100% rotary kiln produced expanded shale, clay, or slate. Blending of screenings or any other deleterious substance which impairs the fire rating is prohibited. The producer of the CMU shall furnish a one page certification showing conformance with all requirements of UL 618.
13. Provide masonry lintels at all openings greater than 1'-0" in width that occur in CMU walls.

2.4 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.
- B. Job-Mixed Muriatic Solution: Solution of 1 part muriatic acid and 10 parts clean water, mixed in a nonmetallic container with acid added to water.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned:
 1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.
 2. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.

3. Available Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes, but is not limited to, the following:
 - a. "Sure Klean No. 600 Detergent," ProSoCo, Inc.
 - b. "Sure Klean No. 101 Lime Solvent," ProSoCo., Inc.
 - c. "Sure Klean Vana Trol," ProSoCo, Inc.

2.5 SOURCE QUALITY CONTROL

- A. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

2.2 INSTALLATION

- A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- B. Thickness: Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

2.3 CONSTRUCTION TOLERANCES

- A. Comply with construction tolerances of referenced unit masonry standard.

2.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less than half-size units at corners, jambs, and where possible at other locations.
- B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work. Do not wedge partitions tight against structural ceiling or beams, but provide a caulk or insulation filled joint between top of masonry and the structural roof deck, structural steel framing or structural floor deck. Stop masonry a minimum of 1/2 inch from vertical, horizontal and sloped steel surfaces.
- D. Pattern Bond: Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches. Lay masonry with vertical joints plumb, one above the other. Bond and interlock each course of each wythe at corners unless otherwise shown.
- E. Stopping and Resuming Work: In each course, rack back one-half unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-In Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
 - 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
 - 3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
 - 4. Install adjustable hollow metal frame anchors, locating anchors on jambs in horizontal bed courses near the top and bottom of each frame and at intermediate points not over 24 inches apart.
 - 5. Fill jambs and heads of all hollow metal door and window frames installed in CMU or concrete walls solid with grout.

6. Rake joints around exterior side of exterior hollow metal door frames for sealant under Division 7.
 7. Where hollow metal frames do not wrap around masonry jambs and heads, rub exposed corners of block to remove sharp, irregular edges.
- G. Intersecting Masonry Walls: Where interior nonload-bearing masonry partition or wall intersects an exterior or interior load-bearing masonry wall at 90 degrees, stop horizontal joint reinforcing in interior partition 4 inches short of intersection. Horizontal joint reinforcing in exterior or interior load-bearing wall shall run continuous. In the same courses as horizontal reinforcing, install wire mesh extending 8 inches minimum into interior partition and projecting into the exterior wall to within 2 inches of exterior face of wall. Install wire mesh reinforcing in horizontal joints 16 inches o.c. vertically.
- H. Grout masonry walls where indicated on drawings.

2.5 MORTAR BEDDING AND JOINTING

- A. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Each mortar batch is allowed only one retempering. Do not use mortar which has begun to set after the first re-tempering or if more than 2-1/2 hours has elapsed since initial mixing.
- B. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Butter ends of brick in hand and in the wall at closures. Do not slush head joints.
- C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.
- D. Joints: Maintain joint widths shown, except for minor variations required, to maintain joint alignment. Lay walls with 3/8 inch joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. For exposed masonry, provide joints as follows:
1. All Exposed Joints: Concave tooled.
 2. All Concealed Joints: Struck flush.
- E. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jams to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.8 HORIZONTAL JOINT REINFORCEMENT

- A. Provide continuous galvanized horizontal joint reinforcing as shown and specified, Refer to Structural Plans sheet S3.3. Fully embed longitudinal side rods in mortar for their

entire length with a minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge control and expansion joints with reinforcing.

- B. Space continuous horizontal reinforcing at 16" oc.
- C. Reinforce masonry openings greater than 1 foot wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8 inches apart, both immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 2 foot beyond jambs of the opening except at control joints.
- D. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. Install control and expansion joints in unit masonry where indicated, or if not indicated, space at a maximum of 30'-0" o.c. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
 - 2. Install preformed control joint gaskets designed to fit standard sash block.
 - 3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
- C. Control Joint Locations: If control joints are not shown on the Drawings, provide as follows:
 - 1. Not to exceed 30 feet between joints in CMU walls, unless otherwise noted.

2. At change from wall setting on foundation to wall setting on floor slab.
 3. At change from exterior wall to interior wall.
 4. At walls setting on floors, that cross floor construction and control joints.
 5. At columns within masonry walls.
 6. At changes in wall thickness.
- D. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with 3/8 inch expansion joint filler sheets (column isolation). Secure with light gage wire.

3.12 LINTELS

- A. Install steel lintels where indicated and/or as required for masonry openings.
- B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast concrete lintels. Temporarily support formed-in-place lintels.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.13 FLASHING / WEEP HOLES

- A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Prepare masonry surfaces so that they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive/sealant/tape as recommended by flashing manufacturer before covering with mortar.
- C. Install flashings as follows:
 1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inches of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
 2. At heads and sills and where flashing is interrupted, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
 3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper.
 4. Interlock end joints of ribbed sheet metal flashings by overlapping ribs not less

- than 1-1/2 inches or as recommended by flashing manufacturer and seal and lap with adhesive as recommended by the flashing manufacturer.
5. Turn down sheet metal flashings at exterior face of masonry to form drip.
 6. All joints in copper flashings shall be soldered and connected in accordance with SMACNA requirements. All joints shall be soldered and sealed forming a watertight installation as specified herein.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:
1. For weep holes with product specified in Part 2 of this Section.
 2. Space weep holes 16 or 24 inches o.c., according to chosen brick size
 3. In un-insulated cavities/air spaces place pea gravel to a height equal to height of first course but not less than 2 inches immediately above flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
- E. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.
- F. Provide concealed flashing in the first in the first course above grade. Provide concealed flashing at other locations in masonry work as shown. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through-wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/4 inch beyond face of wall and bend down at 45-degree angle to create a drip edge, unless otherwise shown. Extend flashings beyond edges of lintels and sills at least 4 inches and turn up edge on sides to form pan to direct moisture to exterior. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings, spaced 16 inches o.c.
1. Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2 inches and seal lap with elastic sealant, or in accordance with manufacturer's instructions.

3.14 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
1. Construct formwork to conform to shape, line, and dimensions shown. Make 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.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.15 VERTICALLY REINFORCED CONCRETE MASONRY

- A. Where grout filled or steel reinforced concrete block masonry foundations or masonry walls are called for on the Drawings, they shall be reinforced and grouted in accordance with the Drawings and details. All cells to be grouted shall be clean and free of mortar protrusions and droppings in the cells.
- B. The low-lift grouting procedure shall be used as described in the Drawings and in NCMA-TEK 23A Grouting for Masonry Walls. Maximum height of grouting shall be 5 feet.
- C. Grout to completely fill each cavity with homogenous grout, extending from the lowest course to the top of the reinforced portion of the foundation or wall. Concrete or mortar shall not be used as grout for CMU.
 - 1. Aggregate used in the grout shall be small enough not to interfere with placement and plasticity.
- D. After the grout is placed, it shall be consolidated with a small vibrator. The top of the grout filling shall be stopped 1-1/2 inches below the top of the concrete block, except for the top course in the wall where the grout shall be struck flush with the top. If highly absorptive masonry units are used, the grout shall be re-vibrated after it has begun to stiffen.
- E. Caging devices and centering clips shall be spaced vertically such that every section of vertical reinforcing steel bar is restrained by 2 clips or devices, one near its top and one near its bottom.

3.16 ANCHORING MASONRY WORK

- A. Provide anchoring devices of the type shown and as specified.
- B. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
 - 1. Provide an open space not less than 1/2 inch width between masonry and structural member, unless other types of anchoring devices are shown. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless other types of anchoring devices are shown.
 - 3. Space anchors as shown, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.

4. The ends of wall ties shall be embedded in mortar joints. Wall tie ends shall engage outer face shells of hollow units by at least 1/2 inch. Wire wall ties shall be embedded at least 1-1/2 inch into the mortar bed of solid masonry units or solid grouted hollow units.
5. Unless otherwise required, wythes not bonded by headers shall be bonded with wall ties as follows:
 - a. Size - Minimum number of ties required
 - b. #9 gage - One wall tie wire per 2.67 sq.ft.
 - c. 3/16 inch diameter - One wall tie wire per 4.50 sq.ft.
 - d. Masonry reinforcing shall be "Ladder" type at Concrete Block with integral "Eyes" to receive "Pindles" placed in masonry joints.
6. Unless accepted by the Engineer, reinforcement shall not be bent after being embedded in grout or mortar.
7. Unless otherwise required adjustable ties shall meet the following requirements:
 - a. Use one tie for each 1.77 sq.ft. of wall area.
 - b. Neither horizontal nor vertical spacing shall exceed 16 inches.
 - c. Maximum misalignment of bed joints from one wythe to the other shall be 1-1/4 inch.
 - d. Maximum clearance between connecting parts of the ties shall be 1/16 inch.

3.17 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Engineer's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:
 - a. Job-mixed detergent solution.
 - b. Job-mixed acidic solution.

- c. Proprietary acidic cleaner; apply in compliance with directions of acidic cleaner manufacturer.
 - 6. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.
 - 7. Clean all exposed concrete masonry of efflorescence in strict accordance with NCMA TEK 8-3A.
- D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04 20 00

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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 marble windowsills.

1.3 SUBMITTALS

- A. Product data for each type of marble, marble accessory, and other manufactured products required.
- B. Shop drawings detailing fabrication and installation of marble. Include cutting and setting drawings indicating sizes, dimensions, and sections; arrangement and provisions for jointing, supporting, anchoring, and bonding stonework; and details showing relationship with, attachment to, and reception of related work.
- C. Samples for verification purposes of marble in form of sets for each color, grade, finish, type, and variety required and consisting of marble not less than 12 inches square. Include 2 in each set of samples showing the full range of variations in appearance characteristics to be expected in completed work.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for marble: Obtain each color, grade, finish, type, and variety of stone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in undamaged condition.
- B. Store and handle stone and related materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes.
 - 1. Do not use pinch or wrecking bars.
 - 2. Store stone on wood skids or pallets covered with nonstaining, waterproof membrane. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones.

3. Protect stored stone from weather with waterproof, nonstaining covers or enclosures, but allow air to circulate around stones.
4. Store cementitious materials off the ground, under cover, and in dry location.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Comply with referenced standards and other requirements indicated applicable to each type of material required.
- B. Provide matched marble from a single quarry for each type, variety, color, and quality of stone required.

2.2 MARBLE

- A. "Alabama" as manufactured by the Georgia Marble Dimension Stone, Polycor, Inc., Tate, Georgia. The following are approved manufacturers: (Equal products are at the approval of the Architect by the following manufacturers. Other manufacturers shall submit request for product approval at least 10 days prior to bid due date.)
 1. Amlink Marble, Ypsilanti, Michigan
 2. Central Marble Products, Rice, Minnesota
 3. "Pure White Thazoz" by StonExchange, Miami, Florida.
- B. Physical Properties: per ASTM C503:
 1. Absorption by weight, % 0.09
 2. Density, lb/cu.ft 169
 3. Compressive strength, PSI 9333
 4. Modulus of rupture, PSI 1364
 5. Abrasion resistance, hardness 16.6
 6. Flexural strength, PSI 1296

2.3 ANCHORS AND ATTACHMENTS

- A. Provide anchors and attachments of type and size required to support dimension stonework and fabricated from the following metals for conditions and anchors indicated below:
 1. Stainless Steel: ASTM A666, AISI Type 304, temper as required to support loads imposed without exceeding allowable design stresses, for anchors in direct contact with stone and the fasteners connecting them to other anchors and to building structure.

2.4 DIMENSION STONE FABRICATION

- A. General: Fabricate dimension stonework in sizes and shapes required to comply with requirements indicated, including details on Drawings and final shop drawings.
 1. For marble comply with recommendations of Marble Institute of America, Inc. (MIA) as published in "Dimensional Stone - Design Manual III."

- B. Cut stones to produce pieces of thickness, size, and shape indicated to comply with fabrication and construction tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.
- C. Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples and field-constructed mock-ups.
- D. Carefully inspect finished stones at fabrication plant for compliance with requirements relative to qualities of appearance, material, and fabrication; replace defective stones with ones that do comply.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive marble, and conditions under which marble will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of dimension stonework. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. All materials used in installation of marble shall be installed in accordance with the manufacturer's requirements.
- B. Installation shall be in accordance with the Drawings, reviewed shop drawings, and manufacturers recommendations.

3.3 CLEANING

- A. After completion of work, all marble surfaces shall be carefully cleaned to remove dirt, stains, or other defacements. Under no circumstances shall wire brushes, harsh abrasive cleansers or acid be used to clean marble.

3.4 PROTECTION

- A. Protect and maintain conditions in a manner acceptable to Fabricator and Installer to ensure stonework is not damaged at time of Substantial Completion.

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Division 05

Metals

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PART 1 – GENERAL

1.1 SUMMARY

- A. The Work required under this Section consists of structural steel, steel erection, shop painting, field touch-up painting, and related items necessary to complete the Work.
- B. Miscellaneous angles, channels, anchor bolts, bent plates, sleeves, sag rods, leveling plates, bearing plates for structural steel, and other incidental items of structural steel required to be built into concrete or masonry shall be provided as indicated or specified and be furnished to respective trades at proper time; including instructions and templates for their installation.
- C. Provide, where specifically called for, loose lintels, steel shelf angles, perimeter angle closure, and accessories.
- D. For openings in metal deck 12 by 12 inches and larger, provide steel reinforcing members. Reinforcing shall be not less than 3 by 3 inches by 3/8 inch angles, unless noted otherwise on Drawings.

1.2 SUBMITTALS

- A. Submit in accordance with Division 1 requirements.
- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 - 1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 - 2. High-strength bolts (each type), including nuts and washers.
 - a. Include Direct Tension Indicators if used.
 - 3. Structural steel primer paint.
 - 4. Shrinkage-resistant grout.
 - 5. Product data and manufacturers specifications for prime paints as specified.
- C. Shop drawings shall be prepared under supervision of a licensed Structural Engineer, in the State in which the Project is located, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
 - 1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 - 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
 - 3. Complete shop drawings by approved fabricator including plan layouts of columns and anchor bolt locations, erection diagrams, and shop detail drawings. Symbols and indications used for structural components on design drawings must appear identically on submitted shop drawings. Types of electrodes proposed for welding processes must also appear thereon.
 - a. The fabricator must review and check shop drawings prior to submission

to the Architect.

- D. Letter from a Professional Engineer within the State of construction activities certifying that he has studied the design drawings, that shop drawings have been prepared under his direct guidance and supervision, and that provided components and connections will meet or exceed loading requirements, where loads are shown at element ends. Such letter of certification must be evidenced by Engineer's full signature and seal authenticity. Architect/Engineer's review of shop drawings will not begin until such certification has been received. This certification is to verify the adequacy of members and connections designed by the fabricator and is not intended to require verifications of the design of structural elements shown on the plans.
- E. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.
- F. Certified copies of each survey conducted by a licensed Land Surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following, :
 - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and including the "Commentary of the AISC Specification," and the current supplements.
 - 3. AISC "Specifications for Structural Joints using ASTM A325 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
 - 4. AWS "Structural Welding Code," AWS D1.1 and its latest revision.
 - 5. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piping, and Bars for Structural Use."
- B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
 - 1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 - 2. If re-certification of welders is required, re-testing will be Contractor's responsibility.
- C. Structural fasteners shall be manufactured in the United States. Fabricator shall furnish proof of U.S. manufacturer to Architect/Engineer. If it becomes necessary to use imported fasteners, each size, type, and each large quantity package (500 pcs. Or more) shall undergo a random sampling of a minimum 5 pieces for testing and the test results to be provided to Architect. Test shall be performed by an independent testing agency and the cost shall be included in the Base Bid. If inferior fasteners are discovered, all fasteners of that type shall be removed and replaced with acceptable fasteners at no cost to the Owner. Fasteners shall be tested prior to use in construction.

1.4 WELDING QUALITY CONTROL

- 1. Welding operators shall be qualified under the provisions of the AWS Structural Welding code, on test pieces in positions and with clearances

equivalent to those actually to be encountered in construction. Welders shall make only those type of welds for which they are specifically certified.

- B. Welds requiring inspection shall be so indicated in the Drawings.
 - 1. Welds indicated as requiring visual inspection shall be visually inspected by an independent inspector, acceptable to the Architect, pre-qualified to make the weld being inspected. Welders and inspectors shall be pre-qualified by the American Welding Society Qualification Test.
- C. The Contractor performing the welding requiring inspection shall cooperate with the independent testing service performing weld testing.
- D. Written reports will be submitted for each weld tested and will indicate whether or not weld is acceptable for intended use.
- E. If by inspection welds fail to meet minimum acceptable criteria, the welds shall be cut out and replaced.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and re-lubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 INSPECTION

- A. The materials and workmanship to be furnished under this Specification shall be subject to inspection in the mill, shop, and field by the Architect/Engineer. Inspection will be conducted without expense to the Contractor; however, inspection in the mill or shop shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with Contract Documents.

PART 2 – PRODUCTS

2.1 ACCEPTABLE FABRICATORS

- A. Firms acceptable as fabricators for structural steel Work under this Section shall be members of The American Institute of Steel Construction (**or**) shall be certified by an approved independent professional testing agency as being qualified for Category I Conventional Steel Structures in conformance to the requirements of the AISC Quality Certification Program.

2.2 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only

materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

- B. Rolled Structural Steel Shapes:
 - 1. W Shapes: ASTM A572 or ASTM A992, $F_y = 50$ ksi
 - 2. Angles, C, M, HP Shapes: ASTM A 36, $F_y = 36$ ksi
- C. Plates and Bars: ASTM A36, $F_y = 36$ ksi
- D. Structural Steel Tubular Products
 - 1. Square, Rectangular, and Special Shapes: ASTM A500, Grade B, $F_y = 46$ ksi
 - 2. Round, Structural Steel Pipe: ASTM A53, Grade B, $F_y = 35$ ksi
- E. Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.
- F. Headed Stud-Type Shear Connectors: ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.
- G. Anchor Bolts: ASTM A1554, Grade 36.
- H. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide hexagonal heads and nuts for all connections.
 - 2. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.
- I. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325. Use 3/4 or 7/8 inch bolts, unless noted otherwise on Drawings. Use bearing type connections with threads included in the shear plane.
 - a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.
 - 2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A 490.
- J. Direct Tension Indicators: ASTM F 959, type as required.
 - 1. Use on all A325 and A490 bolts.
- K. Electrodes and Flux for Submerged Arc Welding: AWS Code and ASTM A588, Series E70 as required.
- L. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621-89A.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sure-Grip High Performance Grout; Dayton Superior.
 - b. Euco N.S.; Euclid Chemical Co.
 - c. Crystex; L & M Construction Chemicals, Inc.
 - d. Masterflow 713; BASF Corporation
 - e. Sealtight 588 Precision Grout; W. R. Meadows.
 - f. Five Star Grout; Fire Star Products, Inc.

2.3 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members as shown.
 2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 3. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as shown.
 1. Bolt field connections, except where welded connections or other connections are indicated.
 - a. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
 - b. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
- C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts."
- D. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.
- F. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

- G. Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld steel bar stops to frames, except where shown removable. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated.
- H. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- I. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- J. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.4 SHOP PAINTING

- A. Shop-paint all structural steel work, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed; paint exposed portions and initial 2 inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 - 3. Coat with tar all steel encased in concrete.
 - 2. Do not paint surfaces to receive shear studs.
- B. Surface Preparation for Exterior Exposed Steel (SSPC – SP 6): After inspection and before shipping, clean all steel work to be painted.
 - 1. Clean all steel scheduled to be exposed and installed in the exterior walls and all steel scheduled to be exposed and installed on the exterior of the building in accordance with SSPC – SP 6, Commercial Blast Cleaning.
 - 2. Prior to commercial blast cleaning, remove visible oil, grease, soluble welding residue and salts in accordance with SSPC – SP 1, Solvent Cleaning.
 - 3. After commercial blast cleaning and prior to shop painting, remove dirt, dust, and all similar contaminants from the surface.
 - 4. All steel lintels installed in exterior walls shall be hot-dipped galvanized, refer to requirements as specified herein.
- C. Surface Preparation for Interior Steel (SSPC – SP 3): After inspection and before shipping, clean steel work to be painted.
 - 1. Clean all steel installed in the interior of the building in accordance with SSPC – SP 3, Power Tool Cleaning.
 - 2. Prior to power tool cleaning, remove visible oil, grease, soluble welding residue and salts in accordance with SSPC – SP 1, Solvent Cleaning.
 - 3. After power tool cleaning and prior to shop painting, remove dirt, dust, and all similar contaminants from the surface.
- D. Shop Prime Painting: Immediately after surface preparation, apply structural steel rust inhibited primer paint in accordance with manufacturer's instructions and at rates as specified. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

3. Exterior exposed steel receiving the SP 6, Commercial Blast Cleaning, shall be prime painted with primer as follows:
 - a. Tnemec "90-97 Tneme-Zinc" two-component aromatic urethane zinc-rich primer. Color 90G97 Green. Metallic zinc content shall be 83% by weight in dried film. Lead content shall be less than 0.06% by weight in the dried film as defined in Part 1303 of the Consumer Product Safety Act Regulations. Apply at a rate to achieve a dry film thickness of 2.5 to 3.5 mils.
 4. Interior steel receiving the SP 3, Power Tool Cleaning, shall be prime painted with primer as follows:
 - a. Tnemec "Series 10" primer. Chemically active, rust-inhibitive modified alkyd primer. Color 99G Green. Apply at a rate to achieve a dry film thickness of 2.0 to 3.5 mils.
- E. Galvanizing: All steel lintels exposed to the exterior and installed in exterior walls shall be hot-dipped galvanized with ASTM A 123. Coating Grade 60.

2.5 SOURCE QUALITY CONTROL

- A. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 1. Promptly notify Architect/Engineer whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Erector must examine the areas and conditions under which structural steel work is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Erector.

3.2 ERECTION

- A. Comply with the AISC Specifications and Code of Standard Practice and with specified requirements.
- B. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect.
- C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

- D. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- E. Setting Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and rough-in to improve bond to surfaces. Clean the bottom surface of base and bearing plates.
 - 1. Setting Plate Procedure:
 - a. Set loose and attached base plates and bearing plates for structural members on wedges or other adjustable devices.
 - b. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
 - c. Pack bedding grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.
 - 2. Double Nut Procedure
 - a. Install lower nuts and washers to required elevation.
 - b. Erect column and install upper nuts and washers.
 - c. After structure has been erected and plumbed, adjust lower nuts to relieve racking, adjust elevation, and distribute load equally to all anchor bolts.
 - d. Tighten nuts.
 - e. Pack bedding grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.
- F. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- G. Level and plumb individual members of structure within specified AISC tolerances.
- H. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- I. Splice members only where indicated and accepted on shop drawings.
- J. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

- K. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect/Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.
- L. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide minimum dry film thickness of not less than that specified for the prime paint.
- M. Lintels: Weld or bolt members together where so indicated.
 - 5. Lintels shall have 8 inch bearing at each end, minimum, unless shown otherwise. Bearing pressures shall not exceed the allowable stress for masonry.

3.3 HIGH STRENGTH STEEL BOLTS

- A. Structural joints using high strength bolts, hardened washers, and nuts shall be tightened to a high tension; the materials, methods of installation and tension control, type of wrenches to be used, and inspection methods shall conform to specifications for "Structural Joints using ASTM A325 or A490 Bolts," as approved by the Research Council on Structural Connections of the Engineering Foundation, November 13, 1985.
- B. The high strength bolts used shall have a suitable identifying mark placed on top of the head before leaving the factory.
- C. Tightening of nuts shall be done by the turn-of-nut method, according to the specifications for "Structural Joints using ASTM A325 or A490 bolts," unless direct tension indicator washers are used, in which case tightening will terminate when proper gap is attained.
- D. For turn of the nut method, bolts that have been "Snug-Tight" shall be marked with identifying symbol and then given an additional 1/2 turn. Marks shall be such that visual inspection can be made of finished connections. Snug tight is defined as the tightness developed by the full effort of a man using a spud wrench on all bolts in the connections.

3.4 ERECTION ALIGNMENT

- A. Framing: The framing shall be carried up true, plumb, and level within a tolerance of 1:500; and temporary bracing shall be introduced, wherever necessary, to take care of loads to which the structure may be subjected, including erection equipment and its operation. Such bracing shall be left in place as long as may be required for safety. It shall finally be removed by the Contractor as part of his equipment. As erection progresses, the Work shall be securely connected to take care of dead load, wind, and erection stresses.

3.5 FIELD QUALITY CONTROL

- A. Engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
- B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment.
- E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.
- F. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.
 - 1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.
- G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.
- H. Field-Bolted Connections: Inspect in accordance with AISC specifications.
 - 1. For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.
 - 6. Bolts installed by the turn of nut method shall be tested in accordance with RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts". Frequency in testing shall be one (1) bolt in each connection and if a failure occurs then all bolts in that particular connection shall be tested.
- I. Field Welding: Inspect and test during erection of structural steel as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of welds as follows:

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100% Construction Documents

- a. Liquid Penetrant Inspection: ASTM E 165.
- b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
- c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
- d. Ultrasonic Inspection: ASTM E 164.

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PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes steel deck units for roof application.
 - 1. Metal roof deck units.
- B. Related Work
 - 1. The cutting, drilling, or punching of openings smaller than 12 by 12 inches for passage of pipes, ducts, and the attachment of other items shall be performed in the field by the respective trades requiring same.
 - 2. For openings 12 by 12 inches and larger, each shall be predetermined and provided or cut under this Section. Steel framing members indicated or required around openings 12 by 12 inches and larger through decks shall be provided and erected under Section 051200.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's specifications and installation instructions for each type of decking and accessories.
 - 1. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.
- B. Shop Drawings: Show layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and accessories.
- C. Pre-installation Conference minutes

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
 - 1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
 - 2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
 - 3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."
- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
 - 1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are not found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

- C. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.
 - 1. Provide cellular floor deck units listed in UL "Electrical Construction Materials Directory" with each cellular metal floor deck unit bearing UL labels and marking. Provide units that will permit use of standard header ducts and outlets for electrical distribution systems.
- D. Design Criteria:
 - 1. Compute the properties of metal roof deck sections on the basis of the effective design width as limited by the provisions of the SDI specifications. Provide the deck section properties, including section modulus and moment of inertia per foot of width.
 - 2. Allowable Deflection: Design and fabricate deck for a maximum deflection of 1/240 of the clear span under the uniform live load.
- E. Preinstallation Conference: Prior to steel deck installation, conduct a preinstallation conference at the project site with the contractor and Architect. Refer to Section 01200, Project Meetings, for preinstallation conference requirements. Submit preinstallation conference meeting minutes as specified.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Bowman/E.G. Smith, Div. Cyclops Corp.
 - 2. Consolidated Systems, Inc.
 - 3. Epic Metals Corp.
 - 4. Mac-Fab Products, Inc.
 - 5. Roll Form Products, Inc.
 - 6. United Steel Deck, Inc.
 - 7. Vulcraft/Div. Nucor Corp.
 - 8. Wheeling Corrugating Co.
 - 9. Wolverine Deck Co.

2.02 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A611, grades C and D, or A653-94 to comply with SDI specifications.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. Shear Connectors: Headed stud type, ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.
- D. Shear Connectors: Strap type, ASTM A 570, Grade D, hot-rolled carbon steel.
- E. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

- F. Galvanizing: ASTM A 525, G90 (.90 oz. per sq.ft.).
- G. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.
- H. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.
- I. Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.
- J. Self-Drilling Screws: Hilti self-drilling screws or approved equal.
- K. Powder Actuated Fasteners: Not permitted.

2.03 FABRICATION

- A. General: Form deck units in lengths to span two or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.
- B. Metal Roof Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck."
 - 1. Provide galvanized corrugated slotted metal form deck as specified by the Steel Deck Institute.
 - 2. Provide galvanized Type WR (wide rib) as specified by the Steel Deck Institute.
 - 3. Depth and gauge shall be as indicated on the Drawings
- C. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6 inches wide.
- D. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.
- E. Metal Roof Deck Units: Provide deck configurations that comply with SDI requirements. Provide galvanized composite metal deck as specified by SDI and gauge as indicated on Drawings.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which metal decking items are to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently

fastened. Do not stretch or contract side lap interlocks.

1. Do not start placement of deck units before supporting members are installed. Place deck units on supporting metal steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before being permanently fastened.
 - a. Lap ends 1-1/2 inch deck units not less than 2 inches.
 - b. Butt ends of 3 inch deck units.
 - c. Do not stretch or compress the side-lap interlocks.
 - d. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
- C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.
- D. Place deck units flat and square, secured to adjacent framing without warp or deflection.
- E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- G. Attach deck to supports and install side lap fasteners as indicated.
 1. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Use welding washers where recommended by deck manufacturer.
 2. Mechanical fasteners, either powder-actuated or pneumatically driven, may be used in lieu of welding. Locate mechanical fasteners and install in accordance with deck manufacturer's instructions. Substituted fasteners must have equivalent strength and characteristics of specified fasteners or welds.
- H. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.
- I. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.
- J. Hanger Slots or Clips: Provide UL-approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.
 1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
 2. Locate slots or clips at not more than 14 inches o.c. in both directions, not over 9 inches from walls at ends, and not more than 12 inches from walls at sides, unless otherwise indicated.
 3. Provide manufacturer's standard hanger attachment devices.
- K. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.
- L. Shear Connectors: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Do not weld shear connectors through two

layers (lapped ends) of decking units. Weld only on clean, dry deck surfaces.

- M. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.
 - 1. Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.
- N. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - 1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
 - 2. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.
- O. Ridge and Valley Plates: Weld ridge and valley plates to the top surface of the roof decking. Lap end joints not less than 3 inches, with laps made in the direction of water flow.
- P. Repair:
 - 1. Holes up to 1/2 inch in diameter fill with urethane or silicone sealant and cover with duct tape.
 - 2. Holes above 1/2 inch diameter require sheet metal plate patches fastened to deck.

3.03 SUPPORT OF OTHER WORK

- A. Suspension wires, straps, and chains such as those used to support acoustical ceilings, ductwork, and lights shall not be attached to or through steel decks.

END OF SECTION 05 31 00

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PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

1.02 DESCRIPTION OF WORK:

- A. Extent of light-gauge framing is shown on Architectural and Structural drawings.
- B. Types of light-gauge metal framing units include the following:
 - 1. "C" shaped stud and track sections.
 - 2. Angles.
 - 3. Other shapes required.
- C. This section applies to exterior wall and soffit framing. See other sections for interior partition wall framing.

1.03 QUALITY ASSURANCE:

- A. Component Design: Compute structural properties of studs and joists in accordance with AISC "Specification for Design of Cold-Formed Steel Structural Members."
- B. Allowable Tolerance: See drawing general notes for allowable tolerances.
- C. Maximum Deflection: Manufacturer approved product data or design calculation to meet height and load conditions with maximum lateral deflection of wall studs due to wind load of L/240 for stud only and L/360 for composite stud and sheathing.

1.04 SUBMITTALS:

- A. Product Data: Submit manufacturer's product information and installation instructions for each item of light-gauge framing and accessories. Submit manufacturer approved span deflection tables or design calculations prepared by a Professional Engineer licensed in the State of Florida to indicate that all light-gauge metal framing members satisfy the requirements of paragraph 1.3 above.
- B. Shop Drawings: Submit shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data.
 - 1. Include placement drawings for framing members showing size and gauge designations, number, type, location and spacing. Indicate supplemental strapping, bracing, splices, accessories, and details required for proper installation.
 - 2. Design of light-gauge metal framing shall be performed by a Licensed Structural Engineer in the state of Florida. Design calculations signed and sealed by the light-gauge steel design Engineer of Record shall be submitted for approval.
 - 3. Light-gauge metal framing shop drawings shall be submitted to the Structural

Engineer of Record for approval prior to fabrication showing wall sections coordinated with drawings showing framing, accessories, anchorage, and connection details.

1.05 DELIVERY AND STORAGE:

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

PART 2 - PRODUCTS

2.01 METAL FRAMING:

- A. System Components: With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated as needed to provide a complete metal framing system.

- B. Materials and Finishes:

- 1. For 16 gauge and heavier galvanized units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi, meeting requirements of ASTM A653, Structural Quality, Grade 50.
- 2. For 18 gauge and lighter galvanized units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A653, Structural Quality, Grade 33. Components shall be a minimum of 20 gauge.
- 3. Provide galvanized finish to metal framing components complying with ASTM A924 for minimum G90 coating.
 - a. Manufacturer: Subject to compliance with requirements, provide "C" shaped, load bearing steel studs of one of the following: Minimum 20 gauge or heavier gauge as required by the loading.
 - 1. Alabama Metal Industries Corp
 - 2. Allied Structural Industries
 - 3. Bostwick Steel Framing Co.
 - 4. Clark Steel Framing
 - 5. Dale/Incor
 - 6. Inryco/Milcor
 - 7. Monex Corp.
 - 8. Unimast, Inc.
 - 9. Wheeling Corrugating Co.

2.02 FABRICATION

- A. General: Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion.
- B. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.
- C. Wire tying of framing components is not permitted.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Manufacturer's Instructions: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, unless otherwise indicated.
- B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners, or 16" o.c. for other types of attachment. Provide fasteners at corners and ends of tracks. All interior studs shall be supported at top of wall by deep leg tracks to allow for 3/4" vertical deflection. Do not screw studs to tracks.
- C. Studs:
 - 1. Install studs plumb, except as needed for diagonal bracing or required for non-plumb wall or warped surfaces and similar requirements.
 - a. Attach studs to top and bottom runner tracks by either welding or by self-drilling screws as defined below at both inside and outside flanges.
 - b. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
 - 2. Axially loaded studs shall be installed in a manner which will assure that their ends are positioned tight against the inside runner webs prior to fastening.
 - a. Provide weak-axis horizontal bracing at 48 inches maximum vertical spacing, both stud flanges.
 - b. Weld or screw bracing at each intersection.
 - 3. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions.
 - a. Install runner tracks and jack studs above and below wall openings.
 - b. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall.
 - c. Load bearing headers required over openings in bearing walls. Header members must be capable of transferring both vertical and horizontal loads to jamb and jack studs.
 - 1. Headers supporting roof members must be designed for resistance of required net uplift loads.
 - 2. Header members require web stiffeners at end bearing conditions. Header or stiffeners must be designed to resist web crippling at concentrated loads.
- D. Install supplementary framing, blocking and bracing in metal framing system wherever walls, partitions and joists are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
- E. Frame both sides of expansion and control joints with a separate stud; do not bridge the joint with components of stud system. See gypsum wall specifications for spacing of control joints.

- F. Install horizontal stiffeners in stud system, spaced (vertical distance) at not more than 4'-0" o.c.. Fasten at each intersection.
- G. Field Painting: Touch-up shop-applied protective coatings damaged during handling and installation. Use galvanizing repair paint for galvanized surfaces.

END OF SECTION 05 40 00

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:

1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
2. Slotted channel framing.
3. Miscellaneous steel trim including steel angle corner guards.
4. Metal bollards.
5. Abrasive metal nosings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Shop primers.
2. Slotted channel framing.
3. Metal bollards.
4. Abrasive metal nosings.

- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
2. Miscellaneous steel trim including steel angle corner guards.
3. Metal bollards.

- C. Samples for Verification: For each type and finish of extruded nosing.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research Reports: For post-installed anchors.

1.6 QUALITY ASSURANCE

- A. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Galvanized Steel: ASTM A653/A653M, structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.
- F. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

- G. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 2.
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.
- I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.3 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 09 91 00 "Painting."
- B. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.
- K. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Extruded Aluminum: Two coats of clear lacquer.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

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.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize and prime exterior miscellaneous steel trim.

2.7 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe and Schedule 80 stainless steel, No. 4/180-grit finish, at locations indicated.
 - 1. Cap bollards with 1/4-inch-thick, plate with domed top.
 - 2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
 - 3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
- B. Fabricate surface mounted bollards with 3/8-inch-thick, steel or stainless steel, ASTM A480/A480M, No. 4 finish baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.
 - 1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- C. Prime steel bollards with primer specified in Section 09 91 00 "Painting."

2.8 ABRASIVE METAL NOSINGS

- A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Safety Tread Co., Inc.
 - b. Amstep Products.
 - c. Balco; a CSW Industrials Company.
 - d. Nystrom, Inc.
2. Source Limitations: Obtain units from single source from single manufacturer.
 3. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
 4. Provide solid-abrasive-type units without ribs.
 5. Nosings:
 - a. Square-back units, for casting into concrete steps.
 - 1) Wisth: AS indicated.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply clear lacquer to concealed surfaces of extruded units.

2.9 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.10 STEEL AND IRON FINISHES

- A. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 1. Shop prime with primers specified in Section 09 91 00 "Painting."
- B. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

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

3.3 INSTALLATION OF METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor surface mounted bollards with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
 - 1. Embed anchor bolts at least 4 inches in concrete.
- C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- D. Fill bollards solidly with concrete, cap after concrete has cured.

3.4 INSTALLATION OF ABRASIVE METAL NOSINGS

- A. Center nosings on tread widths unless otherwise indicated.

- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

3.5 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
 - 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 00 "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs and railings.
 - 1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, blocking for attachment of wall-mounted handrails, and items with integral anchors, that are to be embedded in concrete or masonry.
 - 2. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.
- D. Schedule installation of railings so wall attachments are made only to completed walls.
 - 1. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal pan stairs and the following:
 - 1. Shop primer products.
 - 2. Handrail wall brackets.
 - 3. Grout.
- B. Shop Drawings:

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

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 2. Protect steel members and packaged materials from corrosion and deterioration.
 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, to design stairs, railings, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 3. Uniform and concentrated loads need not be assumed to act concurrently.
 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 5. Limit deflection of treads, platforms, and framing members to $L/360$ or 1/4 inch, whichever is less.
- C. Structural Performance of Railings: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
 3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing for Railings: ASTM A500/A500M (cold formed) or ASTM A513/A513M.
- D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, structural steel, Grade 30, unless another grade is required by design loads.

2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5 where built into exterior walls.
 1. Select fasteners for type, grade, and class required.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

- C. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Electrodes: Comply with AWS requirements.
- B. Shop Primers: Provide primers that comply with Section 09 91 00 "Painting."
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs and railings in shop to greatest extent possible.
 - 1. Disassemble units only as necessary for shipping and handling limitations.
 - 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint with some undercutting and pinholes okay.

- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
 - 1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
 - 2. Locate joints where least conspicuous.
 - 3. Fabricate joints that will be exposed to weather in a manner to exclude water.
 - 4. Provide weep holes where water may accumulate internally.

2.6 FABRICATION OF STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
 - 1. Fabricate stringers as indicated on Drawings.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Provide closures for exposed ends of channel and rectangular tube stringers.
 - c. Finish: Shop primed.
 - 2. Construct platforms of steel plate or channel or rectangular tube headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
 - a. Provide closures for exposed ends of channel and rectangular tube framing.
 - b. Finish: Shop primed.
 - 3. Weld stringers to headers; weld framing members to stringers and headers.
 - 4. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below.
 - a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
 - 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.
 - 1. Fabricate treads and landing subplatforms of exterior stairs so finished walking surfaces slope to drain.
 - 2. Steel Sheet: Uncoated, cold-rolled steel sheet.
 - 3. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
 - 4. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 - 5. Shape metal pans to include nosing integral with riser.
 - 6. At Contractor's option, provide stair assemblies with metal pan subtreads filled with reinforced concrete during fabrication.

7. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
 - a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.7 FABRICATION OF STAIR RAILINGS

- A. Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
 1. Rails and Posts: As Indicated.
 2. Picket Infill: As Indicated.
 3. Intermediate Rails Infill: As Indicated.
- B. Welded Connections: Fabricate railings with welded connections.
 1. Fabricate connections that are exposed to weather in a manner that excludes water.
 - a. Provide weep holes where water may accumulate internally.
 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 3. Weld all around at connections, including at fittings.
 4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 5. Obtain fusion without undercut or overlap.
 6. Remove flux immediately.
 7. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint, some undercutting and pinholes are okay as shown in NAAMM AMP 521.
- C. Form changes in direction of railings as follows:
 1. By bending or by inserting prefabricated elbow fittings.
- D. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
 1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- G. Connect posts to stair framing by direct welding unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
 1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

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

2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.
 - a. Clean bottom surface of plates.
 - b. Set plates for structural members on wedges, shims, or setting nuts.
 - c. Tighten anchor bolts after supported members have been positioned and plumbed.
 - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 2. Comply with requirements for welding in "Fabrication, General" Article.
- F. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."

3.3 INSTALLING RAILINGS

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

- c. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

3.4 REPAIR

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 00 "Painting."

END OF SECTION 05 51 13

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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. Painted, shop fabricated, field assembled, stairs with aluminum floor plate treads.
 - 2. Aluminum railings and guards attached to stairs.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs, railings, and guards.
 - 1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
 - 2. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.
- D. Schedule installation of railings and guards so wall attachments are made only to completed walls.
 - 1. Do not support railings and guards temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal floor plate stairs and the following:
 - 1. Metal floor plate treads.
 - 2. Paint products.
 - 3. Grout.
- B. Shop Drawings:

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

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Aluminum welding will be in accordance with ANSI / AWS D1.2/D1.2M: 2008. Welding shall be performed solely with Pulsed Gas Metal Arc Welding (MIG) processes or Gas Tungsten Arc Welding (TIG) processes by experienced operators.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
1. Keep members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 2. Protect members and packaged materials from corrosion and deterioration.
 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

1.8 WARRANTY

- A. Manufacturer warrants its products to be free from defects in material and workmanship for a period of two years beginning at the date of delivery of product.
- B. Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
1. Warranty Period: 20 years from date of Final Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design stairs, railings, and guards, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft.
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/360.
- C. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
 - 3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. The Step, and Platform system is designed to be a rigid, free-standing structure. All footplates should be fastened securely to a concrete surface or 12" minimum diameter footings in order to achieve full structural integrity. Footing depth will depend on local building code. Fastening all platforms to the building or modular building with lag screws is highly recommended.
- E. Walking surfaces shall have a coefficient of friction no less than 0.50 in all directions of travel.

2.2 MANUFACTURER

- A. Subject to compliance with requirements provide Basis of Design Manufacturer and Product; Upside Innovations LLC., Prefabricated Modular Multi-story step systems.

2.3 METALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. All Platforms, Steps, Legs, and Guardrails are constructed of mill finish aluminum extrusions and mill finish aluminum sheet. Extrusions are either, 6061-T6, 6063-T52, or 6005-T5 aluminum alloy and all aluminum sheet is 5052-H32.
- C. Extruded Aluminum textured Floor Treads:
 - 1. Subject to compliance with requirement provide Basis of Design Product and Manufacturer; Aluminum Distributing, Inc. ADI Metal, Item # CH65-70100109-T5.
 - a. Material: Aluminum 6005-T5.
 - b. Size: 7-inches x 1-inch x length as indicated.
 - c. Finish: Mill.

2.4 FASTENERS

- A. General: Provide Type 316 stainless steel fasteners.
 - 1. Select fasteners for type, grade, and class required.
- B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated and capable of withstanding design loads.
- C. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - 1. Alloy Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Electrodes: Comply with AWS requirements.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for exterior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components shop fabricated in parts for field assembly. All parts shall be shop painted prior to delivery to site for field assembly with bolted connections.

2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs, railings, and guards in shop to greatest extent possible.
1. Disassemble units only as necessary for shipping and handling limitations.
 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Weld exposed corners and seams continuously unless otherwise indicated.
 3. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
 2. Locate joints where least conspicuous.
 3. Fabricate joints that will be exposed to weather in a manner to exclude water.
 4. Provide weep holes where water may accumulate internally.

2.7 FABRICATION

- A. Platforms and Landings:
1. Platform sections are fabricated in typical lengths between 48" and 96" in each 8" increment. Custom lengths can be fabricated as requested.
 2. Walking surfaces are designed and constructed to be continuous, without gaps and shall be made of extruded decking.
- B. Platform Legs:
1. All legs are designed to support the steps and platforms/ landings.
 2. Platform legs shall be designed using a minimum of 3" x 3" x 0.125" aluminum square tube that connects to the platform and a telescoping 2.7" x 2.7" x 0.125" aluminum square tube with a 6" x 6" x .190" welded foot pad. The legs are bolted wall to wall with two Type 316 stainless steel bolts. The telescoping feature allows leg adjustment in order to meet elevation changes.

3. As required to meet Performance Requirements, provide, 2" x 2" x 3/16" aluminum angle is used for cross-bracing platform legs. As heights are increased cross-bracing sizing will be increased in order to provide structural integrity.

C. Steps:

1. Step treads and stringers are designed to carry a uniform live load of 100 pounds per square foot and a concentrated vertical load of 300 pounds in an area of one square foot.
2. Walking surfaces are designed to have a coefficient of friction no less than 0.50 in the normal direction of travel.
3. Steps are designed to allow a clearance of 48" between handrails.

D. Step Rails:

1. All step rails are designed to withstand a concentrated load of 200 pounds applied in any direction on the top of the rail.
2. Steps over 30": Step rails for steps with a vertical rise over 30" shall have a 42" guardrail in addition to the 36" handrail.
3. Steps 30" or under: Step rails for steps at 30" or under do not require a 42" guardrail.
4. All baluster panels and other custom rail panels are designed to withstand a load of 50 pounds in the horizontal direction applied in an area of one square foot.
5. All rails will not allow a 4" diameter sphere to pass through in any area.
6. Rails are provided on both sides of the step treads.
7. All handrails are designed to be continuous along step runs and in between the inside corner of 90 degree and 180 degree turns in step direction. Handrails are not interrupted by posts or other obstructions.
8. All handrails have a clearance of 2-1/4" between the handrail and the guardrail. Handrails are to be constructed of 1-1/4" SCH 40 Pipe with an outside diameter of 1.66".
9. Handrails are designed to be 36" high measured vertically from the top of the step nosing to the top of the rail.
10. Handrails extend 12" past the top Step Nosing parallel to the ground surface and return to the closest rail post or wall if needed due to door swing interference at the top of the step. Step handrails also extend one tread width past the bottom step tread (11") plus an additional 12" parallel to the ground surface and return to the closest rail post.
11. All rail frames are to be constructed at minimum with 1-3/4" x 1-3/4" aluminum square tube.
12. All baluster panels are to be constructed at minimum with 3/4" x 3/4" aluminum square tube.

2.8 FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
 - 1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
 - 1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.
- D. Fit exposed connections accurately together to form hairline joints.

3.3 INSTALLATION OF RAILINGS AND GUARDS

- A. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
 - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
 - 2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails and guards so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inch in 12 feet.

END OF SECTION 05 51 16

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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. Aluminum railings.

1.3 COORDINATION

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data:

- 1. Fasteners.
- 2. Post-installed anchors.
- 3. Handrail brackets.
- 4. Nonshrink, nonmetallic grout.
- 5. Metal finishes.
- 6. Paint products.
- 7. Composite railings.

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- C. Samples for Initial Selection: For products involving selection of color, texture, or design.

- D. Samples for Verification: For each type of exposed finish required.

- 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
- 2. Fittings and brackets.
- 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

- a. Show method of connecting and finishing members at intersections.

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For delegated design professional engineer and testing agency.
- B. Welding certificates.
- C. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.
- D. Research Reports: For post-installed anchors, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 - 1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

2.3 ALUMINUM RAILINGS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- C. Extruded Bars and Tubing: ASTM B221, Alloy 6063-T5/T52.
- D. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- E. Drawn Seamless Tubing: ASTM B210/B210M, Alloy 6063-T832.
- F. Plate and Sheet: ASTM B209, Alloy 6061-T6.
- G. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.
- H. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.4 FASTENERS

- A. Fastener Materials:
 - 1. Aluminum Railing Components: Type 316 stainless steel fasteners.
 - 2. Finish exposed fasteners to match appearance, including color and texture, of railings.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

1. Alloy Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast aluminum.

B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

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

2.6 COMPOSITE RAILINGS

A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.

1. Basis of Design Product and Manufacturer; As indicated on the Exterior Finish Schedule, subject to compliance with requirements, acceptable products by one of the following:
 - a. Lumberrock.
 - b. AZEK Building Products, Inc.
 - c. TimberTech.
 - d. Trex Company, Inc.
2. Railing Configuration: As indicated.
3. Cap Profile: Match Architects Sample.
4. Surface Texture: Match Architect's sample.
5. Color: Match Architect's sample.

2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
 - 1. Clearly mark units for reassembly and coordinated installation.
 - 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water.
 - 1. Provide weep holes where water may accumulate.
 - 2. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection, using an epoxy structural adhesive, if this is manufacturer's standard splicing method.
- K. Form changes in direction as follows:
 - 1. By bending or by inserting prefabricated elbow fittings.

- L. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- M. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
 - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
 - 2. Coordinate anchorage devices with supporting structure.
- Q. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.8 ALUMINUM FINISHES

- A. Superior Performance Organic Finish, Three-Coat Polyvinylidene Fluoride (PVDF): Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.

3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 COMPOSITE RAILING INSTALLATION

- A. Install in accordance with Manufacturers recommendations.
- B. Materials shall be carefully handled and stored under cover in manner to prevent deformation and damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter. All such work shall be repaired and cleaned prior to erection.
- C. Work shall be erected square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set into concrete or masonry shall be furnished loose under this section to be built-into concrete and masonry by those trades as the work progresses. Later cutting or drilling shall be avoided where possible.
- D. Work shall be rigidly braced and secured to surrounding construction, and shall be, tight and free of rattle, vibration, or noticeable deflection after installation.

3.5 ANCHORING POSTS

- A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.
- C. Leave anchorage joint exposed with anchoring material flush with adjacent surface.
- D. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
 - 2. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.
 - 3. For stainless steel railings, weld flanges to post and bolt to supporting surfaces.
- E. Install removable railing sections, where indicated, in slip-fit stainless steel sockets cast in concrete.

3.6 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.
- C. Attach handrails to walls with wall brackets.
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - 4. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements, using self-tapping screws of size and type required to support structural loads.
 - 5. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.7 REPAIR

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.8 CLEANING

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

3.9 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 13

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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. Wire Rope Decorative Metal Railings.

1.3 SUBMITTALS

- A. Product Data: For the following:
1. Manufacturer's product data for cable-rail system.
 2. Fasteners.
 3. Post-installed anchors.
 4. Handrail brackets.
 5. Nonshrink, nonmetallic grout.
 6. Metal finishes.
 7. Paint products.
 8. Composite railings.
- B. Shop Drawings: Show fabrication and installation of cable-rail system. Include plans, elevations, sections, component details, and attachments to other Work.
1. For installed system indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: Short sections of railing showing component assembly and mechanical finishes.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.

- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
 - 1. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.

2.3 ALUMINUM DECORATIVE RAILINGS

- A. Source Limitations: Obtain aluminum decorative railing components from single source from single manufacturer.
- B. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- C. Extruded Bars and Shapes, Including Extruded Tube: ASTM B221, Alloy 6063-T5/T52.

- D. Extruded Structural Pipe and Round Tube: ASTM B429/B429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- E. Drawn Seamless Tube: ASTM B210/B210M, Alloy 6063-T832.
- F. Plate and Sheet: ASTM B209, Alloy 6061-T6.

2.4 WIRE ROPE AND FITTINGS

- A. Stainless Steel Cable and Cable Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Feeney Wire Rope & Rigging.
 - b. Ronstan International Inc.
 - c. Seco South, Inc.
 - d. VIVA Railings, LLC.
 - 2. Cable: 1-by-19 wire cable made from wire complying with ASTM A492, Type 316,.
 - 3. Cable Diameter: As indicated.
 - 4. Cable Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain, without failure, a load equal to minimum breaking strength of cable with which they are used.
 - 5. Wire-Rope Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

2.5 FASTENERS

- A. Fastener Materials:
 - 1. Aluminum Railing Components: Type 316 stainless steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.
 - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.
 - 1. Alloy Group 2 stainless steel bolts, ASTM F593 and nuts, ASTM F594.

2.6 COMPOSITE RAILINGS

- A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
 - 1. Basis of Design Product and Manufacturer; As indicated on the Exterior Finish Schedule, subject to compliance with requirements, acceptable products by one of the following:
 - a. Lumberrock.
 - b. AZEK Building Products, Inc.
 - c. TimberTech.
 - d. Trex Company, Inc.
 - 2. Railing Configuration: As indicated.
 - 3. Cap Profile: Match Architects Sample.
 - 4. Surface Texture: Match Architect's sample.
 - 5. Color: Match Architect's sample.

2.7 FABRICATION

- A. General: Fabricate cable-rail system to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Brackets, Flanges, Fittings, and Anchors: Provide brackets, miscellaneous fittings, and anchors to interconnect cable-rail system members to other work in accordance with manufacturer's requirements.
- C. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
 - 1. Clearly mark units for reassembly and coordinated installation.
 - 2. Use connections that maintain structural value of joined pieces.
- D. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- E. Form work true to line and level with accurate angles and surfaces.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded or mechanical connections unless otherwise indicated.
- H. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
 - 1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- I. Form changes in direction as follows:
 1. By bending or by inserting prefabricated elbow fittings.
- J. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- K. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.
- M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.
 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.
- N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry Work.
 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
 2. Coordinate anchorage devices with supporting structure.
- O. Stainless Steel Cable Guard Infill: Fabricate cable guard infill assemblies in the shop to field-measured dimensions with fittings machine swaged.
 1. Minimize amount of turnbuckle take-up used for dimensional adjustment, so maximum amount is available for tensioning cable.
 2. Tag cable assemblies and fittings to identify installation locations and orientations for coordinated installation.

2.8 ALUMINUM FINISHES

- A. Superior Performance Organic Finish, Three-Coat Polyvinylidene Fluoride (PVDF): Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
 - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 - 4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- C. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations for the installation of cable-rail system.
 - 1. Adjust cable-rail system in accordance with manufacturer's instructions and recommendations.
- B. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railing and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 COMPOSITE RAILING INSTALLATION

- A. Install in accordance with Manufacturers recommendations.
- B. Materials shall be carefully handled and stored under cover in manner to prevent deformation and damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter. All such work shall be repaired and cleaned prior to erection.
- C. Work shall be erected square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set into concrete or masonry shall be furnished loose under this section to be built-into concrete and masonry by those trades as the work progresses. Later cutting or drilling shall be avoided where possible.
- D. Work shall be rigidly braced and secured to surrounding construction, and shall be, tight and free of rattle, vibration, or noticeable deflection after installation.

3.5 ANCHORING POSTS

- A. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.

3.6 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends, using nonwelded connections.
- C. Attach handrails to walls with wall brackets, except where end flanges are used.
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.
 - 4. For steel-framed partitions, fasten brackets with toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and to prepare test reports. Payment for these services will be made by Owner.

- B. Extent and Testing Methodology: Testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Test railings in accordance with ASTM E894 and ASTM E935 for compliance with performance requirements.
- C. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and comply with specified requirements.
- D. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.8 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

3.9 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Decorative formed metal.

1.3 COORDINATION

- A. Coordinate installation of anchorages for decorative formed metal items.
- B. Coordinate installation of decorative formed metal with adjacent construction to ensure that assemblies, and joint sealants, are protected against causes of deterioration.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for decorative formed metal.
 - 1. Include plans, elevations, component details, and attachment details.
 - 2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
- C. Samples: For each type of exposed finish required, in manufacturer's standard sizes.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments, and necessary clearances.
- B. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.
- B. Store products on elevated platforms in a dry location.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. General: Fabricate products from sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.
- B. Aluminum Sheet: Flat sheet complying with ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties of not less than Alloy 5005-H32.
 - 1. Thickness: 0.50 inches thick.

2.2 MISCELLANEOUS MATERIALS

- A. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
 - 1. Provide concealed fasteners for interconnecting decorative formed metal items and for attaching them to other work unless otherwise indicated.
- B. Structural Anchors: For applications indicated to comply with certain design loads, provide fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.
- C. Anchor Materials:
 - 1. Match material and finish of components to be fastened.
- D. Sound-Deadening Materials:
 - 1. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Backing Materials: Provided or recommended by decorative formed metal manufacturer.
- F. Isolation Coating: Manufacturer's standard bituminous paint.

2.3 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
- C. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.
- D. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.
 - 1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
- E. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce decorative formed metal items as needed to attach and support other construction.
- F. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install decorative formed metal items.

2.4 DECORATIVE TRIM

- A. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.
 - 1. Aluminum Sheet: 0.63-Inches Thick.
- B. Conceal fasteners where possible; otherwise, locate where they are as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.
- C. Drill and tap holes needed for securing closures and trim to other surfaces.
- D. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.

2.5 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- B. Use concealed anchorages where possible.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.3 ADJUSTING AND CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with water and soap, rinsing with clean water, and drying with soft cloths.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.4 PROTECTION

- A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

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Division 06

Wood, Plastics and Composites

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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. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Plywood backing panels.

B. Related Requirements:

1. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 06 17 53 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.
3. Section 31 31 16 "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

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. Power-driven fasteners.
 - 3. Post-installed anchors.
 - 4. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- 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].
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
2. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Joists, Rafters, and Other Framing: No. 1 or No. 2 grade.

1. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Southern pine or mixed southern pine; SPIB.
 - d. Douglas fir-south; WWPA.
 - e. Douglas fir-larch (north); NLGA.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Douglas fir- larch (South); WWPA.
5. Douglas fir- larch (North); NLGA

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

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

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

2.5 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 A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.

2.6 METAL FRAMING ANCHORS

- A. Manufactures
 - 1. Simpson Strong- Tie Co., Inc
 - 2. USP Structural Connectors
- B. Allowable design loads, as published by manufacturer, shall meet or exceed the uplift loads shown on the approved shop drawings for the wood roof trusses. 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.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, [**Type 304**] [**Type 316**].
 - 1. Use for exterior locations and where indicated.
- F. Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges at least 85 percent of joist depth.
 - 1. Thickness: **0.062 inch**.
- G. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 - 1. Strap Width: **2 inches**.
 - 2. Thickness: **0.062 inch**.
- H. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

- I. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch-minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- J. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- K. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- L. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
 - 1. Bolt Diameter: **3/4 inch**.
 - 2. Width: **3-3/16 inches**.
 - 3. Body Thickness: **0.138 inch**.
 - 4. Base Reinforcement Thickness: **0.239 inch**.
- M. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.
- N. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.

2.7 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. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

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 nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

- E. Install shear wall panels to comply with manufacturer's written instructions.
- F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- H. Do not splice structural members between supports unless otherwise indicated.
- I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- K. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- L. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- M. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- N. 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.
- O. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

- P. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 - 2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

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

END OF SECTION 06 10 00

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PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Wood sleepers, grounds, and nailers.
 - 2. Plywood Backer Panels

1.2 DEFINITIONS

- A. Rough carpentry includes carpentry work not specified as part of other Sections and generally not exposed, unless otherwise specified.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. 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.
- C. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:
 - 1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - 2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.
 - 3. Warranty of chemical treatment manufacturer for each type of treatment.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
- B. 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.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- C. Plywood Product Standards: Comply with PS 1 (ANSI A199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard PRP-108 for type of panel indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- 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, 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.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including but not limited to, the following:
 - 1. Nailers.
 - 2. Where necessary for installation of other work and not otherwise prohibited.
- B. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.
- C. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.
- D. Wood grounds, nailers, and sleepers shall be pressure treated as specified herein.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, C-C Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.
- B. IT Equipment Wall Panels: Plywood, CDX, fire-retardant treated, not less than 1/2-inch nominal thickness.
- C. Painted Black, refer to Section 09 91 00 "Painting."

2.5 MISCELLANEOUS MATERIALS

- A. 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.

2.6 FASTENERS

- A. Provide fasteners of size and type indicated that 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 of Type 304 stainless steel.
- B. Nails, Wire, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC193 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- E. Wood Screws: ASME B18.6.1.

- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, grounds, and similar supports to allow attachment of other construction.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.
- E. Use screws, unless otherwise indicated. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

3.2 WOOD SLEEPERS, GROUNDS, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

END OF SECTION 06 10 53

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 sheathing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review installation procedures for OSB sheathing with integral weather barrier, including joint treatment, treatment of penetrations and treatment of openings.

1.4 ACTION SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build integrated mockups of exterior wall assembly, 64 sq. ft., (8 feet high by 8 feet wide) incorporating backup wall construction, window, weather barrier, rainscreen, stucco, stone veneer, stone trim, exterior window sill materials and flashing.
 - a. Include a sealant-filled joint at least 16 inches long in exterior wall mockup.
 - b. Include flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit stucco and stone veneer above half of flashing).
 - c. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.2 ROOF SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exposure 1 sheathing.
 1. Span Rating: Not less than 24/0.
 2. Nominal Thickness: Not less than 5/8 inch.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

2.4 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 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. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall 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.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 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. Roof Sheathing:
 - a. Nail to wood framing.
 - b. Space panels 1/8 inch apart at edges and ends.

- C. Zip System Sheathing: Apply seam tape to all wall sheathing panel joints and penetrations in

END OF SECTION 06 16 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Wood roof trusses.
2. Wood floor trusses.
3. Wood girder trusses.

- B. Related Requirements:

1. Section 31 31 16 "Termite Control" for site application of borate treatment to wood trusses.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

- B. 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. Qualification Data: For professional engineer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Metal-plate connectors.
 - 2. Metal truss accessories.

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 Architect and authorities having jurisdiction.

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 01 40 00 "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 unless more stringent requirements are specified below.
1. Design Loads: As indicated.
 2. Maximum Deflection under Design Loads:
 - a. Roof Trusses: Vertical deflection of **1/180** of span.
 - b. Floor Trusses: Vertical deflection of **1/360** of span.
- 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. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Provide dressed lumber, S4S.
 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- B. Minimum Chord Size for Roof Trusses **2 by 6 inches nominal** for both top and bottom chords.
- C. Minimum Specific Gravity for Top Chords: **0.50 0.53**.
- D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in **Section 06 10 00 "Rough Carpentry."**

2.3 PLATES

- A. Manufactures
- 1. Alpine Engineered Product, Inc
 - 2. Cherokee Metal Products, Inc
 - 3. CompuTrus, Inc
 - 4. Eagle Metal Products
 - 5. MiTek Industries, Inc
 - 6. Robbins Engineering, Inc
 - 7. Truswal Systems Corporation

- B. Fabricate connector plates to comply with TPI 1.
- C. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.4 FASTENERS

- A. 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, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufactures
 - 1. USP Structural Connectors
 - 2. Simpson Strong – Tie Co., Inc
- B. Allowable design loads, as published by manufacturer, shall comply with or exceed those **indicated or products of manufacturers listed**. 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.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, **Type 304**
 - 1. Use for exterior locations and where indicated.

- F. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. [**Tie fastens to one side of truss, top plates, and side of stud below.**]
- G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.
- H. Floor Truss Hangers: U-shaped hangers, full depth of floor truss, with 1-3/4-inch-long seat; formed from metal strap 0.062 inch thick with tabs bent to extend over and be fastened to supporting member.
- I. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.
- J. Drag Strut Connectors: Angle clip with one leg extended for fastening to the side of girder truss.
 - 1. Angle clip is 3 by 3 by 0.179 by 8 inches with extended leg 8 inches long. Connector has galvanized finish.
 - 2. Angle clip is 3 by 3 by 0.239 by 10-1/2 inches with extended leg 10-1/2 inches long. Connector has painted finish.

2.6 MISCELLANEOUS MATERIALS

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

2.7 FABRICATION

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

2.8 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
 - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.

2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses **as indicated**; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 1. Install bracing to comply with Section 06 10 00 "Rough Carpentry."
 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not comply with requirements.
 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces according to ASTM A780/A780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

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

END OF SECTION 06 17 53

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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. Lumber soffits.
 - 2. Prefinished wood lattice.
 - 3. Composite Soffit Cladding.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Compliance Certificates:
 - 1. For lumber that is not marked with grade stamp.
- B. Evaluation Reports: For the following, from ICC-ES:
- C. Sample Warranties: For manufacturer's warranties.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.

1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency, indicating grade, species, moisture content at time of surfacing, and mill.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- B. Hardboard: ANSI A135.4.

2.2 LUMBER SOFFITS

- A. Provide kiln-dried lumber siding complying with DOC PS 20.
- B. Species and Grade:
 - 1. Western red cedar; NLGA, WCLIB, or WWPA Grade A.
- C. Pattern:
 - 1. V-edge, smooth-faced tongue and groove, actual face width (coverage) and thickness of 6-7/8 by 23/32 inch.

2.3 PREFINISHED WOOD LATTICE.

- A. Provide kiln-dried lumber siding complying with DOC PS 20.
- B. Species and Grade:
 - 1. Western red cedar; NLGA, WCLIB, or WWPA Grade A.
- C. Pattern: Mtach Architect's sample.

2.4 COMPOSITE SOFFIT CLADDING

- A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
 - 1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, shall not be less than design loads and spans indicated.
- B. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule, or a comparable product by one of the following:
 - 1. Lumberrock.
 - 2. TimberTech.
 - 3. Trex Company, Inc.
- C. Cladding Size: As indicated.
- D. Surface Texture: Match Architect's sample.
- E. Color: Match Architect's sample.

2.5 FINISHING

- A. Refer to Section 09 93 00 "Staining and Transparent Finishing."

2.6 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. For applications not otherwise indicated, provide Type 316 stainless steel fasteners.
- B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.

2.7 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

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

3.4 ADJUSTING

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

3.5 CLEANING

- A. Clean exterior finish carpentry on exposed and semiexposed surfaces.

3.6 PROTECTION

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

2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior standing and running trim.
 - 2. Faux Wood Beams.
 - 3. Beadboard cladding.
 - 4. Floating Shelves.

1.3 COORDINATION

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

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For interior architectural woodwork.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
- D. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- E. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 INTERIOR ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

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

2.2 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: Premium.
 1. Wood Species: As indicated on the Interior Finish Schedule.
 2. Profile: As indicated.
 3. Wood Moisture Content: 8 to 13 percent.
 4. Finger Jointing: Allowed.
 5. Face Surface: Surfaced (smooth).

2.3 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Premium.
 1. Wood Species: As indicated on the Interior Finish Schedule.
 2. Profile: As indicated.
 3. Wood Moisture Content: 8 to 13 percent.
 4. Finger Jointing: Not allowed.
 5. Face Surface: Surfaced (smooth).

2.4 BEADBOARD CLADDING FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Premium.
 1. Wood Species: As indicated on the Interior Finish Schedule.
 2. Pattern: Match Architect's sample.
 3. Wood Moisture Content: 8 to 13 percent.
 4. Face Surface: Surfaced (smooth) and groove pattern.

2.5 FAUX WOOD BEAMS

- A. Subject to compliance with requirements provide Basis of Design Product and Manufacturer, indicated on the Interior Finish Schedule.
 1. Style: As indicated.
 2. Color: As indicated.
 3. Size: As indicated.

2.6 FLOATING SHELVES

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; Walnut Wood Works, 24" solid steel heavy duty invisible hidden floating shelf brackets, or a comparable product approved by the Architect.
 1. Shelves: Solid Wood Stained to match Architect sample. Attached in accordance with concealed shelf bracket Manufacturers requirements.

2.7 FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- B. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.
 - 1. Verify adhesives have a VOC content of 70 g/L or less.
 - 2. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.9 FABRICATION

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

2.10 SHOP PRIMING

- A. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 09 91 00 "Painting."

1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
- C. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Section 09 93 00 "Staining and Transparent Finishing."
 1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

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 in the shop.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with interior architectural woodwork.
- F. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long except where shorter single-length pieces are necessary.
 1. Scarf running joints and stagger in adjacent and related members.
 2. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
 3. Install standing with no more variation from a straight line than 1/8 inch in 96 inches.
- G. Touch up finishing work specified in this Section after installation of interior architectural woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 06 40 23

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. Wood cabinets for opaque finish.
2. Cabinet hardware and accessories.
3. Wood furring, blocking, shims, and hanging strips for installing architectural cabinets that are not concealed within other construction.
4. Shop finishing.

1.3 COORDINATION

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

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 1. Include plans, elevations, sections, and attachment details.
 2. Show full-size details.
 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
 5. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection: For each type of exposed finish, and pull.
- D. Samples for Verification: For the following:

1. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and 8 by 10 inches for panels, for each finish system and color.
 - a. Finish entire exposed surface.
2. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For each type of product.
- C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Manufacturer of products.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Build mockups of typical architectural cabinets as shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 CABINETS, GENERAL

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

2.2 WOOD CABINETS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Type of Construction: Frameless.
- C. Door and Drawer-Front Style: Flush overlay.
- D. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.
- E. Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: Thermally fused laminate panels.
 - a. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.

- F. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
 - 2. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch- thick metal.
- C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.
 - 1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - a. Finish: As indicated.
- D. Recessed Metal Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf brackets, B04112.
- E. Catches: Magnetic type, adjusted for maximum 5-pound pull. Attach with screws and slotted for adjustment.
- F. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Undermount.
 - a. Type: Full extension.
 - b. Motion Feature: Soft close dampener.
- G. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black.

- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.
- I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.6 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch radius unless otherwise indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.7 SHOP FINISHING

- A. General: Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

- C. Opaque Finish:
 - 1. Architectural Woodwork Standards Grade: Custom.
 - 2. Finish: System - 11, catalyzed polyurethane.
 - 3. Color: Match Architect's sample.
 - 4. Sheen: Match Architect's sample.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with cabinet surface.
 - 1. For shop-finished items, use filler matching finish of items being installed.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

3.3 ADJUSTING AND CLEANING

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

- C. Clean cabinets on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 06 41 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-faced architectural cabinets.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including high-pressure decorative laminate and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
 - 3. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection: For each type of exposed finish.
- D. Samples for Verification: For the following:
 - 1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
 - a. Provide one sample applied to core material with specified edge material applied to one edge.
 - 2. Thermally Fused Laminate (TFL) Panels: 8 by 10 inches, for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
 - 3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.

4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program.

1.5 QUALITY ASSURANCE

- A. Defective workmanship or damaged components shall be corrected, repaired, or replaced as requested by the Architect, without further cost to the Owner.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 1. Shop Certification: AWI's Quality Certification Program accredited participant.
- C. Installer Qualifications: AWI's Quality Certification Program accredited participant.
- D. Coordinate delivery of templates and other similar items from other trades necessary for the construction of required casework units.
- E. Coordinate submittals with construction schedule ensuring timely review to avoid delays from installation.
- F. Casework shall be manufactured and install to meet the requirements of the Florida Building Code Current Edition and the Florida Fire Prevention Code Current.

1.6 PREINSTALLATION MEETINGS

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in Field Conditions Article.

1.8 FIELD CONDITIONS

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

- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

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

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Type of Construction: Frameless.
- D. Cabinet, and Door Style: Full Overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on the Finish Schedule or comparable product by one of the following:
 - a. Formica Corporation.
 - b. Lamin-Art, Inc.
 - 2. Colors, Patterns, and Finishes: As selected by Architect from Manufactures full range.
- F. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.

2. Vertical Surfaces: Grade VGS typical, but provide HGS for all surfaces of casework in the Apparatus Bay.
3. Edges: Grade HGS.

G. Materials for Semiexposed Surfaces:

1. Horizontal and vertical surfaces: Grade CLS.

H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

2.2 CABINET CONSTRUCTION

A. Support bases for base cabinets shall be 2-inch x 4-inch minimum pressure treated material. Cabinet Base: 4-inch high, 3/4 inch CDX plywood, marine grade at sink bases and locations indicated. Provide additional center support for cabinets over 24 inches wide.

B. Base, Wall, and Tall Cabinet Boxes

1. Sides, bottom, and top: Constructed of glued and spline doweled 3/4 inch formaldehyde-free plywood providing balanced construction, surfaced with cabinet liner CLS for semi-exposed and vertical grade laminate for exposed locations, provide marine grade plywood for all millwork in the Apparatus Bay.
2. Wall cabinet bottoms and tops: Constructed of glued and spline doweled one inch thick formaldehyde-free plywood, providing balanced construction surfaced with vertical grade laminate for exposed locations and cabinet liner CLS for semi-exposed locations, provide marine grade plywood for all millwork in the Apparatus Bay.
3. Back panel: Constructed of minimum 1/4 inch prefinished tempered hard board, surfaced with CLS for semi-exposed and vertical grade laminate for exposed locations, inset and glued into sides, bottom, and top, provide marine grade plywood for all millwork in the Apparatus Bay.
4. Exposed backs: Constructed of 3/4 inch formaldehyde-free plywood, surfaced with vertical grade laminate of balanced construction for semi-exposed locations, glued and spline doweled, and mechanically attached if required, provide marine grade plywood for all millwork in the Apparatus Bay.
5. Intermediate support rail: Minimum 3/4 inch formaldehyde-free plywood, surfaced with vertical grade laminate of balanced construction, glued and doweled into cabinet sides, provide marine grade plywood for all millwork in the Apparatus Bay.
6. Hanger rails: Two located at top and bottom of cabinet back, 3 on tall cabinets, locate at top, bottom, and center of 3/4 inch formaldehyde-free plywood.

C. Fixed and Adjustable Shelves and Dividers

1. One inch (formaldehyde-free plywood) shelves, provide marine grade plywood for all millwork in the Apparatus Bay.
2. Exposed Locations: Vertical grade plastic laminate both sides. Color to match cabinet exterior plastic laminate or as selected by Architect.
3. Semi-exposed locations: VGS or CLS
4. Front and back leading edges shall be edged with flat 1mm thick high impact PVC edging to match shelf color.
5. Number of adjustable shelves provided, unless indicated otherwise on the Drawings or on the Schedule
 - a. Low and tall cabinets

- | | | |
|----|-------------------|-------------------|
| 1) | 1 up to 24 inches | 4 up to 72 inches |
| 2) | 2 up to 36 inches | 5 up to 84 inches |
| 3) | 3 up to 60 inches | 6 up to 96 inches |

b. Wall hung cabinets

- | | | |
|----|-------------------|-------------------|
| 1) | 0 up to 24 inches | 2 up to 36 inches |
| 2) | 1 up to 30 inches | 3 up to 40 inches |

- Adjustable dividers: 1/4 inch minimum thickness, prefinished tempered hardboard or plywood, smooth both faces, retained by molded plastic support clip.
- Fixed dividers: Constructed of 3/4 inch plywood, surfaced with vertical grade laminate, providing balanced construction; glued and spline doweled. PVC edged to match laminate or adjacent PVC edging.

D. Cabinet Doors

- 3/4 inch formaldehyde-free particleboard, provide marine grade plywood for all millwork in the Apparatus Bay.
- High pressure plastic vertical grade laminate exterior and interior.
- Doors 48 inches and less in length shall have 2 hinges per door; doors over 48 inches in length shall have 3 hinges per door.
- Corners: Square with radiused edges, 3mm PVC edging.

E. Counter tops:

- High Pressure Plastic Laminate: GP-50 grade.
- Plywood; 3/4 inch, formaldehyde-free, marine grade plywood.
- Plywood shall incorporate Type II water resistant glue.
- Horizontal work surfaces to be 1-1/2 inch thick unless otherwise noted.
- Cut openings in countertops for sinks or other items required. Cut to size from template furnished by supplier of sinks or use the designated sinks on job.
- Edging: Radius, with 3mm PVC.
- Provide balancing sheet on opposite face.
- Laminate tops shall be continuous in practical lengths. When requiring splice joints, use a combination of splines or dowels for alignment and Tite-Joint fasteners as required to make a uniform and gapless joint.
- All protruding countertop edges shall be mitered.
- Backsplash and Endsplashes: Scribable, square set, color matching, and mechanically attached.
 - Backsplashes are required at locations where countertops abut walls where indicated on Drawings.
 - Edges of back and endsplashes shall be of square edge configuration.

2.3 CABINET HARDWARE AND ACCESSORIES

- General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch- thick metal.
- Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.

1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - a. Finish: As indicated.
- D. Recessed Metal Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf brackets, B04112.
- E. Catches: Magnetic type, adjusted for maximum 5-pound pull. Attach with screws and slotted for adjustment.
- F. Drawer Slides: ANSI/BHMA A156.9.
 1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Undermount.
 - a. Type: Full extension.
 - b. Motion Feature: Soft close dampener.
- G. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 1. Color: Black.
- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.
- I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 PLASTIC LAMINATE COUNTER TOPS

- A. Plywood; 3/4 inch, formaldehyde-free, marine grade plywood.
- B. Square Edge Configurations: 1 inch to 1-1/8 inch thick monolithic particleboard with 1-1/4 inch edge face including top and bottom laminates.
- C. Top and matching front edge to be high pressure plastic laminate factory bonded.
- D. Provide balancing sheet on opposite face.
- E. Provide countertops for base cabinets and counter sections.
- F. Laminate tops and shall be continuous in practical lengths. When requiring splice joints, use a combination of splines or dowels for alignment and tite-joint fasteners as required to make a uniform and gapless joint.
 1. Provide continuous top for counter type cabinets fixed in a line.
- G. Provide 4 inch high scribable, square set, color matching, mechanically attached backsplash with endsplashes.
 1. Backsplashes are required at locations where countertops abut walls where indicated on Drawings.

- H. Edges of back and endsplashes shall be of square edge configuration.
- I. Sealants: Fully bed and seal splashes to tops and to other splashes with clear Sanitary Silicone Sealant Refer to Section 07 92 00 "Sealants."

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

- A. General: Fabricate cabinets and shelves to dimensions, profiles, and details indicated.
 - 1. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 2. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- B. Countertops: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrates.
- C. Shelves: 3/4-inch plywood core with high pressure laminate all sides and edges. Maximum depth shall be 24 –inches. Maximum length shall be 36 inches. Finish all edges including top and bottom.
- D. All visible surfaces of cabinetry not concealed shall be laminated.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3.3 INSTALLATION OF COUNTERTOPS

- A. Comply with installation requirements in SEFA 2. Abut top and edge surfaces true in plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints where indicated on Shop Drawings.
- B. Field Jointing: Where possible, make in same manner as shop-made joints, using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.
- C. Fastening:
 - 1. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.
 - 2. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
- D. Provide holes and cutouts required for service fittings.
- E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- F. Dress joints smooth, remove surface scratches, and clean entire surface.

3.4 CLEANING AND PROTECTING

- A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches o.c.
- C. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- D. Clean, lubricate, and adjust hardware.

END OF SECTION 06 41 16

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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. Wood planks.

1.3 COORDINATION

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

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For wood planks.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show details full size.
 - 3. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
 - 4. Show finished plank sizes, set numbers, sequence numbers within sets, and method of cutting planks at projecting components, and to produce indicated sizes.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.
 - 1. Include Samples of accessories involving color and finish selection.
- D. Samples for Verification: For each type of wood plank and accessory, with stain color and finish required, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Wood Planks: Equal to 1 percent of amount installed for each type, color, and finish of wood plank indicated.

1.8 QUALITY ASSURANCE

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

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

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

- C. Install factory-finished wood planks after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PLANK FABRICATORS

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of planks.

2.2 FACTORY FINISHED WOOD PLANKS – WD-1

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
- B. Architectural Woodwork Standards Grade: Premium.
 - 1. Wood Species: As indicated.
 - 2. Wood Moisture Content: 8 to 13 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Face Surface: Surfaced (smooth).
 - 5. Edge: Ship lapped.
 - 6. Finish: Prefinished.
- C. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
- D. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.

2.3 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 8 to 13 percent.

2.4 INSTALLATION MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
- B. Installation Adhesive: Product recommended by plank fabricator for each substrate for secure anchorage.
- C. Plank attachment: Blind screwing into framing and adhesive.

2.5 FABRICATION

- A. Arrange planks in shop or other suitable space in proposed sequence for examination by Architect. Mark units with temporary sequence numbers to indicate position in proposed layout.
 - 1. Notify Architect seven days in advance of the date and time when layout will be available for viewing.
 - 2. Provide lighting of similar type and level as that of final installation for viewing layout unless otherwise approved by Architect.
 - 3. Rearrange planks as directed by Architect until layout is approved.
 - 4. Obtain Architect's approval of layout before start of assembly. Mark units and Shop Drawings with assembly sequence numbers based on approved layout.
- B. Complete fabrication, including assembly, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times plank fabrication will be complete.
- C. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.6 FINISHING

- A. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Section 09 93 00 "Staining and Transparent Finishing."
 - 1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition planks to humidity conditions in installation areas.

3.2 INSTALLATION

- A. Install in accordance with Manufacturer's requirements.
- B. Install planks level, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- C. Anchor planks to supporting substrate with blind screwing and adhesive.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 06 42 10

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid surface window sills.

1.3 ACTION SUBMITTALS

- A. Product Data: For solid surface fabrications.
- B. Shop Drawings: Show materials, finishes, edge and profiles.
 - 1. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Window Sills, 12 inches long.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface fabrications to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate solid surface fabrications similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of solid surface fabrications.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of solid surface fabrications by field measurements before fabrication is complete.

PART 2 - PRODUCTS

2.1 SOLID SURFACE FABRICATIONS MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Basis of Design Product and Manufacturer; As Indicated on the Finish Schedule, or comparable product by one of the following:
 - a. E. I. du Pont de Nemours and Company.
 - b. Formica Corporation.
 - c. Wilsonart LLC.
 - 2. Colors and Patterns: Match Architect's samples.
 - 3. Thickness: 2 cm.

2.2 FABRICATION

- A. Configuration: As Indicated.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material and conditions under which solid surface fabrications will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install solid surface fabrications level to a tolerance of 1/16 inch in 4 feet, 1/8-inch maximum.
- B. Secure solid surface fabrications with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match solid surface material. Remove surface scratches, and clean entire surface.

END OF SECTION 06 61 16

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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. Composite decking.
 - 2. Composite stair treads.
 - 3. Composite railings.

1.3 ACTION SUBMITTALS

- A. Product Data: For composite decking and railings. Include installation instructions.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for initial review: For composite decking and railings, not less than 24 inches long, showing the range of variation to be expected in appearance of decking, including surface texture and profiles.
- D. Samples for verification: For composite decking and railings, not less than 24 inches long, showing the range of variation to be expected in appearance of decking, including surface texture and profiles.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Composite decking and railings.
 - 2. Decking fasteners.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store composite lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS FOR RAILINGS

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

2.2 COMPOSITE DECKING AND STAIR TREADS

- A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, shall not be less than design loads and spans indicated.
- B. Composite Lumber: Solid shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; TimberTech Vintage Collection, or a comparable, acceptable product by one of the following:
 - a. Lumberrock.
 - b. AZEK Building Products, Inc.
 - c. Trex Company, Inc.
 2. Decking Standard: ICC-ES AC109 or ICC-ES AC174.
 3. Decking Size: As indicated.
 4. Surface Texture: Match Architect's sample.
 5. Color: Weathered Teak.

2.3 COMPOSITE RAILINGS

- A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.

1. Basis of Design Product and Manufacturer; As indicated on the Exterior Finish Schedule, subject to compliance with requirements, acceptable products by one of the following:
 - a. Lumberrock.
 - b. AZEK Building Products, Inc.
 - c. TimberTech.
 - d. Trex Company, Inc.
2. Railing Configuration: As indicated.
3. Cap Profile: Match Architects Sample.
4. Surface Texture: May Vary, Match Architect's sample.
5. Color: Match Architect's sample.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 1. Use Type 316 stainless steel.
- B. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
 1. Use Type 316 stainless steel.
- C. Stainless Steel Bolts: ASTM F593, Alloy Group 2; with ASTM F594, Alloy Group 2 hex nuts and, where indicated, flat washers.
- D. Postinstalled Anchors: Stainless steel, torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E488 conducted by a qualified independent testing and inspecting agency.
 1. Stainless steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 2.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Install composite lumber to comply with manufacturer's written instructions.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- E. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC70 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.
 - 3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- F. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.
- G. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.4 RAILING INSTALLATION

- A. Install in accordance with Manufacturers recommendations.
- B. Materials shall be carefully handled and stored under cover in manner to prevent deformation and damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter. All such work shall be repaired and cleaned prior to erection.
- C. Work shall be erected square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set into concrete or masonry shall be furnished loose under this section to be built-into concrete and masonry by those trades as the work progresses. Later cutting or drilling shall be avoided where possible.
- D. Work shall be rigidly braced and secured to surrounding construction, and shall be, tight and free of rattle, vibration, or noticeable deflection after installation.
- E. Balusters: Fit to railings, glue, and screw in place. Countersink fastener heads, fill flush, and sand filler.
- F. Newel Posts: Secure to stringers and risers with countersunk-head wood screws and glue.

- G. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts and glue.

END OF SECTION 06 73 00

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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. Composite Cladding.

1.3 ACTION SUBMITTALS

- A. Product Data: For composite cladding. Include installation instructions.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for initial review: For composite cladding, not less than 24 inches long, showing the range of variation to be expected in appearance of cladding, including surface texture and profiles.
- D. Samples for verification: For composite cladding, not less than 24 inches long, showing the range of variation to be expected in appearance of cladding, including surface texture and profiles.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store composite lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 COMPOSITE CLADDING

- A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
 - 1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, shall not be less than design loads and spans indicated.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Lumberrock.
 - 2. AZEK Building Products, Inc.
 - 3. TimberTech.
 - 4. Trex Company, Inc.
 - 5. Versatex.
- C. Cladding Size: As indicated.
- D. Surface Texture: Match Architect's sample.
- E. Color: Match Architect's sample.

2.2 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. Use Type 316 stainless steel.
- B. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
 - 1. Use Type 316 stainless steel.
- C. Stainless Steel Bolts: ASTM F593, Alloy Group 2; with ASTM F594, Alloy Group 2 hex nuts and, where indicated, flat washers.
- D. Postinstalled Anchors: Stainless steel, torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E488 conducted by a qualified independent testing and inspecting agency.
 - 1. Stainless steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Install composite lumber to comply with manufacturer's written instructions.
- C. Do not splice members between supports unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- E. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC70 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.
- F. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.
- G. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.4 INSTALLATION

- A. Materials shall be carefully handled and stored under cover in manner to prevent deformation and damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter. All such work shall be repaired and cleaned prior to erection.
- B. Work shall be erected square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set into concrete or masonry shall be furnished loose under this section to be built-into concrete and masonry by those trades as the work progresses. Later cutting or drilling shall be avoided where possible.

- C. Work shall be rigidly braced and secured to surrounding construction, and shall be, tight and free of rattle, vibration, or noticeable deflection after installation.

END OF SECTION 06 83 00

Division 07
Thermal and Moisture Protection

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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. Sheet waterproofing.
 - 2. Blindside sheet waterproofing for walls below grade.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1. 8-by-8-inch square of waterproofing and flashing sheet.
 - 2. 4-by-4-inch square of drainage panel.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Research Reports: For modified bituminous sheet waterproofing/termite barrier, showing compliance with ICC AC380.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 - 1. Build for blindside sheet waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.
 - a. Size: 100 sq. ft. in area.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

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

1.8 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - a. Warranty Period: Five years from date of Substantial Completion.
 - 2. Termite Barrier Warranty: Manufacturer agrees to furnish replacement waterproofing termite barrier material and accessories for waterproofing termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

- a. Warranty Period: Ten years from date of Substantial Completion.
- B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.
 1. Warranty includes removing and reinstalling protection board and drainage panels.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

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

2.2 SHEET WATERPROOFING

- A. Modified Bituminous Sheet Waterproofing: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive side.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. GCP Applied Technologies Inc.
 - c. Henry Company; a Carlisle company.
 - d. W. R. Meadows, Inc.
 2. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 BLINDSIDE SHEET WATERPROOFING

- A. Blindside Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. GCP Applied Technologies Inc.
 - c. Henry Company; a Carlisle company.
 - d. W. R. Meadows, Inc.
 2. Physical Properties:
 - a. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D1970/D1970M.
 - b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D903, modified.
 - c. Lap Adhesion: 5 lbf/in. minimum; ASTM D1876, modified.

- d. Hydrostatic-Head Resistance: 230 feet; ASTM D5385, modified.
- e. Puncture Resistance: 100 lbf minimum; ASTM E154/E154M.
- f. Water Vapor Permeance: 0.1 perm maximum; ASTM E96/E96M, Water Method.
- g. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.

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

2.4 ACCESSORIES

- A. Furnish accessory materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
1. Furnish liquid-type accessory materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by sheet waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.
- G. Protection Course, Asphaltic: ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
1. Thickness: Nominal 1/4 inch.
 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.

2.5 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel without Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core, without a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft..
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. GCP Applied Technologies Inc.
 - c. Henry Company; a Carlisle company.
 - d. W. R. Meadows, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
 - 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections.
- E. Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.
- F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D4258.
 - 1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- G. Bridge and cover isolation joints, expansion joints, and discontinuous joints with overlapping sheet strips of widths according to manufacturer's written instructions.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- H. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's instructions.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.

- I. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.3 INSTALLATION OF SHEET WATERPROOFING

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- E. Seal edges of sheet waterproofing terminations with termination bar and sealant.
- F. Install sheet waterproofing and accessory materials to tie into adjacent waterproofing.
- G. Roll waterproofing membrane to firmly adhere to substrate. Roll seams and terminations.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- I. Immediately install protection course with butted joints over waterproofing membrane.
 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 INSTALLATION OF BLINDSIDE SHEET WATERPROOFING

- A. Install blindside sheet waterproofing according to manufacturer's written instructions.
- B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.
- C. Vertical Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.
 1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detail tape.

- D. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
- E. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
- F. Install sheet waterproofing and accessory materials to produce a continuous watertight tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.5 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

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

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests, and to furnish reports to Architect.
- B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.
- C. Waterproofing will be considered defective if it does not pass tests and inspections.

3.7 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 13 26

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Miscellaneous stuffing insulation.
 - 2. Unfaced batt insulation.
 - 3. Semi-Rigid Insulation.
 - 4. Sound attenuation blankets.
 - 5. Mineral Wool Insulation.
 - 6. Polyisocyanurate Foam-Plastic Board Insulation.

1.3 SUBMITTALS

- A. Product Data: Each type of insulation product specified.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thickness, widths, and lengths.

2.2 MISCELLANEOUS STUFFING INSULATION

- A. Shall be inorganic (non-asbestos) mineral wool insulation without facing, for the purpose of filling and stuffing openings in walls around pipes, structural components, conduits, expansion joints to eliminate noise transfer and to insulate. Use to seal top of interior walls, not fire rated walls, between masonry and roof deck, or as otherwise indicated. Use at expansion joints as detailed or as otherwise indicated. Insulation shall have a flame spread rating of 15 or less, and a smoke development rating of 0; per ASTM E84. Miscellaneous stuffing insulation shall be formaldehyde-free. Approved manufacturers are as follows:
 - 1. Thermafiber Corporation
 - 2. Rock Wool Manufacturing Company

2.3 UNFACED BATT INSULATION

- A. Unfaced preformed glass fiber batt insulation conforming to ASTM C665, Type I. Flame spread shall be 25, smoke developed 50 in accordance with ASTM E136. Unfaced batt insulation shall be formaldehyde-free. Approved manufacturers are as follows:
 - 1. Basis of design Product and Manufacturer EcoBatt™ by Knauf; subject to compliance with requirements other manufacturer offering products which may be incorporated into the work are but not limited to the following:
 - a. Owens-Corning Fiberglas Corp.
 - b. CertainTeed Corporation
 - c. JohnsManville

2.4 SEMI-RIGID INSULATION

- A. Glass-Fiber Board, Unfaced: ASTM C 612, Type IA; unfaced, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics. Nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Owens Corning Johns Manville; a Berkshire Hathaway company; Fiberglass 703 or Johns Manville, IS300, 3-inches thick or a comparable product by one of the following:
 - a. CertainTeed Corporation.
 - b. Knauf Insulation.
 - c. Owens Corning.

2. Minimum R-Value per inch: 4.0.
3. Thickness: As required to meet R-value indicated.

2.5 SOUND ATTENUATION BLANKETS

- A. Sound Attenuation Blanket Insulation: 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, with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
1. Basis of design Product and Manufacturer EcoBatt™ by Knauf; subject to compliance with requirements other manufacturer offering products which may be incorporated into the work are but not limited to the following:
 - a. Owens-Corning Fiberglas Corp.
 - b. CertainTeed Corporation;
 - c. JohnsManville.

2.6 MINERAL WOOL INSULATION

- A. Unfaced preformed glass fiber batt insulation conforming to ASTM C665, Type I. Flame spread shall be 25, smoke developed 50 in accordance with ASTM E136. Unfaced batt insulation shall be formaldehyde-free. Approved manufacturers are as follows:
1. Owens-Corning Fiberglas Corp.
 2. Knauf Fiber Glass
 3. CertainTeed Corporation
 4. JohnsManville

2.7 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.
1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Thermax™ Heavy Duty Insulation or a comparable product by one of the following:
 - a. Hunter Panels.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Rmax, Inc.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- B. Thickness: As indicated.

2.8 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Owens Corning, Insul-Quick system or a comparable product by one of the following:
 - 1. AGM Industries, Inc
 - 2. Gemco.
- C. Rigid and Semi-rigid insulation shall be installed using welded pins or studs finished with sheet metal pins utilizing the Fiberglas "Insul-Quick" system with speed washers or studs. Nuts shall be installed 12" x 18" centers and the insulation impaled over them. The sheet metal shall be secured to the same fasteners. Seal all joints with sealant or tape as recommended by the manufacturer.

2.9 ACCESSORIES

- A. 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.
- B. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
 - 2. Spray Polyurethane Foam Insulation: ASTM C4536, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 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.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled

- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
- E. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

3.4 MISCELLANEOUS STUFFING INSULATION

- A. Where the Drawings call for interior walls to extend to deck or roof, openings in walls between rooms above the ceiling shall be sealed with mineral wool placed or stuffed in openings to eliminate noise transfer and air movement. Mineral wool insulation shall be provided at other building locations indicated or requiring minor fill to eliminate air movement.
- B. Also use mineral wool stuffing at the transition between rigid insulations where the GWB ends within the interstitial space above the ceiling on exterior tilt wall applications

3.5 BATT INSULATIONS

- A. Install in areas as indicated. Install in strict accordance with the manufacturers written installation instructions. Install in all exterior wall voids, behind beams, and concealed locations in the exterior walls and roof areas of the building whether or not indicated. All gaps shall be filled with batt insulation.
- B. Install thermal insulation as follows:
 - 1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
 - 4. Until gypsum board is installed, hold insulation in place with 10-inch staples fabricated from 0.0625-inch (16-gage)-diameter tie wire and inserted through slot in web of member.
- C. All voids in the perimeter of the building shell shall be filled and closed with batt insulation or miscellaneous mineral wool stuffing insulation, whether or not indicated or shown. This includes behind all steel beams, wide flange beams, channels, CMU, miscellaneous framing, etc.

3.6 SEMI AND RIGID INSULATION INSTALLATION

- A. Install using welded pins or studs finished with sheet metal pins utilizing the Fiberglas "Insul-Quick" system or similar with speed washers or studs. Nuts shall be installed 12" x 18" centers and the insulation impaled over them. The sheet metal shall be secured to the same fasteners. Seal all joints with sealant or tape as recommended by the manufacturer.

3.7 SOUND ATTENUATION BLANKETS

- A. Install in interior walls where indicated. Install with clips as recommended by the manufacturer. Install in strict accordance with the manufacturers written installation instructions. Install from floor to full height of wall, or as otherwise indicated.

3.8 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Recheck measurements and dimensions, before starting each installation.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

3.9 PROTECTION

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

END OF SECTION 07 21 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Masonry insulation; foamed-in-place insulation.

1.3 SUBMITTALS

- A. Product Data: Submit product data for insulation specified.
- B. Test Reports: Submit product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, and other properties, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

- A. Manufacturing Standards: Provide insulation from a single approved source. Product components shall be of the same brand from the same approved source arriving at the site either pre-mixed according to the manufacturer's printed instructions or in unopened factory sealed containers.
- B. Installer Qualifications for Foamed-In-Place Masonry Insulation: Engage an authorized contract installer who has been trained and authorized by the product manufacturer.
- C. At the Architect's request, the Installer will provide infrared scanned images of the work prepared by a "Block Wall Scan IR" trained IR technician to confirm that empty core cells are filled with foam insulation. Insulation voids shall be foamed at no added cost to the Owner.
- D. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Comply with manufacturer's written instructions for handling and protecting during installation.

1.6 WARRANTY

- A. Warranty: Provide a one-year product and installation warranty by the manufacturer and installer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Injected Foam Insulation - Foamed-In-Place Insulation: Two-component, nitrogen-based, non-toxic amino-plast resin, utilizing a foaming catalyst, and air as a delivery method.
1. Product and Manufacturer – Basis of Design: Core-Fill 500; Tailored Chemical Products of Florida, Inc; subject to compliance with requirements, other acceptable Manufacturers offering products which may be incorporated in the Work include the following:
 - a. Applegate R-Foam, LLC.
 - b. CFI Foam, Inc.
 - c. RetroFoam LLC.
 2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 3. Fire-Resistance Ratings: Foam shall neither add to nor detract from fire-resistance ratings of insulated fire-resistance rated CMU walls per prevailing building codes.
 4. Surface Burning Characteristics: Class A per ASTM E84; Flame Spread Index < 25; Smoke Developed.
 5. Index < 450.
 6. Thermal Resistance: R-4.6/inch @ 75°F per either ASTM C518 or ASTM C177.
 7. Potential Heat: < 8000 Btu/lb when tested per NFPA 259.EXECUTION

2.2 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

2.3 INSTALLATION

- A. General: Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.

- C. Fill all open cells and voids in hollow concrete masonry walls where shown on the drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" diameter holes drilled to access each column of block cells e.g. 8" o/c beginning approximately four (4) feet above the finished floor. Repeat this procedure at 10' to 14' intervals above the first horizontal row of holes and as needed until the empty core cells are completely filled.

END OF SECTION 07 21 19

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Closed-cell spray polyurethane foam.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers written instructions for handling and protection prior to and during installation.
- B. Store both components in a temperature-controlled area between 60 and 85 degrees F. Do not allow product to freeze.
- C. Use only those components that are supplied by the Manufacturer.

1.7 PROJECT CONDITIONS

- A. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

PART 2 - PRODUCTS

2.1 PERFORMANCE CHARACTERISTICS

- A. Air Material Air Leakage Rate: Maximum material air leakage rate shall meet per (0.02 psf per ASTM E 283).
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Development Index: 450 or less.
- C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM D 1622, minimum density between 2.0 and 2.4 lb/cu. ft. and minimum aged R-value at 1-inch thickness of minimum 7.4 deg F x h x sq. ft./Btu at 75 deg F.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Huntsman Building Solutions; HEATLOK HFO HIGH LIFT or comparable product by one of the following:
 - a. BASF Corporation.
 - b. Dow Chemical Company (The).
 - 2. Thickness: 2 inches. Minimum.

2.3 THERMAL BARRIER

- A. Basis of Design Product and Manufacturer; LOK/ DC315 as Manufactured by IFTI.

2.4 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Do not apply insulation within 3-inches of heat emitting devices or where the temperature is in excess of 200 degrees F, as per ASTM C411 or in accordance with applicable codes.
- E. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Thermal Protection: Protect installed spray polyurethane foam insulation with qualified thermal or per applicable building codes.

END OF SECTION 07 21 20

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of roof insulation for roofing as indicated on the Drawings and specified herein. Specification includes the following:
 - 1. Roof insulation.
 - 2. Cover board.

1.3 SUBMITTALS

- A. Product Approval Certification: Submit current Product Approval certification indicating compliance with the Florida Building Code and FAC 9N-3.
- B. Product data.
 - 1. Roof insulation
 - 2. Fasteners
- C. Shop Drawings: Include plans, sections, details, and attachments to other Work.
 - 1. Layout and thickness of insulation.
 - 2. Tapered insulation, including slopes.
 - 3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

1.4 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at the Project site.
- B. Roof system shall be designed to meet wind-loading requirements for Building Code with the Supplement. Refer to Structural Drawings for wind velocity and "Importance Factor" requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original packaging, dry, undamaged, with seals and labels intact.

- B. 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.

1.6 WARRANTY

- A. Insulation shall be included as a covered component of the membrane roofing warranty. Refer to section 07 54 19 "Ketone Ethylene Esther (KEE) Roofing," for warranty requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. **Material Compatibility:** Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- B. **Structural Performance:** Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to withstand the effects of the following:
 - 1. **Wind Loads:** In accordance with Florida Building Code (current edition).
 - a. **Basic Wind Speed:** As indicated on the Structural Drawings.

2.2 MATERIALS

- A. **General:** Preformed roof insulation boards manufactured or approved by membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:
 - 1. Atlas EPS; a Division of Atlas Roofing Corporation.
 - 2. Firestone Building Products.
 - 3. GAF Materials Corporation.
 - 4. Insulfoam LLC; a Carlisle company.
 - 5. Johns Manville; a Berkshire Hathaway company.
- C. **Polyisocyanurate Board Insulation:** ASTM C 1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.
 - 1. **Overall R-value:** As indicated.
 - 2. **Long Term Thermal Resistance (LTTR)** minimum value of 5.6 per inch @ 75 degrees F.

2.3 INSULATION ACCESSORIES

- A. **General:** Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to another insulation layer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 - 1. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3.2 PREPARATION

- A. Install insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. Comply with insulation manufacturer's instructions and recommendations for the handling, installation, and bonding or anchorage of insulation to substrate.
- D. Installation Over Wood Decking:
 - 1. Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to wood decks.
 - a. Fasten slip sheet according to requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
 - b. Fasten slip sheet to resist specified uplift pressure at corners, perimeter, and field of roof.
 - 2. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. Fill gaps exceeding 1/4 inch with insulation.

- e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- 3. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
 - a. Fasten insulation as required by the Building Code.
 - b. Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
- 4. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Adhere each layer of insulation to substrate as required by the Building Code.

3.4 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 - 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 - 4. Adhere cover board to substrate using adhesive as required by the Building Code.

3.5 PROTECTING AND CLEANING

- A. Protect insulation system from damage and wear unit; covered by roofing membrane.
- B. Correct deficiencies in or remove insulation that does not comply with requirements, repair substrates, and repair or reinstall insulation to a condition free of damage and deterioration prior to installation of roofing membrane.

END OF SECTION 07 22 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Exterior finish system.

1.3 ACTION SUBMITTALS

- A. Product Data: For each component, trim, and accessory.
- B. Shop Drawings:
 - 1. Include plans, sections, details of components, details of penetrations and terminations, flashing details, joint locations and configurations, and connections and attachments to other work.
- C. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
 - 1. Include similar Samples of exposed accessories involving color selection.
- D. Samples for Verification: 12-inch-square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including.
 - 1. Include exposed trim and accessory Samples to verify color selected.
 - 2. Include a typical control joint filled with sealant of color selected, as specified in Section 07 92 00 "Joint Sealants."
- E. Maintenance Data: For finish system to include in maintenance manuals.

1.4 CLOSEOUT SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An installer certified in writing by manufacturer as qualified to install manufacturer's system using trained workers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit finish system to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.8 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace finish that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Bond integrity and weathertightness.
 - b. Deterioration of finishes beyond normal weathering.
 - 2. Warranty coverage includes:
 - a. Finish, including base and finish coats and reinforcing mesh.
 - b. Accessories, including trim components and flashing.
 - 3. Warranty Period: Five years from date of Substantial Completion.
- B. Installer's Warranty: Warrant the system to be free from defects in workmanship for a period of five (5) years from the Date of Substantial Completion issued for the project or this portion of the project.
 - 1. Warranty shall provide 100% labor and material to replace system shown to have defects in workmanship.

PART 2 - PRODUCTS

- A. Finish-Coat Materials: Manufacturer's standard acrylic-based coating complying with the following:
 - 1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

2.2 MANUFACTURER

- A. Basis of design Manufacturer; STO Corp.
- B. Other acceptable manufacturers that may be incorporated into the work are but not limited to the following:
 - 1. Dryvit systems.
 - 2. Other acceptable Manufacturers.
- C. Soffit Applications
 - 1. Ground Coat for Soffit Applications (STO BTS Plus): A one-component, polymer modified, cementitious, high-build base coat with less than 33 percent portland cement content by weight.
 - 2. Fabric for Soffit Applications: STO mesh, nominal 4.5 ounce per square yard, symmetrical, interlaced open weave glass fiber fabric made with minimum 25 percent by weight alkaline resistant coating for compatibility with Sto materials
 - 3. Finish for soffit applications: STO exterior ready mixed coatings, as manufactured by STO Industries.
 - a. Stolit 1.0, ready mixed, acrylic based coating. Abrasion resistant, vapor permeable, water based, flexible, and weather resistant to freeze/thaw cycles, wind driven rain and U.V. light.
 - b. Color Selection: The lightness value of the exterior finish color to be applied over Dens-Glass Gold sheathing shall be 20 percent or greater, and the color fastness shall not be less than 7.
 - 4. Colors: Match Architect's sample.
 - 5. Textures: Match Architect's sample.
- D. Water: Potable.
- E. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784 and ASTM C 1063.
 - 1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.

2.3 MIXING

- A. Comply with manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by manufacturer. Mix materials in clean containers. Use materials within time period specified by manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Prepare and clean substrates to comply with manufacturer's written instructions to obtain optimum bond between substrate and finish.

3.3 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter, expansion joints, and elsewhere as indicated. Coordinate with installation of insulation.
 - 1. Expansion Joint: Use where indicated on Drawings.
 - 2. Casing Bead: Use at other locations.

3.4 BASE-COAT INSTALLATION

- A. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

3.5 FINISH-COAT INSTALLATION

- A. Primer: Apply over dry base coat according to manufacturer's written instructions.
- B. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - 1. Embed aggregate in finish coat according to manufacturer's written instructions to produce a uniform applied-aggregate finish of color and texture matching approved sample.

3.6 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive coatings.

END OF SECTION 07 24 11

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preshaped Shutters.
 - 2. Other preshaped architectural forms indicated on the Drawings.

1.3 SUBMITTALS

- A. Product Data: Submit product data for materials and units specified.
- B. Shop Drawings: Include sizes and profiles; include dimensions of each different pre-shaped architectural form. Show fabrication and installation of units including plans, elevations, details configurations, and attachments adjacent construction.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain pre-formed units from one source and by a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver units in original, unopened packages with manufacturer's labels intact and clearly identifying products.
- B. Store units inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

PART 2 - PRODUCTS

2.1 PRE-SHAPED ARCHITECTURAL FORMS

- A. Manufacture – Basis of Design: Spectis Moulders Inc.; other acceptable manufacturers are as follows:
 - 1. Fypon, Ltd.

- B. Shapes and Profiles: As indicated.

2.2 ACCESSORIES

- A. Adhesives: Types recommended by the forms manufacturer for installation to substrates indicated.
- B. Mechanical Fasteners: Screw type fasteners; stainless steel; of type as recommended by the manufacture for installations indicated.

2.3 FABRICATION

- A. Cupola Columns: Manufacture column assemblies with closed tops and bottoms. Factory cut columns, capitals and bases to profiles indicated. Provide accessible mechanical anchor points.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with material manufacturer's written instructions for installation as applicable to each type of substrate indicated.
- B. Mechanically and adhesive attach units to substrate by method complying with system manufacturer's written requirements.

END OF SECTION 07 24 30

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Architectural Foam Shapes.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each component.
- B. Samples: For each exposed product and for each color and texture specified, 8 inches square in size.

1.5 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by manufacturer certifying the following:
 - 1. Substrate is acceptable to manufacturer.
- B. Product Certificates: For cementitious materials insulation.

1.6 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - 1. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit foam shapes to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace foam shapes that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Bond integrity and weathertightness.
 - b. Deterioration of finishes beyond normal weathering.
 - 2. Warranty coverage includes the following components:
 - a. Finish, including base and finish coats and reinforcing mesh.
 - b. Insulation.
 - c. Insulation adhesive and mechanical fasteners.
 - 3. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Dryvit Systems, Inc.
 - 2. Parex USA, Inc.
 - 3. Senergy; BASF Corp.
 - 4. Sto Corp.

- B. Source Limitations: Obtain components from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

1. Impact Performance: ASTM E 2568, High impact resistance.
2. Bond Integrity: Free from bond failure within between foam shapes and substrates, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
3. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate; cured for 28 days and shows no growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274.
 - a. Wind Loads: Uniform pressure as indicated on Drawings.

2.3 MATERIALS

- A. Adhesive: Manufacturer's standard formulation designed for indicated use; compatible with substrate.
- B. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation (EPS): Comply with ASTM C 578, Type I; and with manufacturer's requirements for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
 1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks.
 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E 84.
 3. Foam Build-Outs: Provide with profiles and dimensions indicated on Drawings.
- C. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E 2098 and the following:
 1. Reinforcing Mesh, General: Not less than weight required to meet impact-performance level specified in "Performance Requirements" Article.
- D. Base-Coat Materials: Manufacturer's standard mixture complying with one of the following:
 1. Job-mixed formulation of portland cement complying with ASTM C 150/C 150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 4. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
- E. Primer: Manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

- F. Finish-Coat Materials: Manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:
 - 1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 - a. Colors: Match Architect's sample.
 - b. Textures: Match Architect's sample.
- G. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
- H. Water: Potable.

2.4 MIXING

- A. Comply with manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by manufacturer. Mix materials in clean containers. Use materials within time period specified by manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect foam shapes, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind foam shapes and deterioration of substrates.
- C. Prepare and clean substrates to comply with manufacturer's written instructions to obtain optimum bond between substrate and adhesive for foam shapes.
 - 1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Comply with ASTM C 1397, ASTM E 2511, and manufacturer's written instructions for installation of foam shapes as applicable to each type of substrate.

3.4 INSTALLATION

- A. Adhesively attach insulation to substrate in compliance with ASTM C 1397 and the following:
 - 1. Press and slide foam shapes into place. Apply pressure over the entire surface of foam shape to accomplish uniform contact, high initial grab, and overall level surface.
 - 2. Allow adhered foam shapes to remain undisturbed for not less than 24 hours, before beginning rasping and sanding insulation or before applying base coat and reinforcing mesh.
 - 3. Apply foam shapes over dry substrates.
 - 4. Abut insulation tightly at joints within and between each foam shape to produce flush, continuously even surfaces without gaps or raised edges.
 - 5. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
 - 6. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.
 - 7. Interrupt foam shapes for expansion joints where indicated.
 - 8. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
 - 9. Fully wrap edges with strip reinforcing mesh.
 - 10. Treat exposed edges of insulation by encapsulating with base coat, reinforcing mesh, and finish coat.
- B. Expansion Joints: Install at locations indicated, where required by manufacturer, and as follows:
 - 1. At expansion joints in substrates.
 - 2. Where foam shapes adjoin dissimilar substrates, materials, and construction, including other foam shapes.

3.5 BASE-COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of foam shapes in minimum thickness recommended in writing by manufacturer, but not less than 1/16-inch dry-coat thickness.
- B. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

3.6 FINISH-COAT INSTALLATION

- A. Primer: As recommended, apply over dry base coat according to manufacturer's written instructions.
- B. Finish Coat: Apply over dry base coat and primer if required, maintaining a wet edge at all times for uniform appearance, in thickness required by manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by manufacturer.

3.7 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive foam shapes.

END OF SECTION 07 24 35

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide the Work required to provide and install the underslab vapor retarder and its accessories as indicated on the Drawings and as specified herein.

1.3 SUBMITTALS

- A. Product data and general recommendations from materials manufacturer for types of underslab vapor retarder required.
- B. Samples of underslab vapor retarder and auxiliary materials.
- C. Submit pre-installation conference meeting minutes.

1.4 QUALITY ASSURANCE

- A. Pre-installation Conference: Prior to installing vapor retarder and associated work, meet at Project site with the contractor. Review material selections and procedures to be followed in performing work. Notify Architect at least 48 hours before conducting meeting.
- B. Vapor retarder shall comply with:
 - 1. ASTM E 1745, latest edition, "Water Vapor Barriers Used in Contact with Soil or Granular Fill under Concrete Slabs."
 - 2. ASTM E 1643, latest edition, "Installation of Water Vapor Barriers Used in Contact with Earth or Granular Fill Under Concrete Slabs."
 - 3. Federal Specification UU-B-790a Type 1, Grade A, Style 4.

1.5 PROJECT CONDITIONS

- A. Substrate: Proceed with work after substrate construction, openings, and penetrating work have been completed and areas are free of standing or running water, ice, and frost.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: "Moistop Ultra 15 Underslab Vapor retarder" as manufactured by Fortifiber Building Products Systems. Products of the following manufacturers are also acceptable provided compliance with requirements as specified herein:
 - 1. Griffolyn Division of Reef Industries, Inc.
 - 2. Stego Industries, Ilc.

2.2 UNDERSLAB VAPOR RETARDER

- A. Multi-layer composite polyethylene reinforced with fiberglass reinforcing.
- B. Class A material in accordance with ASTM E 1745, latest edition.
- C. Thickness: 15 mil reinforced.

2.3 AUXILIARY MATERIALS

- A. Joint Tape: Provide types of adhesive compound and tapes recommended by underslab vapor retarder manufacturer for seams in vapor retarder, and for projections through vapor retarder.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that all items that pass through the vapor retarder are properly and rigidly installed.
- B. Substrate shall be free of projections and irregularities.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions for handling and installing underslab vapor retarder materials.
- B. Seal projections through vapor retarder and seal seams. Bond to vertical surfaces and also, where shown or recommended by manufacturer, bond to horizontal surfaces.
- C. Overlap and seal all seams in strict accordance with the manufacturers written installation instructions.

3.3 PROTECTION

- A. Protect completed vapor retarder during installation of the concrete slab on grade.
- B. Repair and seal all punctures that may occur prior or during installation.

- C. Vapor retarder shall be continuously sealed at all joints and projections.

END OF SECTION 07 26 10

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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. Air and water barrier.

1.3 PERFORMANCE REQUIREMENTS

- A. Performance Requirements:
 - 1. The air and water barrier system shall be applied to the building envelope to control water and air leakage into and out of the conditioned space.
 - a. The air and water barrier system components include window and door flashing, air and water barrier membrane system, and accessory materials for application to exterior building envelope substrates indicated
 - 2. Joints, penetrations and paths of water and air infiltration shall be made watertight and airtight.
 - 3. The system shall withstand positive and negative combined wind, stack and HVAC pressures on the building envelope without damage or displacement.
 - 4. The system shall be installed airtight and shall remain flexible allowing for the relative movement of building envelope components due to thermal and moisture variations.

1.4 SUBMITTALS

- A. Product Data: For materials indicated; include manufacturer's product data including air and water barrier system materials and accessories, technical and test data, material descriptions and properties, installation instructions, and substrate preparation requirements.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air and water barrier system assemblies.

1. Show locations and extent of barrier. Include details for substrate joints and cracks, counter flashing, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of barrier.

C. Qualification Data: For Installer.

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

E. Reports: Field quality control reports for the following.

1. On-site testing.
2. Observation of air and water barrier installation.

1.5 QUALITY ASSURANCE

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

B. Preinstallation Conference: Conduct conference at Project site.

1. Review air and water barrier requirements and installation, special details, mockups, and bond testing, barrier protection, and work scheduling that covers barriers.
2. Contractor, Owner's Authorized Representative, installing subcontractor, membrane system manufacturer's representative, and all subcontractors who have materials penetrating membrane system or finishes covering membrane system shall be present.
3. Contractor shall notify Owner's Authorized Representative at least seven days prior to time for conference.
4. Contractor shall record minutes of meeting and distribute to attending parties.

5. Agenda: As a minimum discuss:

- a. Surface preparation.
- b. Substrate condition and pretreatment.
- c. Minimum curing period.
- d. Special details and sheet flashing.
- e. Sequence of construction, responsibilities, and schedule for subsequent operations.
- f. Installation procedures.
- g. Inspection procedures.
- h. Protection and repair procedures.
- i. Review and approval of all glazing applications.

C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by air and water barrier materials manufacturer.

D. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.

1. Build integrated mockups of exterior wall assembly incorporating backup wall construction, external cladding, window, door frame, penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of barriers, and sealing of gaps, terminations, and penetrations of barrier assembly.
 - a. Mockup shall illustrate material interfaces and seals of air and water barrier in accordance with manufacturer's application instructions and recommendations.
 - b. Coordinate construction of mockups to permit inspection of air and water barrier before external cladding is installed.
 - c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply barrier until mockups are approved.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Reports: Field quality control reports for the following.

1. On-site testing.
2. Observation of air and water barrier installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations. Remove damaged material from site and dispose of in accordance with applicable regulations.
- B. Protect air and water barrier components from freezing and extreme heat.
- C. Sequence deliveries to avoid delays, and to minimize on-site storage.
- D. Remove and replace air and water barrier materials that cannot be applied within their stated shelf life.
- E. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used.
 1. Apply at surface and ambient temperatures recommended by the manufacturer. Refer to manufacturer's product data sheets for best practices.
 2. Proceed with installation only when the substrate construction and preparation work are complete and in condition to receive the membrane system.

- B. Exposure Limitations: Schedule work to ensure that air and water barrier system is covered and protected from UV exposure within 180 days of installation. If air and water barrier membrane system cannot be covered within 180 days after installation, apply temporary UV protection as recommended by membrane manufacturer.

1.8 WARRANTY:

- A. Manufacturer's Warranty Requirements: Submit manufacturer's written warranty stating that installed air and water barrier materials are watertight, free from defects in material and workmanship, and agreeing to replace defective materials and components.
 - 1. Warranty period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturer's standard formulation designed for indicated use; compatible with substrate and complying with one of the following:

2.2 AIR AND WATER BARRIER SYSTEM

- A. Products and Manufacturer – Basis of Design: Prosoco R-Guard Cat 5 Air & Water Resistive Barrier System; PROSOCO, Inc.
 - 1. System Components:
 - a. PROSOCO R-GUARD GypPrime
 - b. PROSOCO R GUARD Stucco Prime
 - c. PROSOCO R-GUARD Joint & Seam Filler
 - d. PROSOCO R-GUARD FastFlash
 - e. PROSOCO R-GUARD CAT-5
 - f. PROSOCO R-GUARD AirDam sealant
 - 2. Backer Rod: Compressible, closed cell rod stock as recommended by system materials manufacturer for compatibility with AirDam sealant.
 - 3. Air and Water Barrier Sealant: R-GUARD AirDam.
- B. Other Acceptable Product and Manufacturer: Subject to compliance with requirements, the following may be used as a substitution for the Basis of Design specified:
 - 1. Manufacturer: E.I du Pont de Nemours and Company
 - a. System Description: DuPont Tyvek Fluid Applied WB
 - 1) Provide all materials and components for a complete air and water barrier system.

2.3 ACCESSORY MATERIALS

- A. General: Provide accessory materials recommended by air and water barrier materials manufacturer to produce a complete air and water barrier assembly. All accessory materials shall be compatible with primary air and water barrier materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with installation requirements and other conditions affecting performance of the Work.
- B. All surfaces shall be sound, clean and free of grease, dirt, excess mortar or other contaminants. Fill or bridge damaged surfaces, voids or gaps larger than one-half (1/2) inch with suitable material as required to comply with material manufacturer's installation instructions and recommendations.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by barrier manufacturer.
 - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for barrier application.
- B. Mask off adjoining surfaces not covered by barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another in accordance with air and water barrier membrane materials manufacturer to provide continuous support for barrier materials.

3.3 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to manufacturer's written instructions.

3.4 FLASHING AT WINDOWS, DOORS, OPENINGS AND PENETRATIONS:

- A. Flashing: Apply flashing materials in accordance with manufacturer's application guideline illustrations.

3.5 AIR AND WATER BARRIER COATING INSTALLATION

- A. General: Apply air and water barrier materials in accordance with manufacturer's application guideline illustrations. Apply coating within manufacturer's recommended application temperature ranges.
- B. Inspect membrane before covering. Repair any punctures, translucent or damaged areas by applying additional material.
- C. Correct deficiencies in or remove barrier that does not comply with requirements; repair substrates and reapply barrier components.
- D. Primer: Apply Primer; do not allow Primer to dry. Limit application of Stucco Prime to surfaces that can be covered with stucco scratch coat while primer is still "transfer wet to touch."

3.6 FLASHING TRANSITIONS

- A. Apply joint and seam filler and liquid flashing membrane to waterproof transitions in rough opening and between dissimilar materials.
 - 1. Fill any voids between the top of the flashing leg and the vertical wall with joint and seam filler. Tool to direct water from the vertical wall to the flashing.
 - 2. Apply flashing material to the top edge of the flashing leg.
 - 3. Apply products to create a monolithic "cap-flash" flashing membrane extending 2 inches up the vertical face of the structural wall and 1 inch over the flashing membrane.
 - 4. Apply additional product as needed to achieve a void and pinhole free surface.
 - 5. Allow flashing membrane to skin before installing other wall assembly, air and water barrier components.

3.7 INSTALLATION OF SEALANT FOR WINDOWS AND DOORS

- A. Sealant: Install sealant in continuous beads without air gaps or air pockets.
 - 1. Apply sealant to a clean, dry or damp surface
 - 2. Install sealant in continuous ribbons without gaps or air pockets, with complete wetting of the joint bond surfaces.
 - 3. Tool sealant immediately to ensure complete wetting of joint bond surface and to produce a smooth, concave joint profile flush with the edges of the adjacent surfaces. Where horizontal and vertical surfaces meet, tool sealant to create a slight cove so as to not trap moisture or debris.

4. Do not allow sealant to overflow onto adjacent surfaces. Prevent staining of adjacent surfaces.
5. Remove excess and misplaced sealant as work progresses. Clean the adjoining surfaces to remove misplaced sealant without damage to adjacent surfaces or finishes.

3.8 FIELD QUALITY CONTROL

- A. On-Site Testing: The air and water barrier material manufacturer's authorized representative shall perform tests as required to confirm the air and water barrier materials have been installed in accordance with material manufacturer's instructions and written recommendations.
- B. Observation of air and water Barrier Installation: The barrier material manufacturer's authorized representative shall observe installation of materials. Observations includes, but are not limited to, the following:
 1. Site conditions for application temperature and dryness of substrates have been maintained.
 2. Substrate conditions for application have been maintained during materials installation.
 3. Continuity of air and water barrier system has been achieved with no gaps or holes.
 4. Maximum exposure time of materials to UV deterioration has not been exceeded.
 5. Compatible materials have been used in all locations.
 6. Connections between assemblies have complied with air and water barrier materials manufacturer's requirements including surface preparation and continuity of seal.
 7. All penetrations have been sealed.
- C. Material application will be considered defective if it does not pass on-site testing and site observations.
 1. Apply additional barrier material, according to manufacturer's written instructions, where testing and observation results indicate insufficient thickness.
 2. Remove and replace deficient barrier components for retesting in accordance with manufacturer's instructions and recommendations.
- D. Repair damage to barriers caused by testing; follow manufacturer's written instructions.

3.9 CLEANING AND PROTECTION

- A. Protect air and water barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 1. Protect air and water barrier from exposure to UV light and harmful weather exposure as required by manufacturer.
 2. Protect air and water barrier from contact with incompatible materials and sealants not approved by air and water barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

- C. Remove masking materials after installation.

END OF SECTION 07 27 26

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. Standing-seam metal roof panels.
 - 2. Underlayment Materials.

1.3 CODE COMPLIANCE

- A. Exterior openings shall meet the requirements of the Florida Building Code.
 - 1. Provide product evaluations and installation requirements indicating compliance with Code requirements.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof area and eave, including fascia, as shown on Drawings; approximately 48 inches square by full thickness, including attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

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

1.11 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 1. Wind Loads: As indicated on Drawings.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- D. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Berridge Manufacturing Company.
 - b. MBCI.
 - c. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
 2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.040 inch.
 - b. Exterior Finish: Metallic fluoropolymer.
 - c. Color: Match Architect's samples.
 3. Clips: One-piece fixed to accommodate thermal movement.
 - a. Material: 0.0625-inch- thick, stainless steel sheet.
 4. Joint Type: Double folded.
 5. Panel Coverage: 16 inches.
 6. Panel Height: 2.0 inches.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle WIP Products; a brand of Carlisle Construction Materials.

- b. GCP Applied Technologies Inc.
- c. Henry Company.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- E. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets.
 - 1. Refer to Section 07 62 00 "Sheet Metal Flashings and Trim."
- F. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot-long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
 - 1. Refer to Section 07 62 00 "Sheet Metal Flashings and Trim."
- G. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- H. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Panels and Accessories:
 - 1. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - a. Color: As selected by Architect from Manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Use Type 316 stainless steel fasteners.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.
 2. Connect downspouts to underground drainage system indicated.
- J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

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

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes metal soffit panels.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 FIELD CONDITIONS

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

1.10 COORDINATION

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

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
1. Wind Loads: As indicated on Drawings.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

- A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile Metal Soffit Panels: Ventilated panels formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.
 - 1. Subject to compliance, Basis of Design Product and Manufacturer; Berridge Manufacturing Company, Model FW-12, or a comparable product by one of the following:
 - a. MBCI.
 - b. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
 - 2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Nominal Thickness: 0.040 inch.
 - b. Profile: Flat with (2) ribs per panel and ventilated.
 - c. Exterior Finish: Three-coat fluoropolymer.
 - 1) Color: As selected by Architect from manufacturer's full range.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

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

1. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - a. Color: As selected by Architect from Manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
 1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.

4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Use Type 316 stainless-steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.

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

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 93

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
1. Adhered ketone ethylene ester (KEE) roofing system.
 2. Accessory roofing materials.
 3. Walkways.

1.3 CODE COMPLIANCE

- A. General: Roofing membrane system shall meet the requirements of the Florida Building Code.
1. Provide Florida Product Approval information for thermoplastic membrane roofing system; include product evaluations and installation requirements indicating compliance.

1.4 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.5 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
1. Meet with Owner, Architect, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
 5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

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

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

1.6 ACTION SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Product Data: For each type of product.
 1. For insulation and roof system component fasteners, include copy of SPRI's Directory of Roof Assemblies.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work, including the following:
 1. Layout and thickness of insulation.
 2. Base flashings and membrane terminations.
 3. Flashing details at penetrations.
 4. Tapered insulation, including slopes.
 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 7. Tie-in with air barrier.
- D. Samples for Verification: For the following products:

1. Roof membrane and flashing, of color required.
 2. Walkway pads or rolls, of color required.
- E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates:
1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Evaluation Reports: For components of roofing system, from ICC-ES.
- D. Field Test Reports:
1. Concrete internal relative humidity test reports.
 2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- E. Field quality-control reports.
- F. Sample Warranties: For manufacturer's special warranties.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.9 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturers: A qualified manufacturer that is UL listed, listed in FM Approvals' RoofNav or listed in SPRI's Directory of Roof Assemblies for roofing system identical to that used for this Project.
 2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.10 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.

1.11 FIELD CONDITIONS

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

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, and other components of roofing system.
 - 2. Warranty Period: 20 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings to withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and base flashings to remain watertight.

1. Accelerated Weathering: Roof membrane to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746 or ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Roofing materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
1. Zone 1 (Roof Area Field): As indicated on the drawings.
 2. Zone 2 (Roof Area Perimeter) : As indicated on the drawings.
 - a. Location: From roof edge to distance as indicated on the drawings, from inside roof edge.
 3. Zone 3 (Roof Area Corners): As indicated on the drawings..
 - a. Location: From roof edge to distance as indicated on the drawings, from inside roof edge.
- D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
- E. Energy Performance: Roofing system to have an initial solar reflectance and an emissivity as required by the Florida Building Code, when tested in accordance with ANSI/CRRC S100.
- F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 KETONE ETHYLENE ESTER (KEE) ROOFING

- A. KEE Sheet: ASTM D6754/D6754M, fabric reinforced and fabric backed.
1. Basis of Design Product and Manufacturer; Seaman Corporation; FiberTite-SM 60-mil Membrane: Nominal 60 mil ketone ethylene ester (KEE) membrane reinforced with 5.0 oz per sq yd knitted polyester fabric. Or Subject to compliance with requirements a comparable product by the following:
 - a. Carlisle Roofing.
 2. Ketone Ethylene Ester (KEE) Content: Not less than 50 percent by weight of the polymer content of the sheet when tested in accordance with ASTM D8154.
 3. Exposed Face Color: White.
- B. Source Limitations: Obtain components for roofing system from manufacturer of roof membrane.

2.3 FLASHING MEMBRANE

- A. Requirements to match field membrane and warranty expectations selected for roofing system.
 - 1. FiberTite-SM Nominal 45 mil.

2.4 ANCILLARY MATERIALS

- A. FiberTite Membrane Adhesives:
- B. Alpha-Tite: VOC compliant solvent borne, contact (two-sided) bonding adhesive for bonding smooth-back FiberTite membranes to properly prepared and preauthorized horizontal and vertical substrates.

2.5 FASTENERS

- A. Insulation Fasteners: FiberTite-HD: No. 14-13, heavy duty threaded steel No. 3 Phillips truss, self-tapping corrosion resistant fastener.

2.6 ADDITIONAL COMPONENTS

- A. Flashing Terminations Sealant: FTR-101. Single-component gun-grade polyether.
- B. Pitch Pans – Not Allowed.
- C. Fabricated Metal Flashing: FiberClad Metal, Aluminum with PVC coating.
- D. FTR Pre-molded Flashings: Injection molded vent stack, split Wrapid Flash and inside and outside corner flashing using FiberTite vinyl compound.
- E. FTR Non-Reinforced Membrane: Field fabrication membrane, 60 mil non-reinforced vinyl membrane.
- F. FTR-Termination Bar: Membrane flashings restraint and termination seals. 0.125 x 1 x 120 inch 6060-T5 extruded aluminum bar with pre-punched slots, 8 inches on center.
- G. FTR-601 & FTR-601 PG: Dual component, single bead (ribbon applied) urethane insulation adhesive. Adhesive is a non-solvent, elastomeric, urethane adhesive, specifically designed for bonding single or multiple layers of roof insulation and insulation composites or cover boards to structural roof decks and base sheets.
- H. FiberTite Seam Cleaner: FiberTite Seam Cleaner is to be used with clean white cotton cloths or rags to clean contamination from the seam areas of the membrane prior to welding.
- I. FTR T Joint Covers: Pre-cut 4 x 4 inch 60 mil non-reinforced membrane to reinforce areas where three overlapping sheets of membrane intersect.

2.7 ACCESSORY ROOFING MATERIALS

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

1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as KEE sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Roof Vents: As recommended by roof membrane manufacturer.
 1. Size: Not less than 4-inch diameter.
- E. Bonding Adhesive: Manufacturer's standard.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- I. 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.

2.8 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
 1. Size: Approximately 36 by 60 inches.
 2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 31 00 "Steel Decking."
 4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.

5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with no fewer than three test probes.
 - b. Submit test reports within 24 hours of performing tests.
 6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 7. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.
 8. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
 9. Verify that any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
 10. Verify that adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch at top surface.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- D. Install sound absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.4 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roof membrane and allow to relax before installing.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- E. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.5 INSTALLATION OF BASE FLASHING

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

3.6 INSTALLATION OF WALKWAYS

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
 - 1. Install flexible walkways at the following locations:
 - a. Perimeter of each rooftop unit.
 - b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - d. Top and bottom of each roof access ladder.
 - e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - f. Locations indicated on Drawings.
 - g. As required by roof membrane manufacturer's warranty requirements.
 - 2. Provide 6-inch clearance between adjoining pads.
 - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.
 - 1. Infrared Thermography: Testing agency surveys entire roof area using infrared color thermography according to ASTM C1153.
 - a. Perform tests before overlying construction is placed.
 - b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.
 - c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - d. Testing agency to prepare survey report of initial scan indicating locations of entrapped moisture, if any.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
- C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.8 PROTECTING AND CLEANING

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

3.9 ROOFING INSTALLER'S WARRANTY

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

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

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

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

END OF SECTION 07 54 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Formed roof-drainage sheet metal fabrications.
 - 2. Formed steep-slope roof sheet metal fabrications.
 - 3. Formed low-slope roof sheet metal fabrications.

1.3 COORDINATION

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

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates if applicable.
 - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each of the following
 - 1. Underlayment materials.
 - 2. Elastomeric sealant.
 - 3. Butyl sealant.
 - 4. Epoxy seam sealer.
- B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies.
 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 8. Include details of roof-penetration flashing.
 9. Include details of connections to adjoining work.
 10. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge and built-in gutter, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- B. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. Protect finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Exposed Coil-Coated Finish:
 - a. Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - 2. Color: As selected by Architect from manufacturer's full range.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- C. Lead Sheet: ASTM B749 lead sheet.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - b. GCP Applied Technologies Inc.
 - c. Henry Company.
 - d. Owens Corning.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - 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.
 2. Fasteners for Aluminum Sheet: Type 316 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

- G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products, Inc.
 - d. Hohmann & Barnard, Inc.
 - 2. Source Limitations: Obtain reglets from single source from single manufacturer.
 - 3. Material: Aluminum, 0.024 inch thick.
 - 4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - 5. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 - 6. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - 7. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
 - 8. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

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

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

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters:
 - 1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
 - 2. Fabricate in minimum 96-inch-long sections.
 - 3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.
 - 4. Expansion Joints: Lap type.
 - 5. Fabricate from the following materials:
 - a. Aluminum: 0.040 inch thick.
- B. Downspouts: Fabricate downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricate from the following materials:
 - a. Aluminum: 0.125 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and fascia wrap: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates. Shop fabricate interior and exterior corners.
 1. Joint Style: Overlapped, 4 inches wide.
 2. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch thick.
- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
 1. Coping Profile: As Indicated, in accordance with SMACNA's "Architectural Sheet Metal Manual."
 2. Joint Style: Butted with expansion space and 6-inch-wide, concealed backup plate.
 3. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch thick.
- C. Roof and Roof-to-Wall Transition Expansion-Joint Cover: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 1. Aluminum: 0.050 inch thick.
- D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 1. Aluminum: 0.032 inch thick.
- E. Flashing Receivers: Fabricate from the following materials:
 1. Aluminum: 0.032 inch thick.
- F. Roof-Penetration Flashing: Fabricate from the following materials:
 1. Lead: 4 lb.
- G. Roof-Drain Flashing: Fabricate from the following materials:
 1. Lead: 4 lb.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment:
 - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 - 2. Prime substrate if recommended by underlayment manufacturer.
 - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
 - 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
 - 6. Roll laps and edges with roller.
 - 7. Cover underlayment within 14 days.
- B. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.
 - 1. Install in shingle fashion to shed water.
 - 2. Lapp joints not less than 4 inches.

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
 - 1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim by torch.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate 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.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- G. Rivets: Rivet joints in aluminum where necessary for strength.
- 3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM
- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
1. Join sections with riveted joints or joints sealed with sealant.

2. Provide for thermal expansion.
3. Attach gutters at eave or fascia to firmly anchor them in position.
4. Provide end closures and seal watertight with sealant.
5. Slope to downspouts.
6. Fasten gutter spacers to front and back of gutter.
7. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
8. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts:

1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Provide elbows at base of downspout to direct water away from building.
5. Connect downspouts to underground drainage system.

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

3.5 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
 - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
 - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - 2. Extend counterflashing 4 inches over base flashing.
 - 3. Lap counterflashing joints minimum of 4 inches.
 - 4. Secure in waterproof manner.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 INSTALLATION TOLERANCES

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

3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.

3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - a. Walls and partitions.
 - b. Floors and ceilings.
 - c. Smoke barriers.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and Owners, and other information specified.
- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

- b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

- 1) UL in "Fire Resistance Directory."

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hilti, Inc.

2. 3M Fire Protection Products
3. Tremco, Inc.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

- G. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Through-penetration firestop system manufacturer's name.
 6. Installer's name.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07 84 13

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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. Sealants for interior and exterior applications.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 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. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- D. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- E. Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.
- F. 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.

- G. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- H. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Manufacturer's Representative: Manufacturer's representative shall certify the installation of sealant materials and shall attend pre-construction meetings, make site visits during construction and after completion of each phase of work that directly applies to the materials being installed before issuing a warrantee certification.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of each type of sealant and backing installation; minimum length 8 feet.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F.
 - 3. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: As specified beginning from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 PRODUCTS AND MANUFACTURERS

- A. Products: Provide the following products for each application listed. Substitutions for exterior building joint sealants shall be listed on the Validated Products list published by the Sealant, Waterproofing, and Restoration Institute (SWRI).
 - 1. Joint Sealant - One-Part: For precast concrete, poured-in-place concrete, and concrete-to-concrete and concrete-to-masonry; one-part silicone sealant, having a joint movement capability of plus-or-minus 100% elongation, minus 50% compression, and Shore A durometer hardness of 15.
 - a. Product and Manufacturer:
 - 1) Dow Corning 790 Silicone Building Sealant; Dow Corning Corp.
 - b. Warranty: Manufacturer's standard 20-year warranty.
 - 2. Joint Sealant - One-Part: For masonry-to-aluminum, steel-to-aluminum, concrete-to-aluminum, steel-to-steel, and other metal-to-metal joints (including KYNAR coatings); one-part silicone sealant having a joint movement capability of plus-or-minus 50% elongation, and Shore A durometer hardness of 30.
 - a. Product and Manufacturer:
 - 1) Dow Corning 795 Silicone Building Sealant; Dow Corning Corp.
 - b. Warranty: Manufacturer's extended 20-year warranty.
 - 3. Joint Sealant - Two-Part, Pourable Urethane Sealant: For horizontal joints, exterior and interior; provide joint sealant with a joint movement capability of plus-or-minus 25%.

- a. Products and Manufacturers: Provide one of the following.
 - 1) Vulkem 245; Tremco, Inc.
 - 2) NR200 Urexpan; Pecora Corp.
 - 3) Sikaflex 2c SL; Sika Corp.
 - 4) THC-900; Tremco, Inc.
 - b. Warranty: Manufacturer's extended 5-year warranty.
4. Joint Sealant - Two-Part Urethane Non-Sag Sealant: For general interior use; provide joint sealant with a joint movement capability of plus-or-minus 50%.
- a. Products and Manufacturers: Provide one of the following.
 - 1) Vulkem 922; Tremco, Inc.
 - 2) Dynatrol II; Pecora Corp.
 - 3) Sikaflex 2c NS; Sika Corp.
 - 4) NP II; Sonneborne Building Products Division, ChemRex, Inc.
 - b. Warranty: Manufacturer's extended 5-year warranty.
5. Joint Sealant - One-Part Latex Sealant: For interior use for horizontal and vertical joints around door frames, and joints between dissimilar materials.
- a. Products and Manufacturers: Provide one of the following.
 - 1) AC-20 + Silicone; Pecora Corp.
 - 2) Sherwin Williams; 850A
 - 3) Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
 - 4) Tremflex 834; Tremco, Inc.
 - b. Warranty: Manufacturer's standard warranty.
6. Joint Sealant - One-Part Silicone - Sanitary Sealant: For Interior use at plumbing fixtures in toilets and janitor closets, and horizontal and vertical joints of dissimilar materials in toilets and other wet areas.
- a. Products and Manufacturers: Provide one of the following.
 - 1) Dow Corning 786 Silicone Mildew Resistant Sealant; Dow Corning Corp.
 - 2) SCS1700 Sanitary; General Electric Co.
 - 3) Pecora 898 Silicone Mildew Resistant Silicone Sealant; Pecora Corp.
 - 4) Tremsil 200; Tremco, Inc.
 - b. Warranty: Manufacturer's extended 3-year warranty.
7. Joint Sealant - Acoustic 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.
- a. Product and Manufacturer: Provide the following.
 - 1) Pecora Corporation; AC-20 FTR.
 - 2) USG Corporation; SHEETROCK Acoustical Sealant.

2.3 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Backer Rod (Joint Fillers, Compressible Filler): Type B, ASTM C 1330, preformed, cylindrical, flexible, compressible, resilient, non-staining, bi-cellular material, with a density of 24-48 km/m³ per ASTM D1622, tensile strength greater than 200 kPa per ASTM D 1623, and water absorption less than 0.1 g/cc per ASTM C 1016.
 - 1. Product and Manufacturer - Basis of Design:
 - a. Sof Rod; Nomaco, Inc., Zebulon, NC.
 - 2. Other Acceptable Manufacturers: Manufacturers offering products having performance characteristics meeting or exceeding those specified may be incorporated into the Work.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify location and application of acoustical sealant and all other sealants indicated. Do not allow sealants to come into contact with incompatible materials. Prevent reaction to metals and other substances; protect all surfaces.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates, unless otherwise recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.
 - 1. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
 - 1. Install sealants by proven techniques and at the same time backings are installed.
 - 2. Place sealants so they directly contact and fully wet joint substrates.
 - 3. Completely fill recesses provided for each joint configuration.
 - 4. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- B. Backing Materials: Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- C. Bond-Breaker Tape: Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- D. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Perform field-test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 - 2. Test Method: Test joint sealants by hand-pull method described below:
 - a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from crosscut end of 2-inch piece.
 - b. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
 - 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
 - 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field- adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free from voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

- B. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 07 92 00

Division 08

Openings

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Interior standard steel doors and frames.
 - 2. Exterior standard steel doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

- 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.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

- B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.

- C. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

- D. Field quality control reports.

1.8 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.9 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies is to meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

- B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies is to meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amweld Building Products, Inc.
 - 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.
 - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- 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. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone Level E (Essential Facility).
 - 1. Large-Missile Test: For glazed openings located within 30 feet of grade.

- D. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested 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. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A..

- 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch.
- d. Edge Construction: Model 1, Full Flush.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Core: Polyurethane.
- g. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.

- 2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
- b. Construction: Full profile welded.

- 3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A..

- 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
- d. Edge Construction: Model 2, Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- h. Core: Polyurethane.

2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
 - b. Construction: Full profile welded.
3. Exposed Finish: Prime.

2.5 BORROWED LITES

- A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch.
- B. Construction: Face welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 3. Postinstalled Expansion Anchor: Minimum 3/8-inch-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. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z 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 08 80 00 "Glazing."

2.8 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Sidelite 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.
 - 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, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 - 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.10 LOUVERS

- A. Provide louvers for interior doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
 2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other.
 3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.
- B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

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. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with 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. Solidly pack mineral-fiber insulation inside frames.
 5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
 2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
 3. Smoke-Control Doors: Install doors in accordance with NFPA 105.
- D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. 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.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 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 according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

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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. Flush Wood Doors.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
 - 1. Door core materials and construction.
 - 2. Door edge construction
 - 3. Door face type and characteristics.
 - 4. Door trim for openings.
 - 5. Factory-machining criteria.
 - 6. Factory- finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
 - 1. Door schedule indicating door location, type, size, fire protection rating, and swing.
 - 2. Door elevations, dimension and locations of hardware, lite and cutouts, and glazing thicknesses.
 - 3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 - 4. Dimensions and locations of blocking for hardware attachment.
 - 5. Dimensions and locations of mortises and holes for hardware.
 - 6. Clearances and undercuts.
 - 7. Requirements for veneer matching.
 - 8. Doors to be factory finished and application requirements.
 - 9. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:

SANIBEL FIRE AND RESCUE STATION 172
100% Construction Documents

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Special warranties.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.
- C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on bottom with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.
- B. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during remainder of construction period.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood 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 UL 10C or NFPA 252.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/MI's "Architectural Woodwork Standards."
 - 1. Provide labels and certificates from AWI certification program indicating that doors comply with requirements of grades specified.

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

- B. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.

2.3 SOLID-CORE FLUSH WOOD VENEER-FACED DOORS

A. Interior Doors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eggers Industries.
 - b. Masonite Architectural.
 - c. Oshkosh Door Company.
 - d. VT Industries Inc.
2. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty.
3. Architectural Woodwork Standards Grade: Premium.
4. Faces: Single-ply wood veneer not less than 1/50 inch thick.
 - a. Species: As indicated on the Interior Finish Schedule.
 - b. Cut: As indicated on the Interior Finish Schedule.
 - c. Color: As indicated on the Interior Finish Schedule.
 - d. Match between Veneer Leaves: Match Architects Sample.
5. Exposed Vertical and Top Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A.
 - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: 550 lbf in accordance with WDMA T.M. 10.
6. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-2 particleboard.
 - 1) Provide doors with glued-wood-stave or WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 08 71 00 "Door Hardware."

- b. Glued wood stave.
 - c. WDMA I.S. 10 structural composite lumber.
 - 1) Screw Withdrawal, Door Face: 550 lbf.
 - 2) Screw Withdrawal, Vertical Door Edge: 550 lbf.
 - d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
- a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.
8. Construction: Five or Seven plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES

- A. Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated on Drawings.
- 1. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
- 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
- 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 - 5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels:
- 1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
 - 2. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - 3. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails.

4. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."

2.6 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish: ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
3. Staining: Match Architect's sample.
4. Effect: Match Architect's sample.
5. Sheen: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 71 00 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Job-Fitted Doors:

1. Align and fit doors in frames with uniform clearances and bevels as indicated below.

- a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
 2. Machine doors for hardware.
 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 4. Clearances:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
 - c. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - d. Comply with NFPA 80 for fire-rated doors.
 5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 6. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- C. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 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 08 14 16

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PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames.

1.2 SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges - Masonry Walls:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Babcock-Davis.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Karp Associates, Inc.
 - d. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - e. Nystrom, Inc.
 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
 3. Locations: Walls.
 4. Door Size: 24" x 24" unless indicated otherwise.
 5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
 6. Frame Material: Same material, thickness, and finish as door.

7. Latch and Lock: Cam latch, Key operated.
8. Hinges: Continuous Stainless Steel Piano type with pin.
9. Provide UL Labeled, fire-rated access doors and panels when required to be installed in fire-rated walls or ceilings.

B. Recessed Access Doors with Concealed Flanges - Drywall locations:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Babcock-Davis.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Karp Associates, Inc.
 - d. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - e. Nystrom, Inc.
2. Description: Door face recessed for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Ceiling.
4. Door Size: 24" x 24" unless indicated otherwise.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Hinges: Continuous Stainless Steel Piano type with pin.
7. Latch and Lock: Cam latch, Key operated.
8. Provide UL Labeled, fire-rated access doors and panels when required to be installed in fire-rated walls or ceilings.

C. Provide one key-operated cam lock per access door. Furnish 2 keys per lock. Key locks alike, unless otherwise scheduled.

1. If only one latching device is required, then it shall be a key operated cam lock.

D. Provide UL Labeled, fire-rated access doors and panels when required to be installed in fire-rated walls or ceilings.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same material as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.
 - 1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.
- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 08 31 13

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 sliding aluminum-framed glass doors for exterior locations.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
- C. Shop Drawings: For sliding aluminum-framed glass doors.
 - 1. Include plans, elevations, sections, and details.
 - 2. Detail attachments to other work, and between units, if any.
 - 3. Include hardware and required clearances.
- D. Samples: For each exposed product and for each color specified, 12-inch-long section with weather stripping, glazing bead, and factory-applied color finish.
- E. Samples for Initial Selection: For each type of sliding aluminum-framed glass door indicated.
 - 1. Include Samples of hardware and accessories involving color selection.
- F. Samples for Verification: For sliding aluminum-framed glass doors and components required, prepared on Samples of size indicated below:
 - 1. Main Framing Member: 12-inch-long section with weather stripping, glazing bead, and factory-applied color finish.
 - 2. Hardware: Full-size units with factory-applied finish.

- G. Product Schedule: For sliding aluminum-framed glass doors. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer and testing agency.
- B. Product Test Reports: For each sliding aluminum-framed glass door, for tests performed by a qualified testing agency, and for each class and performance grade indicated, tested at AAMA gateway size.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes, weather stripping, operable panels, and operating hardware to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating sliding aluminum-framed glass doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to sliding aluminum-framed glass door manufacturer for installation of units required for this Project.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup for sliding aluminum-framed glass doors, as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of sliding aluminum-framed glass doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection.
 - c. Excessive water leakage or air infiltration.
 - d. Faulty operation of movable panels and hardware.

- e. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - f. Failure of insulating glass and laminated glass.
2. Warranty Period:
- a. Sliding Door: Five years from date of Substantial Completion.
- B. Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
1. Warranty Period: 20 years from date of Final Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
1. Product Certification: AAMA certified with label attached to each door.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
- 1. Minimum Performance Class: Class AW.
 - 2. Minimum Performance Grade: Grade 75.
- C. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone indicated.
- 1. Large-Missile Test: For glazing located within 30 feet of grade.
 - 2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.
- D. Thermal Movements: Provide sliding aluminum-framed glass doors, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- E. Sound Transmission Class (STC): Rated for not less than 33 STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.
- F. Outside-Inside Transmission Class (OITC): Rated for not less than 30 OITC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E1332.

2.2 SLIDING ALUMINUM-FRAMED GLASS DOORS

- A. Frames and Door Panels: Fabricated from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Thermally Improved Construction: Fabricate frames and door panels with an integral, concealed, low-conductance thermal barrier located between exterior and interior surfaces in a manner that eliminates direct metal-to-metal contact.
- B. Threshold and Sill Cap/Track: Provide extruded-aluminum threshold and track of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior; with manufacturer's standard finish.
 - 1. Low-Profile Floor Track: ADA-ABA compliant.

2.3 MANUFACTURERS

- A. Subject to compliance with requirements, provide Basis-of-Design Product and Manufacturer; PGT Industries; Winguard, SGD-770, or a comparable product by one of the following:
 - 1. EFCO Corporation.
 - 2. Kawneer North America, an Arconic company.
 - 3. YKK AP America Inc.
- B. Configuration: As indicated.
- C. Finish: Fluoropolymer.

2.4 GLAZING

- A. Refer to Section 08 80 00 "Glazing."

2.5 HARDWARE

- A. General: Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with aluminum complying with AAMA 907 and designed to smoothly operate, tightly close, and securely lock sliding aluminum-framed glass doors.
- B. Door Pulls: Provide manufacturer's standard pull.
 - 1. Color and Finish: Match Architect's sample.
- C. Lock: Install manufacturer's keyed cylinder lock and multipoint locking device on each movable panel, lockable from the inside only. Adjust locking device to allow unobstructed movement of the panel across adjacent panel in the direction indicated.

2.6 ACCESSORIES

- A. Fasteners: Noncorrosive and compatible with door members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.
- B. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for sliding aluminum-framed glass doors, complying with ASTM B456 or ASTM B633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
 1. Windborne-Debris Resistance: Provide anchors of same design used in windborne-debris resistance testing.

2.7 FABRICATION

- A. Fabricate sliding aluminum-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- B. Fabricate sliding aluminum-framed glass doors that are reglazable without dismantling panel framing.
- C. Weather Stripping: Provide full-perimeter weather stripping for each door panel.
- D. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- F. Factory-Glazed Fabrication: Glaze sliding aluminum-framed glass doors in the factory where practical and possible for applications indicated. Comply with requirements in Section 08 80 00 "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440.

2.8 GENERAL FINISH REQUIREMENTS

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

2.9 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight sliding aluminum-framed glass door installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing doors, hardware, accessories, and other components.
- B. Windborne-Debris Resistance: Anchor sliding aluminum-framed glass doors that have been tested for windborne-debris resistance to structure using anchoring method, fastener type, and fastening frequency identical to that used in windborne-debris resistance testing.
- C. Install sliding aluminum-framed glass doors level, plumb, square, true to line, without distortion, without warp or rack of frames and panels, and without impeding thermal movement; anchored securely in place to structural support; and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction.
- D. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.
- E. Install sliding aluminum-framed glass doors and components to drain condensation, water penetrating joints, and moisture migrating within doors to the exterior.
- F. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Test and inspect installed sliding aluminum-framed glass doors as follows:

1. Testing Methodology: Test sliding aluminum-framed glass doors for air infiltration and water resistance according to AAMA 502.
 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 4. Testing Extent: Three sliding aluminum-framed glass doors of each type as selected by Architect and a qualified independent testing and inspecting agency. Conduct tests after perimeter sealants have cured.
 5. Test Reports: Prepared according to AAMA 502.
- C. Sliding aluminum-framed glass door will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Lubricate hardware and moving parts.
- B. Adjust operating panels to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and a weathertight closure. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
- C. Clean exposed surfaces immediately after installing sliding aluminum-framed glass doors. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess sealants, glazing materials, dirt, and other substances.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect sliding aluminum-framed glass door surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact sliding aluminum-framed glass door surfaces, remove contaminants immediately according to manufacturer's written instructions.
- F. Refinish or replace sliding aluminum-framed glass doors with damaged finishes.
- G. Replace damaged components.

END OF SECTION 08 32 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior service doors.
 - 2. Exterior insulated service doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
 - 5. Show locations of controls, locking devices, and other accessories.
 - 6. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
 - 1. Curtain slats.
 - 2. Bottom bar with sensor edge.
 - 3. Guides.

4. Brackets.
5. Hood.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 CLOSEOUT SUBMITTALS

- A. Special warranty.
- B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors 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 MANUFACTURERS

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
 1. Obtain operators and controls from overhead coiling-door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

- B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
 - 1. Design Wind Load: As indicated on Drawings.
 - 2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
 - 3. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

- C. Windborne-Debris Impact Resistance: Provide impact-protective overhead coiling doors that pass ASTM E1886 missile-impact and cyclic-pressure tests according to ASTM E1996 for Wind Zone indicated.
 - 1. Large-Missile Test: For overhead coiling doors located within 30 ft. of grade.
 - 2. Small-Missile Test: For overhead coiling doors located between 30 ft. and 60 ft. above grade.

2.3 INTERIOR SERVICE DOORS

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Clopay Building Products.
 - b. Cookson; a CornellCookson company.
 - c. McKeon Door Company.
 - d. Overhead Door Corporation.

- B. Door Curtain Material: Aluminum.

- C. Door Curtain Slats: Flat profile slats of 2-5/8-inch center-to-center height.

- D. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from aluminum extrusions and finished to match door.

- E. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats.

- F. Hood: Match curtain material and finish.
 - 1. Shape: As indicated on Drawings.
 - 2. Mounting: As indicated on Drawings.

- G. Locking Devices: Equip door with locking device assembly.
 - 1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with thumbturn outside with cylinder.

- H. Manual Door Operator: Push-up operation.

- I. Curtain Accessories: Equip door with push/pull handles pull-down strap.

- J. Door Finish:

1. Aluminum Finish: Clear anodized.

2.4 EXTERIOR INSULATED SERVICE DOORS

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Clopay Building Products.
 - b. Cookson; a CornellCookson company.
 - c. McKeon Door Company.
 - d. Overhead Door Corporation.
- B. Operation Cycles: Door components and operators capable of operating for not less than 50,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
 1. Include tamperproof cycle counter.
- C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E283 or DASMA 105.
- D. Insulated Door Curtain R-Value: 4.5 deg F x h x sq. ft./Btu.
- E. Door Curtain Material: Galvanized steel.
- F. Door Curtain Slats: Flat profile slats of 2-5/8-inch center-to-center height.
 1. Insulated-Slat Interior Facing: Metal.
 2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
- G. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.
- H. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- I. Hood: Match curtain material and finish.
 1. Shape: As indicated on Drawings.
 2. Mounting: As indicated on Drawings.
- J. Locking Devices: Equip door with locking device assembly.
 1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with thumbturn outside with cylinder.
- K. Electric Door Operator:
 1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
 2. Operator Location: As indicated on Drawings.

3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 ft. or lower.
4. Motor Exposure: Interior.
5. Emergency Manual Operation: Chain type.
6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
 - a. Sensor Edge Bulb Color: Black.
7. Control Station(s): Where indicated on Drawings.

L. Curtain Accessories: Equip door with weatherseals.

M. Door Finish:

1. Factory Prime Finish: Manufacturer's standard color.
2. Interior Curtain-Slat Facing: Same finish as exterior curtain-slat face.

2.5 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural-steel sheet; complying with ASTM A653/A653M, with G90 zinc coating; nominal sheet thickness (coated) of 0.028 inch; and as required.
2. Aluminum Door Curtain Slats: ASTM B209 sheet or ASTM B221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch; and as required.
3. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
4. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.7 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized-steel sheet with G90 zinc coating, complying with ASTM A653/A653M.
 - 2. Aluminum: 0.040-inch-thick aluminum sheet complying with ASTM B209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.
 - 3. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.
- B. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling unless otherwise indicated.

2.8 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - 1. Lock Cylinders: As standard with manufacturer and keyed to building keying system.
 - 2. Keys: Three for each cylinder.
- C. Chain Lock Keeper: Suitable for padlock.
- D. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.9 CURTAIN ACCESSORIES

- A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
 - 1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
 - 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- C. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.

2.10 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.11 MANUAL DOOR OPERATORS

- A. Push-up Door Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed 25 lbf.

2.12 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
 - 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
 - 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - 3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- D. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- E. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
 - 1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

- a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- F. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
 - 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- G. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- H. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.13 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.14 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.15 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.

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

3.2 INSTALLATION, GENERAL

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with the accessibility standard.
- D. Power-Operated Doors: Install according to UL 325.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
 - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
 - 1. Adjust exterior doors and components to be weather resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.5 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service includes 12 months' full maintenance by skilled employees of coiling-door Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies are to be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08 33 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass folding doors.

1.3 CODE COMPLIANCE

- A. Exterior door systems shall meet the requirements of the Florida Building Code.
 - 1. Provide product evaluations and installation requirements indicating compliance with Code requirements.

1.4 PREINSTALLATION MEETINGS

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

1.5 SUBMITTALS

- A. Product Control Approval: Submit current Product Control Notice of Acceptance in accordance with the Florida Building Code and FAC 9N-3.
- B. Testing and Labeling: Comply with the Building Code. Submit manufacturer's certification indicating compliance.
- C. Product Data: Submit product data for system and products specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- D. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Engineering Responsibility: Prepare engineering data for glass folding doors, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project as prepared by a professional engineer registered in the state of Florida.
 - a. Include structural analysis data signed and sealed by professional engineer registered in the state of Florida responsible for their preparation.

- b. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
 - c. Include all drawings and installation details required to ensure the elements installed on this Project will be installed in the same manner as they were tested and approved.
 - E. Pre-Installation Minutes: Submit pre-installation conference meeting minutes.
 - F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
 - G. Samples: For exposed finish specified, in manufacturer's standard sizes.
 - H. Qualification Data: For qualified Installer and testing agency.
 - I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
 - J. Field quality-control reports.
 - K. Maintenance Data: For door systems to include in maintenance manuals.
 - L. Warranties: Sample of special warranties.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For glazed folding doors to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Manufacturers Qualifications: Company specializing in manufacturing the products as specified herein with a minimum of ten (10) years experience.
 - B. Installer Qualifications: Company specializing in performing the work of this section with a minimum of five (5) years experience.
 - C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
 - D. Professional Engineer Qualifications: The engineer shall be a professional engineer registered in the state of Florida and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of glazed folding doors that are similar to those indicated for this Project in material, design, and extent.
 - E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

- B. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed folding doors that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Structural failures including, but not limited to, excessive deflection.
- b. Noise or vibration caused by thermal movements.
- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- d. Adhesive or cohesive sealant failures.
- e. Water leakage through fixed glazing and framing areas.
- f. Failure of operating components.

2. Warranty Period: 3 years from date of Substantial Completion.

- C. Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, to design Glazed Folding Doors.

- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed folding doors representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed folding doors shall withstand movements of supporting structure including, but not limited to, deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:

- a. Thermal stresses transferring to building structure.
- b. Glass breakage.

- c. Noise or vibration created by wind and thermal and structural movements.
- d. Loosening or weakening of fasteners, attachments, and other components.
- e. Failure of operating units.

C. Structural Loads:

- 1. Wind Loads: As indicated on Drawings.
- 2. Other Design Loads: As indicated on Drawings.

D. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests according to ASTM E 1996 for Wind Zone As indicated.

- 1. Large-Missile Test: For glazed openings located within 30 feet of grade.
- 2. System to be resistant to penetration by flying missiles per SSTD 12-99.

E. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

2.2 DOOR ASSEMBLY

- A. Basis of Design Product and Manufacturer; FF701 Series Four-Fold Doors as manufactured by Door Engineering and Manufacturing; specified as the type, size, function, and quality of the products required, or an acceptable product as approved by the Architect.
- B. Operation Cycles: Door components and operators capable of operating for not less than 25 cycles per day for 50,000 total cycles. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

2.3 MATERIALS

- A. Steel Tube: ASTM A513 and ASTM A500/A500M
- B. Steel Sheets: Steel sheets of commercial quality, complying with ASTM A1011/A1011M hot-rolled steel sheet.
- C. Hardware: Manufacturer's standard components.
- D. Fasteners: Zinc-coated steel.

2.4 CONSTRUCTION

- A. Construction: Door framing shall be minimum 11-gauge structural steel tube with 14-gauge sheet steel on the exterior and interior faces. Sheeting shall be formed on the vertical edges with no visible welds or caulked sheet edges on the interior or exterior panel faces. All frames and framing members shall be true to dimension and square in all directions, and no door shall be bowed, warped, or out of line, in the vertical or horizontal plane of the door opening by more than 1/8 inch in 20 feet. Exposed welds and welds which interfere with the installation of various parts shall be ground smooth and flush.
- B. Surface Mounted Tube Frame: Supply pre-hung tube frame system constructed of TS6x6x0.25, designed to anchor to masonry wall construction or weld to steel structure. All hinges, track supports and operator supports shall be factory attached.
- C. Factory finish: Operator and operating hardware shall be powder coated manufacturer's standard gray. Panels, frame and all other hardware shall be finished as follows:
- D. All exposed steel shall be finished with manufacturer's standard zinc rich primer and polyurethane top coat, PPG Spectracron or equal.
 - 1. Color: As selected by Architect from Manufacturer's full range.
- E. Operating Hardware: Hardware shall include guide tracks and brackets, trolleys, center guides, not less than three pairs of jamb and fold hinges per opening, and all bolts, nuts, fasteners, etc. necessary for complete installation and operation. Jamb hinges shall be dual shear and have two thrust bearings and two needle bearings. Jamb hinges shall be gusseted. Fold hinges shall be dual shear with two thrust bearings. Fold hinges shall be stainless steel. All bearings shall be completely sealed within the hinge barrel and include grease zerks. All hinge pins shall be minimum 3/4" diameter hardened steel. All trolleys shall be equipped two (2) Nylatron rollers.
- F. Hinge Guards: Provide plastic guards at jamb hinges to prevent access through hinge space.
- G. Weatherstripping: Material shall be adjustable and readily replaceable and provide a substantially weather-tight installation. Weatherstripping at center shall be 1/16" cloth inserted neoprene. No exposed fasteners shall be required to attach the center bulb weatherseals. Weatherstripping at sill shall include two 1/16" cloth inserted neoprene sweeps with an aluminum retainer. The retainer shall be attached to the door with adhesive.
- H. Perimeter Weatherstripping: Provide jamb and head weatherstripping of 1/16" cloth-inserted neoprene bulb (or closed cell neoprene).
- I. Glass: Refer to specification 08 80 00 "Glazing."
- J. Hurricane Locking System: Locking bolts shall be completely concealed within the door panel. Locking bolts shall extend into the floor and into the header tube. A limit switch shall disable the operator when the locks are engaged.

2.5 OPERATION

- A. Each door shall be operated by an overhead mounted electro-mechanical drive unit designed for high cycle operation. Operator consists of an electric motor, gear reducer, and rotating drive arm. The door shall be operated with connecting rods attached to the rotating drive arm on the operator and to control arms attached to the jamb door section and to the door lintel. The connecting rods shall be positive drive, keeping the door under firm control at all times. The connecting rods shall be fitted with spherical bearings and control arms shall be equipped with oil impregnated bronze bearings on polished shafts.
- B. Operator shall be instantly reversible, open and close rapidly and start and stop gradually. Operator shall be adjustable to allow door to fully clear the opening. Operator shall automatically lock the door in the closed position. Operator shall be equipped with disengaging mechanism to convert to manual operation.
- C. Electric motor shall be of sufficient size to operate doors under normal operating conditions at no more than 75 percent of rated capacity. The motor shall be wound for three phase 208/260/480 VAC, 60 Hertz operation.
- D. Electric Controls: Controls shall be furnished by the door manufacturer and shall be complete for each door, and built in accordance with the latest NEMA standards. Incoming electrical shall be (Choose One): 120VAC single phase, 208VAC single phase, 208/230VAC 3-phase, 480VAC 3-phase.
 - 1. Control panel assemblies shall be UL listed as per NFPA70.
 - 2. Controls shall include a programmable logic controller with digital message display. Controller shall include programmable close timers and programmable inputs/outputs
 - 3. Motor starters shall be magnetic reversing, factory wired with overload and under voltage protection, and equipped with mechanical interlocks. All control components shall be enclosed in one enclosure with a wiring diagram placed on the inside of the cover.
 - 4. If incoming voltage is single phase, control panel shall include a variable frequency drive to convert voltage to 3-phase for the motor
 - 5. Enclosures shall be NEMA 4 with disconnect switch.
 - 6. Pushbuttons (interior) for each door shall have one momentary pressure three-button push-button station marked "OPEN", "CLOSE" and "STOP". Push button enclosure shall be NEMA 4.
 - 7. Limit switches shall be provided to stop the travel of the door in its fully open or fully closed position. Provide cremone bolt limit switch to be used for HVAC or exhaust removal system.
 - 8. Safety edges: Provide 4-wire fail-safe electric safety edges on leading edge of all doors to reverse door upon contact with obstruction.
 - 9. Photo eyes: Provide (1) exterior, jamb mounted, light Curtain type photo eyes, NEMA 4 rated. Photo eye shall cover from floor level to 72" above floor.
 - 10. Presence Sensor: Provide (1) interior, overhead mounted, presence sensor with pre-open and pre-close safety fields. Sensor shall be LZR-Widescan or equal.
 - 11. Radio controls: Provide one (1) radio receiver and (1) single button remotes per door. Remotes to open and close doors with single button.
 - 12. Timer Activation Loop Detectors (fire station applications): Provide "pulse on exit type" loop detector to activate auto close timer once loop has been activated and cleared, include hand/auto switch to deactivate timer. G.C. to coordinate installation of preformed loop with installer prior to exterior apron being poured.

13. Warning Horn/Strobe: Provide warning light and strobe. Include outputs PLC to allow for activation while door is in motion both opening and closing, along with activation prior to closing. Include programmable "delay-to-close" timer which activates the warning horn for a set time, prior to the door closing.
14. Wiring: Door manufacturer shall supply controls and components only. Electrical contractor shall install controls and furnish and install conduits and wiring for jobsite power and control wiring.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing Glazed folding Doors. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
 1. Furnish and apply sealing materials to provide a weather tight installation at all joints and intersections and at opening perimeters.
- B. General: Install folding doors complying with manufacturer's written installation instructions. Install track in one piece. Properly flash and waterproof around the perimeter of the opening.
- C. Standard Floor Clearances: 1/4 to 3/4 inch maximum (above floor finish).
- D. Verify the structural integrity of the header such that the deflection with the live and dead loads is limited to the lesser of L/720 of the span and 1/4". Structural support for lateral loads (both wind load and eccentric load when the panels are stacked open) must be provided.
- E. All building dead loads shall be applied to the header prior to installing the folding door. If so and if a reasonable amount of time has been allowed for the effect of this dead load on the header, then only the building's live load can be used to meet the above requirements of L/720 or 1/4". If not, both the dead and live loads need to be considered.
- F. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.
- G. Installer to provide appropriate anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
- H. Install panels, handles and lock set in accordance with manufacturer's recommendations and installation instructions.
- I. Adjust hardware for proper operation.

3.3 ADJUSTING AND CLEANING

- A. Inspection of the doors and a complete operating test will be made by the installer in the presence of the general contractor or architect as soon as the erection is complete. Any defects noted shall be corrected. After door approval in the above test, the general contractor must assume the responsibility for any damage or rough handling of the doors during construction until the building is turned over to the owner and final inspection is made.
- B. Clean surfaces and repaint abraded or damaged finished surfaces to match factory-applied finish.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure glazed folding door systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 35 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of the sectional overhead doors, tracks, and all accessories as shown on Drawings and specified herein.

1.3 SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Product Data: For each type and size of sectional door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. Include diagrams for power, signal, and control wiring.
- D. Samples: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ANSI A216.1, Application Type Commercial. Maintain one copy on site.
- B. Manufacturers Qualifications: Company specializing in manufacturing the products as specified herein with a minimum of ten (10) years experience.

- C. Installer Qualifications: Company specializing in performing the work of this section with a minimum of five (5) years experience.
- D. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- E. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

1.5 WARRANTY

- A. Submit manufacturer's standard warranty for door and parts to be free from defects in materials and workmanship for a period of one (1) year from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall comply with performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 - 1. Design Wind Load: As indicated on Drawings.
 - 2. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.
- C. Windborne-Debris Impact Resistance: Provide sectional doors that pass missile-impact and cyclic-pressure tests according to Wind Zone as indicated.
 - 1. Large Missile Test: For overhead coiling doors located within 30 feet of grade.

2.2 MANUFACTURER

- A. Steel Sectional Door: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise indicated.
- B. Basis of Design Product and Manufacturer, Overhead Door Corporation. ThermaCore 515, or a comparable product by one of the following:
 - 1. Raynor Door Company.
 - 2. Wayne-Dalton Corp.
- C. Operation Cycles: Door components and operators capable of operating for not less than 50,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

- D. Air Infiltration: Maximum rate of 0.07 cfm/sq. ft. at 15 mph when tested according to ASTM E 283 or DASMA 105.
- E. Installed R-Value: 12.12 deg F x h x sq. ft./Btu.
- F. Steel Sections: Zinc-coated (galvanized) steel sheet with a minimum G60 zinc coating.
 - 1. Section Thickness: 2 inches.
 - 2. Exterior-Face, Steel Sheet Thickness: 20 Gauge.
 - a. Surface: Flat.
 - b. Surface: Manufacturer's standard, smooth.
 - 3. Insulation: Foamed in place.
 - 4. Interior Facing Material: Zinc-coated (galvanized) steel sheet, 20 gauge.
- G. Track Configuration: High-lift track or curved as Indicated.
- H. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.

2.3 MATERIALS AND CONSTRUCTION

- A. Hardware: Hinges and brackets shall be fabricated from galvanized steel. Track rollers shall have seven 1/4" diameter hardened steel balls per roller.
- B. Spring Counterbalance: Heavy duty oil tempered wire torsion springs on continuous ball bearing cross header shaft. Galvanized aircraft type lifting cables with minimum safety factor of 5 to 1.
- C. Weatherstripping:
 - 1. Bottom of door shall have U-type vinyl bulb seal and an extruded aluminum retainer to seal the bottom of the door to the floor.
 - 2. Jamb seals shall be EPDM rubber blades attached to rigid vinyl snap-on extrusion and mounted to the track angle mounting to form a seal along the sides of the door when closed.
 - 3. Header seals shall be an EPDM rubber seal held in place by galvanized steel retainer bolted to the top section of the door at the header.

2.4 ELECTRIC OPERATOR

- A. Electric Door Operator:
 - 1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
 - 2. Operator Type: Manufacturer's standard for door requirements.
 - 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
 - 4. Motor Exposure: Interior, clean, and dry.
 - 5. Emergency Manual Operation: Chain type.
 - 6. Obstruction-Detection Device: Automatic electric sensor edge on bottom section.

- a. Sensor Edge Bulb Color: As selected by Architect from manufacturer's full range.
- 7. Control Station: Locations as indicated.
- B. Door Finish:
 - 1. High Performance organic Coating.

2.5 STEEL DOOR SECTIONS

- A. Exterior Section Faces and Frames: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
 - 1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weather-resistant seal, with a reinforcing flange return.
 - 2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
- B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch-nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch-thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.
- C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.
- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.
- E. Provide reinforcement for hardware attachment.
- F. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections and the interior facing material, with no exposed insulation.
- G. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.
- H. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.6 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances indicated on Drawings, provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides for required door type, size, weight, and loading.
1. Galvanized Steel: ASTM A 653/A 653M, minimum G60 zinc coating.
 2. Slope tracks at an angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
 3. Track Reinforcement and Supports: Galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches apart for door-drop safety device.
 - a. For Vertical Track: Intermittent, jamb brackets attached to track and attached to wall.
 - b. For Horizontal Track: Continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.
- B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

2.7 HARDWARE

- A. General: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch-nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible. Provide double-end hinges where required, for doors more than 16 feet wide unless otherwise recommended by door manufacturer.
- C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch-diameter roller tires for 3-inch-wide track and 2-inch-diameter roller tires for 2-inch-wide track.

2.8 LOCKING DEVICES

- A. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.9 COUNTERBALANCE MECHANISM

- A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.

2.10 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
 - 1. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with an adjustable coupling or drive chain.
- D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.
 - 1. Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: 115 V.
 - c. Hertz: 60.
 - 2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
 - 3. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - 4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 - 5. Use adjustable motor-mounting bases for belt-driven operators.
- E. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Device: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom section. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
- G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure, push-button control labeled "Close."
 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Emergency Manual Operation: Equip electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.11 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 STEEL AND GALVANIZED-STEEL FINISHES

- A. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF or FEVE resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.

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

3.2 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks:
 - 1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
- C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- D. Power-Operated Doors: Install according to UL 325.

3.3 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- D. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780/A 780M.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 08 36 13

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:
 - 1. Exterior and Interior storefront.
 - 2. Entrance doors and frames.

1.3 CODE COMPLIANCE

- A. Exterior openings shall meet the requirements of the Florida Building Code.
 - 1. Provide product evaluations and installation requirements indicating compliance with Code requirements.

1.4 SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Engineering Responsibility: Prepare engineering data, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project as prepared by a professional engineer registered in the state of Florida.
- C. Testing and Labeling: Comply with the Building Code. Submit manufacturer's certification indicating compliance.
- D. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- E. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
 - 1. Engineering Responsibility: Prepare engineering data for storefront and entrance systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project as prepared by a professional engineer registered in the state of Florida.

- a. Include structural analysis data signed and sealed by professional engineer registered in the state of Florida responsible for their preparation.
 - b. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
 - c. Include all drawings and installation details required to ensure the elements installed on this Project will be installed in the same manner as they were tested and approved.
- F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- G. Samples for Verification: Of exposed finish selected in manufacturer's standard sizes.
- H. Samples: For the following.
1. Aluminum Framing:
 - a. Samples for Verification: Of exposed metal finish selected in manufacturer's standard sizes.
 2. Glass: Glass products, in the form of 12-inch-square Samples for each type of glass indicated.
- I. Test Reports: Provide certified test reports indicating compliance with the Building Code.
- J. Field Test Reports: Field quality-control test reports.
- K. Warranties: Warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced Installers skilled in the successful installation of the specified materials and assemblies on similar projects for a minimum of five (5) years.
1. Engineering Responsibility: Preparation of data for storefront systems including the following:
 - a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - b. Shop Drawings, pre-construction testing program development, and comprehensive engineering analysis by a qualified professional engineer.
- B. Test Reports: Provide test reports from AAMA accredited laboratories certifying the performance as specified.
1. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate ANSI/AAMA/NWWDA 101/I.S.2/NAFS-02 window type.
- C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.
- D. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

- E. Preinstallation Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review required testing and inspecting procedures.
- F. Source Limitations for Glass: Obtain glass from one source from a single manufacturer for each glass type.
- G. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code-Aluminum."

1.6 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Designate an installed unit as a mock-up for review by the Architect.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Environmental Limitations for Glass and Glazing: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 degrees F.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 2. Warranty Period: 10 years from date of Final Completion.
- B. Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
1. Warranty Period: 20 years from date of Final Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Building Code Requirements: Provide storefront and entrance systems that complies with the requirements of the Florida Building Code.
- B. Delegated Design: Engage a qualified professional engineer to design aluminum-framed entrances and storefronts.
- C. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
- D. Structural Loads:
 1. Wind Loads: As indicated on Drawings.
- E. Structural: Test in accordance with ASTM E330/E330M as follows:
 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
- G. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
 3. Air Leakage:
 - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with ASTM E283.
 - b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- H. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone Level E (Essential Facility).
1. Large-Missile Test: For glazing located within 30 feet of grade.
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 GLAZING

- A. Glazing: Comply with Section 08 80 00 "Glazing."

2.3 EXTERIOR FRAMES

- A. Model and Manufacturer – Basis of Design: YHS 50 FI YKK AP America.
1. Or a comparable product by one of the following:
 - a. EFCO Corporation
 - b. Kawneer an Alcoa Company

2. Exterior Framing Construction: Non-Thermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Center.
5. Finish: Fluoropolymer.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer.
9. Glass: Refer to Section 08 80 00 Glazing.

2.4 INTERIOR STOREFRONT

- A. Model and Manufacturer – Basis of Design: YES 40 FS YKK AP America.

1. Or a comparable product by one of the following:
 - a. EFCO Corporation
 - b. Kawneer an Alcoa Company
2. Exterior Framing Construction: Non-Thermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Center.
5. Finish: Fluoropolymer.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer.
9. Glass: Refer to Section 08 80 00 Glazing.

2.5 ENTRANCE DOORS

- A. Model and Manufacturer – Basis of Design: Model 50H, YKK AP America.

1. Or a comparable product by one of the following:
 - a. EFCO Corporation
 - b. Kawneer an Alcoa Company
2. Finish: Fluoropolymer.
3. Glass: Refer to Section 08 80 00 Glazing.

2.6 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Bars, Rods, and Wire: ASTM B 211.
5. Welding Rods and Bare Electrodes: AWS A5.10.

- B. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip.
- C. Glazing Gaskets: As required to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
- D. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- E. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- F. Compression Glazing Strips and Weather-Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.
 - 1. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.
 - 2. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864
 - 3. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.

2.7 COMPONENTS

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Reinforce members as required to retain fastener threads.
 - 2. 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.
- B. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

2.8 ENTRANCE DOOR HARDWARE

- A. Refer to section 08 71 00 "Door Hardware."

2.9 FABRICATION

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
 - 1. Fabricate components for screw-spline (concealed fastener) frame construction.
 - 2. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
 - 3. Prepare components to receive concealed fasteners and anchor and connection devices.

4. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- B. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
- D. 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.

2.10 ALUMINUM FINISH

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of glazing systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing glazing systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement 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 the system plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
- D. Install glazing to comply with requirements of Division 08 Section "Glazing," unless otherwise indicated.

- E. Install perimeter sealant to comply with requirements of Division 07 Section "Joint Sealants," unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of three tests in areas as directed by Architect.
 - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - 2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - a. Perform a minimum of three tests in areas as directed by Architect.
 - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure glazing systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 41 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes aluminum windows.

1.3 CODE COMPLIANCE

- A. Exterior openings shall meet the requirements of the Florida Building Code.
 - 1. Provide product evaluations and installation requirements indicating compliance with Code requirements.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.5 ACTION SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

- C. Shop Drawings: For aluminum windows.
 - 1. Include plans, elevations, sections, hardware, accessories, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- D. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include Samples of hardware and accessories involving color selection.
- E. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
 - 1. Exposed Finishes: 2 by 4 inches.
 - 2. Exposed Hardware: Full-size units.
- F. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion.
 - c. Aluminum Finish: 10 years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, peeling, or chipping.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
1. Window Certification: AAMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
1. Minimum Performance Class: Class AW.
 2. Minimum Performance Grade: Grade 75.
- C. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone indicated.
1. Large-Missile Test: For glazing located within 30 feet of grade.
 2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

- D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

2.3 ALUMINUM WINDOWS

- A. Subject to compliance with requirements, provide Basis-of-Design Product and Manufacturer; PGT Industries; Winguard, Model 7710A Aluminum Horizontal Roller Window, or a comparable product by one of the following:

- 1. EFCO Corporation.
 - 2. Kawneer North America, an Arconic company.
 - 3. YKK AP America Inc.

- B. Types: Sliding.

- C. Finish: Fluoropolymer.

2.4 GLAZING

- A. Refer to Section 08 80 00 "Glazing."

2.5 COMPONENTS

- A. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

- 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

- B. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

- 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

- C. Horizontal-Sliding Window Hardware:

- 1. Sill Cap/Track: Manufacturer's standard of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
 - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide key-operated custodial locks.
 - 3. Roller Assemblies: Low-friction design.

- D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- E. Dividers (False Muntins): Provide extruded-aluminum divider grilles in designs indicated for each sash lite.
 - 1. Type: Permanently located at exterior lite.
 - 2. Pattern: As indicated on Drawings.
 - 3. Profile: As selected by Architect from manufacturer's full range.
- F. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.6 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.7 GENERAL FINISH REQUIREMENTS

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

2.8 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
 5. Test Reports: Prepared according to AAMA 502.
- C. Windows will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

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PART I - GENERAL

1.01 WORK INCLUDED

- A. The work in this section shall include furnishing of all items of finish hardware as hereinafter specified or obviously necessary to complete the building, except those items that are specifically excluded from this section of the specification.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Hollow Metal Doors and Frames
- B. Wood Doors and Frames

1.03 DESCRIPTION OF WORK

- A. Furnish labor and material to complete hardware work indicated, as specified herein, or as may be required by actual conditions at building.
- B. Include all necessary screws, bolts, expansion shields, other devices, if necessary, as required for proper hardware application. The hardware supplier shall assume all responsibility for correct quantities.
- C. All hardware shall meet the requirements of Federal, State and Local codes having jurisdiction over this project, notwithstanding any real or apparent conflict therewith in these specifications.
- D. Fire-Rated Openings:
 - 1. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80, NFPA Standards NO. 101, UBC 702 and UL10C. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels.
 - 2. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating "Fire Exit Hardware".
- E. Fasteners:
 - 1. Hardware as furnished shall conform to published templates generally prepared for machine screw installation.
 - 2. Furnish each item complete with all screws required for installation. Typically, all exposed screws installation.
 - 3. Insofar as practical, furnished concealed type fasteners for hardware units which have exposed screws shall be furnished with Phillips flat heads screws, finished to match adjacent hardware.
 - 4. Door closers and exit devices to be installed on wood or composite fire doors shall be attached with closed head through bolts (sex bolts).
- F. Florida Building Code (Latest edition)
 - 1. Provide Miami-Dade Notice of Authorization (NOA) if required by authority having jurisdiction require.
 - 2. Engineering Reports that opening meet requirement for wind load, water infiltration and impact as required in FBC

1.04 QUALITY ASSURANCE

- A. The supplier to be a directly franchised distributor of the products to be furnished and have in their employ an AHC (Architectural Hardware Consultant). This person is to be available for consultation to the architect, owner and the general contractor at reasonable times during the course of work.
- B. The finish hardware supplier shall prepare and submit to the architect six (6) copies of a complete schedule identifying each door and each set number, following the numbering system and not creating any separate system himself. He shall submit the schedule for review, make corrections as directed and resubmit the corrected schedule for final approval. Approval of schedule will not relieve Contractor of the responsibility for furnishing all necessary hardware, including the responsibility for furnishing correct quantities.
- C. No manufacturing orders shall be placed until detailed schedule has been submitted to the architect and written approval received.
- D. After hardware schedule has been approved, furnish templates required by manufacturing contractors for making proper provisions in their work for accurate fitting, finishing hardware setting. Furnish templates in ample time to facilitate progress of work.
- E. Hardware supplier shall have an office and warehouse facilities to accommodate the materials used on this project. The supplier must be an authorized distributor of the products specified.
- F. The hardware manufactures are to supply both a pre-installation class as well as a post-installation walk-thru. This is to insure proper installation and provide for any adjustments or replacements of hardware as required.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Wrap, protect finishing hardware items for shipment. Deliver to manufacturing contractors hardware items required by them for their application; deliver balance of hardware to job; store in designated location. Each item shall be clearly marked with its intended location.

1.06 WARRANTY

- A. The material furnished shall be warranted for one year after installation or longer as the individual manufacturer's warranty permits.
- B. Overhead door closers shall be warranted in writing, by the manufacturer, against failure due to defective materials and workmanship for a period of ten (10) years commencing on the Date of Final Completion and Acceptance, and in the event of failure, the manufacture is to promptly repair or replace the defective with no additional cost to the Owner.

PART II - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. To the greatest extent possible, obtain each kind of hardware from one manufacturer only.
- B. All numbers and symbols used herein have been taken from the current catalogues of the following manufacturers.

PRODUCT	ACCEPTABLE MANUFACTURER	ACCEPTABLE SUBSTITUTE
1) Hinges	Ives	Hager, Stanley
2) Locks & Latches	Schlage Lock	By Owner
3) Cylinders, Keys, Keying	Schlage Lock	By Owner
4) Exit Devices	Von Duprin	By Owner
5) Door Closers	LCN	By Owner
6) OH Stops/holders	Glynn Johnson	Rixson
7) Wall Stops/Floor Stops, Flushbolts	Ives	Rockwood, Hager
8) Kick Plates	Ives	Rockwood, Hager
9) Threshold/ Weather-strip	Zero	National Guard, Pemko
10) Silencers	Ives	Rockwood, Hager
11) Key Cabinet	Lund	Key Control

- C. If material manufactured by other than that specified or listed herewith as an equal, is to be bid upon, permission must be requested from the architect seven (7) days prior to bidding. If substitution is allowed, it will be so noted by addendum.

2.02 FINISH OF HARDWARE:

- A. Exterior Hinges to be Stainless Steel (32D) and Interior hinges to be Satin Chrome (26D) Door Closers to be Aluminum, Locks to be Satin Chrome (26D). Exit Devices to be Satin Chrome (26D). Overhead Holders to be Satin Chrome (26D), Stainless Steel (32D) and the Thresholds to be Mill Finish Aluminum.

2.03 HINGES AND PIVOTS:

- A. Exterior butts shall be Stainless Steel. Butts on all out swinging doors shall be furnished with non-removable pins (NRP).
B. Interior butts shall be as listed.
C. Doors 5' or less in height shall have two (2) butts. Furnish one (1) additional butt for each 2'6" in height or fraction thereof. Dutch door shall have two (2) butts per leaf.

2.04 KEYING:

- A. Locks and cylinders shall be Schlage Lock Company. All bittings shall be issued by lock manufacturer in order to create a grand master key system.
B. Locks and cylinders to be construction master keyed in a manner that does not require the cylinders to be removed.
C. Provide Two (2) each change keys per lock and Six (6) each construction master keys.

2.05 LOCKSETS:

- A. Locksets shall be Heavy Duty Mortise/Cylindrical type, unless specified otherwise, in "L" and "ND" series, lever design as manufactured by Schlage Lock.

1. Acceptable substitutions:

- A. Approved by Owner

2.06 EXIT DEVICES:

- A. All devices shall be Von Duprin 98 Series in types and functions specified. All devices must be listed under "Panic Hardware" in accident equipment list of Underwriters Laboratories. All labeled doors with "Fire Exit Hardware" must have labels attached and be in strict accordance with Underwriters Laboratories.
- B. All exit devices shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified testing laboratory.
- C. All surface strikes shall be roller type and come complete with a plate underneath to prevent movement. And shall be provided with a dead-latching feature to prevent latchbolt tampering.
 - 1. Acceptable Substitutions:
 - A. Approved by Owner

2.07 DOOR CLOSERS:

- A. All closers shall be LCN 4000 series with slim cover having non-ferrous covers, steel arms separate valves for adjusting backcheck, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Closers shall be furnished with parallel arm mounted on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Furnish with non-hold open arms unless otherwise indicated.
- B. Door closer cylinders shall be of high strength cast construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.
- C. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards UBC 7-2 (1997) and UL 10C.
- D. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic backcheck. Backcheck shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. Pressure relief valves (PRV) are not acceptable.
 - 1. Acceptable Substitutions:
 - A. Approved by Owner

2.08 TRIM AND PLATES:

- A. Kick plates, mop plates, and armor plates, shall be .050 gauge with 32D finish. Kick plates to be 10" high, mop plates to be 4" high. All plates shall be two (2) inches less full width of door.
- B. Push plates, pull plates, door pulls, and miscellaneous door trim shall be shown in the hardware schedule.

2.09 DOOR STOPS:

- A. Door stops shall be furnished for all door to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall bumpers equal to Ives WS407 Series are preferred, but where not practical furnish floor stops equal to Ives FS436 or FS438 series. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 450 Series.

2.10 THRESHOLDS AND WEATHERSTRIP:

- A. Thresholds and weatherstrip shall be as listed in the hardware schedule.

2.11 DOOR SILENCERS:

- A. Furnish rubber door silencers equal to Ives SR64 for all new interior hollow metal frames, (2) per pair and (3) per single door frame.

PART III - EXECUTION

3.01 INSTALLATION:

- A. All hardware shall be applied and installed in accordance with the Finish Hardware schedule. Care shall be exercised not to mar or damage adjacent work.
- B. Contractor to provide a secure lock-up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses both before and after installation.
- C. No hardware is to be installed until the hardware manufactures have provided a pre-installation class. This is to insure proper installation of the specified products.

3.02 ADJUSTING AND CLEANING:

- A. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions. Prior to turning project to owner, contractor shall clean and make any final adjustments to the finish hardware.

3.03 PROTECTION:

- A. Contractor shall protect hardware as it is stored on construction site in a covered and dry place.
- B. Contractor shall protect exposed hardware installed on doors during the construction phase.

3.04 KEY CABINET:

- A. Set up and index one (1) Key Cabinet that allows room for expansion for 150% of the number of keys for the project.

3.05 HARDWARE SCHEDULE:







- A. The following schedule is furnished for whatever assistance it may afford the contractor; do not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, provide door or item with hardware same as required for similar purposes. Quantities listed are for each pair of doors; or for each single door.
- B. This hardware schedule prepared by.

Allegion, PLC
 3451 Technological Ave, Suite 7
 Orlando FL 32817
 Ph: 407-571-2000
 Fax 407-571-2006

Hardware Group No. 01

For use on Door #(s):

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		ITEMI	FINIS	MFR
Y					D	H	
4	EA	HINGE	5BB1 4.5 X 4.5 NRP			630	IVE
1	EA	POWER TRANSFER	EPT10 CON			689	VON
1	EA	EXIT DEVICE	FL3690 91 MEL			626	B/O
1	EA	SURFACE CLOSER	4040XP SCUSH			689	LCN
1	EA	THRESHOLD	65A-223			A	ZER
1	EA	WIRE HARNESS	CON-12				SCH

OPENING TO COMPLY WITH FBC LEVEL E

CARD READER BY DIV.28 SECURITY SUB TO RELEASE ELECTRIC EXIT DEVICE FOR ACCESS

SECURITY SUB TO COORDINATE WITH HARDWARE SUPPLIER

BALANCE OF HARDWARE BY ALUM SUPPLIER

SANIBEL FIRE AND RESCUE STATION 172
 100% Construction Documents

Hardware Group No. 02

For use on Door #(s):

Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP			630	IVE
1	EA	POWER TRANSFER	EPT10 CON			689	VON
1	EA	ELEC PANIC HARDWARE	QEL-WS-9827-L-06-CON 24 VDC		⚡	626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
	EA	NOTE	CYLINDER TO MATCH MASTER SYSTEM			626	B/O
1	EA	SURFACE CLOSER	4040XP SCUSH			689	LCN
1	EA	RAIN DRIP	142AA			AA	ZER
1	EA	GASKETING	188SBK PSA			BK	ZER
1	EA	THRESHOLD	65A-223			A	ZER
1	EA	WIRE HARNESS	CON-12		⚡		SCH
1	EA	WIRE HARNESS	CON-6W		⚡		SCH

OPENING TO COMPLY WITH FBC LEVEL E
 CARD READER AND POWER SUPPLY BY DIV.28 SECURITY SUB TO RELEASE ELECTRIC
 EXIT DEVICE FOR ACCESS
 SECURITY SUB TO COORDINATE WITH HARDWARE SUPPLIER

Hardware Group No. 03

For use on Door #(s):

Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			630	IVE
1	EA	MULT PT STOREROOM	LM9380J 06A			626	SCH
	EA	NOTE	CYLINDER TO MATCH MASTER SYSTEM			626	B/O
1	EA	SURFACE CLOSER	4040XP SCUSH			689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS			630	IVE
1	EA	RAIN DRIP	142AA			AA	ZER
1	EA	GASKETING	188SBK PSA			BK	ZER
1	EA	THRESHOLD	65A-223			A	ZER

OPENING TO COMPLY WITH FBC LEVEL E

SANIBEL FIRE AND RESCUE STATION 172
 100% Construction Documents

Hardware Group No. 04

For use on Door #(s):

Provide each PR door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			630	IVE
1	EA	POWER TRANSFER	EPT10 CON			689	VON
1	EA	ELEC PANIC HARDWARE	QEL-WS-9827-L-06-CON 24 VDC		⚡	626	VON
1	EA	PANIC HARDWARE	WS-9827-EO			626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
	EA	NOTE	CYLINDER TO MATCH MASTER SYSTEM			626	B/O
2	EA	SURFACE CLOSER	4040XP CUSH			689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER
1	EA	WIRE HARNESS	CON-12		⚡		SCH
1	EA	WIRE HARNESS	CON-6W		⚡		SCH

OPENING TO COMPLY WITH FBC LEVEL E
 CARD READER BY DIV.28 SECURITY SUB TO RELEASE ELECTRIC EXIT DEVICE FOR
 ACCESS
 SECURITY SUB TO COORDINATE WITH HARDWARE SUPPLIER

Hardware Group No. 05

For use on Door #(s):

Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	PANIC HARDWARE	98-L-BE-06			626	VON
1	EA	SURFACE CLOSER	4040XP RW/PA			689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CCV			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER

SANIBEL FIRE AND RESCUE STATION 172
 100% Construction Documents

Hardware Group No. 06

For use on Door #(s):

Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 TW8		⚡	652	IVE
1	EA	EU STOREROOM LOCK	ND80JDEU RHO 12V/24V DC		⚡	626	SCH
	EA	NOTE	CYLINDER TO MATCH MASTER SYSTEM			626	B/O
1	EA	SURFACE CLOSER	4040XP RW/PA			689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CCV			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER
1	EA	WIRE HARNESS	CON-192		⚡		SCH
1	EA	WIRE HARNESS	CON-32		⚡		SCH

CARD READER AND POWER SUPPLY BY DIV. 28 SECURITY SUB TO RELEASE ELECTRIC
 LOCK FOR ACCESS
 SECURITY SUB COORDINATE WITH HARDWARE SUPPLIER

Hardware Group No. 07

For use on Door #(s):

Provide each SGL door(s) with the following:






QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	CLASSROOM LOCK	ND70JD RHO			626	SCH
	EA	NOTE	CYLINDER TO MATCH MASTER SYSTEM			626	B/O
1	EA	WALL STOP	WS406/407CCV			630	IVE
3	EA	SILENCER	SR64			GRY	IVE

SANIBEL FIRE AND RESCUE STATION 172
 100% Construction Documents

Hardware Group No. 08

For use on Door #(s):






Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	PRIVACY LOCK	ND40S RHO			626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA			689	LCN
1	EA	WALL STOP	WS406/407CCV			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER

Hardware Group No. 09

For use on Door #(s):







Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	PRIVACY LOCK	ND40S RHO			626	SCH
1	EA	OH STOP	450S			652	GLY
1	EA	WALL STOP	WS406/407CCV			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER

Hardware Group No. 10

For use on Door #(s):

Provide each SGL door(s) with the following:





QT Y		DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
4	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	PASSAGE SET	ND10S RHO			626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA			689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CCV			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER

SANIBEL FIRE AND RESCUE STATION 172
 100% Construction Documents

Hardware Group No. 11

For use on Door #(s):







Provide each SGL door(s) with the following:

QT Y	EA	DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
4	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	PASSAGE SET	ND10S RHO			626	SCH
1	EA	WALL STOP	WS406/407CCV			630	IVE
3	EA	SILENCER	SR64			GRY	IVE

Hardware Group No. 12

For use on Door #(s):

Provide each SGL door(s) with the following:

QT Y	EA	DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5			652	IVE
1	EA	PUSH PLATE	8200 8" X 16"			630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"			630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA			689	LCN
1	EA	WALL STOP	WS406/407CCV			630	IVE
1	EA	GASKETING	188SBK PSA			BK	ZER

Hardware Group No. 13

For use on Door #(s):

Provide each SGL door(s) with the following:

QT Y	EA	DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
		NOTE	HARDWARE BY DOOR MANUF.				BYO

SCREEN DOOR

Hardware Group No. 14

For use on Door #(s):

Provide each RU door(s) with the following:

QT Y	EA	DESCRIPTION	CATALOG NUMBER		ITEM D	FINIS H	MFR
		NOTE	HARDWARE BY DOOR MANUF.				BYO

END OF SECTION 08 71 00

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Glass.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. FBC: Florida Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 CODE COMPLIANCE

- A. Exterior openings shall meet the requirements of the Florida Building Code.
 - 1. Provide product evaluations and installation requirements indicating compliance with Code requirements.

1.5 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.6 PREINSTALLATION MEETINGS

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

SANIBEL FIRE AND RESCUE STATION 172
100% Construction Documents

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.7 ACTION SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Product Data: For each type of product.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
 1. Insulating glass.
- D. Glazing Accessory Samples: For sealants, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.
- C. Product Test Reports: For tinted glass, coated glass, insulating glass and glazing sealants, for tests performed by a qualified testing agency.
 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazing to include in maintenance manuals.

1.10 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.

- B. **Installer Qualifications:** A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.
- C. **Glass Testing Agency Qualifications:** A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. **Sealant Testing Agency Qualifications:** An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.11 PRECONSTRUCTION TESTING

- A. **Preconstruction Adhesion and Compatibility Testing:** Test each glass product, sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - 2. Determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, sealants, gaskets, and glazing channel substrates.
 - 3. Test Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.13 FIELD CONDITIONS

- A. **Environmental Limitations:** Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.14 WARRANTY

- A. **Manufacturer's Special Warranty for Insulating Glass:** Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

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

- B. **Manufacturer's Special Warranty for Laminated Glass:** Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Source Limitations for Glass:** Obtain tinted and coated glass from single source from single manufacturer.
- B. **Source Limitations for Glazing Accessories:** For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. **General:** Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. **Delegated Design:** Engage a qualified professional engineer, to design glazing.
- C. **Structural Performance:** Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
1. Design Wind Pressures: As indicated on Drawings.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
- D. **Windborne-Debris-Impact Resistance:** Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone Level E (Essential Facility).

1. Large-Missile Test: For glazing located within 30 feet of grade.
- E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. 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 is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. 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 the IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. AGC Glass Company North America, Inc.
 2. Cardinal Glass Industries.
 3. Guardian Glass; SunGuard.
 4. Oldcastle Building Envelope.
 5. Pilkington North America.
 6. Viracon, Inc.
 7. Vitro.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 2. Perimeter Spacer: Manufacturer's standard spacer material and construction.
 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.
- B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with the following to comply with interlayer manufacturer's written instructions:
1. Polyvinyl butyral interlayer.

2.7 FIRE RATED GLAZING

- A. Fire Safe Glazing (Fire Rated Glass): Clear fire rated glazing.
 - 1. Manufacturers
 - a. Glaverbel S.A., distributed by InterEdge Technologies
 - b. Oldcastle Glass
 - c. SAFTI *FIRST*
 - d. SCHOTT North America, Inc.
 - e. Nippon Electric Glass Co., Ltd.,
 - f. Vetrotech Saint-Gobain North America Inc.
 - 2. Thickness: As required for fire-ratings indicated.
 - 3. Fire-Protection Rating: As required for the assembly in which glazing material is installed.
 - a. Glazing for Fire-Rated Door and Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA.
- B. Impact Safety Rating: As required for the assembly in which glazing material is installed.
 - 1. Glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.
- D. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.8 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: Match Architect's samples.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Use NT Class as required to meet performance requirements and adhesion testing.

2.9 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.

2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.11 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- 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 sealant-substrate 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 the length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 GLAZING SCHEDULE

- A. GL-1A – Storefronts and Apparatus Bay Doors: Tinted, Level-E, 1-5/16" Overall thickness insulating, laminated, Low-E Coated glass.
1. Basis of Design Fabricator: Viracon.
 2. Exterior Glass Ply: 1/4" heat treated (Temper where required by Code).
 - a. Coating: VRE7-65 with Azuria Tint #2 surface.
 3. Space: 1/2" aluminum air filled, black finish.
 4. Silicone: Black.
 5. Interior Glass Ply 1: 1/4" clear, heat treated.
 6. Interlayer: 0.180" Sentryglas by Kuraray.
 7. Interior Glass Ply 2: 1/4" clear, heat treated.
 - a. Winter U-Value 0.25.
 - b. Summer U-Value 0.21.
 - c. Solar Heat Gain Coefficient 0.23.
- B. GL-1B - Storefronts: Clear, Level-E, 1-5/16", Overall thickness insulating, laminated, Low-E coated glass.
1. Basis of Design Fabricator: Viracon.
 2. Exterior Glass Ply: 1/4" heat treated (Temper where required by Code).
 - a. Coating: VNE1-63 on #2 surface.
 3. Space: 1/2" VTS argon filled, black finish.
 4. Silicone: Black.
 5. Interior Glass Ply 1: 1/4" clear, heat treated.
 6. Interlayer: 0.180" Sentryglas by Kuraray.
 7. Interior Glass Ply 2: 1/4" clear, heat treated.
 - a. Winter U-Value 0.24.
 - b. Summer U-Value 0.20.
 - c. Solar Heat Gain Coefficient 0.28.

- C. GL-2 - Storefront Entrances: Tinted, Level-E, 1" Overall thickness insulating. laminated, Low-E Coated glass.
 - 1. Basis of Design Fabricator: Viracon.
 - 2. Exterior Glass Ply: 1/4" heat treated (Temper where required by Code).
 - a. Coating: VRE7-65 on #2 surface.
 - 3. Space: 5/16" VTS argon filled, black finish.
 - 4. Silicone: Black.
 - 5. Interior Glass Ply 1: 3/16" clear, heat treated.
 - 6. Interlayer: 0.180" Sentryglas by Kuraray.
 - 7. Interior Glass Ply 2: 3/16" clear, heat treated.
 - a. Winter U-Value 0.28.
 - b. Summer U-Value 0.29.
 - c. Solar Heat Gain Coefficient 0.25.
- D. GL-3 - Sliding Windows and Sliding Glass Door: Tinted, Level-E, 13/16" Overall thickness, insulating, laminated, Low-E coated glass.
 - 1. Basis of Design manufacturer: PGT.
 - 2. Exterior Glass Ply: 3/16" Clear heat treated (Temper where required by Code).
 - 3. Coating: Azure Blue tint on #2 surface.
 - 4. Space: Aluminum air filled, black finish.
 - 5. Silicone: Black.
 - 6. Interior Glass Ply 1: 1/8" Clear heat treated.
 - 7. Interlayer: 0.090" PVB Interlayer.
 - 8. Interior Glass Ply 2: 1/8" Clear heat treated.
 - a. Winter U-Value 0.28.
 - b. Summer U-Value 0.25.
 - c. Solar Heat Gain Coefficient 0.23.
- E. GT: Interior, 1/4-inch fully tempered, clear glass.
- F. FG-90: Interior, clear, fire rated glazing.
 - 1. Basis of Design Manufacturer; SAFTIFIRST.
 - a. 45 minute rated – Superlite II-XL-45.

END OF SECTION 08 80 00

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Vinyl Backed Safety mirrors.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Silvered mirrored glass. Include description of materials and process used to produce mirrored glass that indicates source of glass, glass coating components, edge sealer, and quality-control provisions.
- B. Shop Drawings: Include elevations, sections, details, and attachments to other Work.
- C. Samples: For each type of products.
- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.
- B. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each type of accessory indicated.
- C. NAAMM's Publication: For silvered mirrored glass, comply with recommendations in NAAMM's "Mirrors, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors."
- D. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to mirrored glass manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For silvered mirrored glass, comply with mirrored glass manufacturer's written instructions for shipping, storing, and handling mirrored glass as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install mirrored glass until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty for Silvered Mirrored Glass: Written warranty, made out to Owner and signed by mirrored glass manufacturer agreeing to replace silvered mirrored glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below:
 - 1. Warranty Period: Five years from date of substantial completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
- B. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule.
- C. Safety Glazing Products: For tempered mirrors, provide products that comply with 16 CFR 1201, Category II.

2.2 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.

- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Franklin International; Titebond Division.
 - b. Laurence, C. R. Co., Inc.
 - c. Palmer Products Corporation.
- D. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- E. Anchors and Inserts: Provide devices as required for installation.

2.3 FABRICATION

- A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes to suit Project conditions.
- B. Mirrored Glass Edge Treatment: Sanded edge (Pencil Edge).
- C. Vinyl-Backed Safety Mirrored Glass: Apply vinyl backing with pressure-sensitive adhesive coating over glass coating as recommended by vinyl-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections. Use adhesives and vinyl backing compatible with mirrored glass as certified by organic coating manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, over which mirrored glass units are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.
 - 1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
 - 2. Proceed with mirrored glass installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

- A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

- B. Wall-Mounted Mirrors: Install mirrors with mastic and concealed mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION 08 83 00

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:
 - 1. Fixed extruded-aluminum louvers.

1.3 ACTION SUBMITTALS

- A. Product Control Approval: Submit current Product Control Notice of Acceptance in accordance with the Florida Building Code and FAC 9N-3.
- B. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- C. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- D. Samples: For each type of metal finish required.
- E. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Windborne-debris-impact-resistance test reports.
- C. Sample Warranties: For manufacturer's special warranties.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- C. Windborne-Debris-Impact Resistance: Louvers located within 30 feet of grade shall pass basic protection, when tested according to AMCA 540.
- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable-Blade Louver:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ruskin Company; EME520MD or a comparable product by one of the following:
 - a. Airolite Company, LLC (The).
 - b. American Warming and Ventilating; a Mestek Architectural Group company.
 - c. Construction Specialties, Inc.
 - d. Greenheck.
2. Louver Depth: 5-inches.
3. Blade Profile: Plain blade without center baffle.
4. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
5. Finish: Fluoropolymer.
6. Louver Performance Ratings:
 - a. Free Area: Not less than 7.5 sq. ft. for 48-inch-wide by 48-inch-high louver.
 - b. Point of Beginning Water Penetration: Not less than 950 fpm.
 - c. Air Performance: Not more than 0.10-inch wg static pressure drop at 700-fpm free-area exhaust velocity.
7. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Insect screening.

B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Non-rewirable, U-shaped frames.

D. Louver Screening for Aluminum Louvers:

1. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

2.5 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use Type 316 stainless-steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Exterior flange unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
- G. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 92 00 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 08 91 19

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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. Flood vents.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of metal finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For flood vents, from ICC-ES.
- B. Sample Warranties: For manufacturer's special warranties.

1.5 WARRANTY

- A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain vents from single source from single manufacturer.

2.2 FLOOD AND AIR VENTS

- A. Insulated Stainless Steel Flood: Type 316 stainless steel welded frame and flood door assembly, designed to automatically release under hydrostatic pressure or rising water level.
1. Subject to compliance with requirements, provide Basis of Design product and Manufacturer; SmartVent Model 1540-520, or a comparable product by the following:
 - a. USA Foundation Flood Air Vents.
 2. Size: 16:w x 8" H x 3" D.
 3. Finish: Powder-Coat.

2.3 ACCESSORIES

- A. Insulated Sealing Kit: Flood Vent Sealing Kit Model #1540-526 to provide tight seal behind the vent opening.
1. When a flood event occurs, the pre-cut Homasote® sealing material dislodges from the frame, creating an unobstructed opening to allow flood water to flow through freely.
 2. Installed on the interior wall.
 3. Finish: White.

2.4 MATERIALS

- A. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A666 or ASTM A240/A240M, austenitic stainless steel, Type 316.

2.5 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. 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.
1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install according to manufacturer's written instructions.
- B. Locate and place vents level, plumb, and at indicated alignment with adjacent work.
- C. Attach vents securely in place using fasteners supplied or approved by manufacturer.
- D. Protect unpainted surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by separating surfaces with waterproof gaskets or nonmetallic flashing.
- E. Use concealed anchorages.

3.2 ADJUSTING AND CLEANING

- A. Adjust flood vents for proper operation.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore vents damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

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Division 09
Finishes

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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. Shaft enclosures.

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance:
 - 1. Provide gypsum board shaft-wall assemblies capable of withstanding the full air-pressure loads indicated for maximum heights of partitions without failing and while maintaining an airtight and smoke-tight seal. Evidence of failure includes deflections exceeding limits indicated, bending stresses causing studs to break or to distort, and end-reaction shear causing track (runners) to bend or to shear and studs to become crippled.

1.5 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.
- B. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.
- C. Research/Evaluation Reports: Evidence of compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction that substantiate required fire-resistance rating for each gypsum board shaft-wall assembly.
- D. Acoustical-Test-Response Reports: From a qualified independent testing agency substantiating required STC rating for each gypsum board shaft-wall assembly.

1.6 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory" or GA-600, "Fire Resistance Design Manual" as indicated.
- B. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination." Review methods and procedures for installing work related to gypsum board shaft-wall assemblies including, but not limited to, the following:
 - 1. Fasteners proposed for anchoring steel framing to building structure.
 - 2. Sprayed fire-resistive materials applied to structural framing.
 - 3. Wiring devices in shaft-wall assemblies.
 - 4. Doors and other items penetrating shaft-wall assemblies.
 - 5. Items supported by shaft-wall-assembly framing.
 - 6. Mechanical work enclosed within shaft-wall assemblies.

1.7 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. Stack gypsum panels flat on leveled supports off the ground to prevent sagging.

1.8 PROJECT CONDITIONS

- A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 9 Section "Gypsum Board 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:
 - 1. American Gypsum.
 - 2. Georgia-Pacific Corp.
 - 3. United States Gypsum Company.

2.2 ASSEMBLY MATERIALS

- A. General: 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.
- B. Steel Framing: ASTM C 645.
 - 1. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized coating.
- C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1-inch thickness and with moisture-resistant paper faces.
- D. Gypsum Wallboard: ASTM C 36, core type as required by fire-resistance-rated assembly indicated.
 - 1. Edges: Tapered.
- E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "Gypsum Board Assemblies" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- F. Gypsum Wallboard Joint-Treatment Materials: ASTM C 475 and as specified in Division 9 Section "Gypsum Board Assemblies."
- G. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- H. Track (Runner) 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. Powder-Actuated Fasteners: Provide powder-actuated fasteners with capability to sustain, without failure, a load equal to 10 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 1190.
 - 2. Postinstalled Expansion Anchors: Where indicated, provide expansion anchors with capability to sustain, without failure, a load equal to 5 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 488.
- I. Acoustical Sealant: As recommended by gypsum board shaft-wall assembly manufacturer for application indicated.
- J. Sound Attenuation Blankets: ASTM C 665 for Type I, unfaced mineral-fiber-blanket insulation produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

2.3 GYPSUM BOARD SHAFT WALL

- A. Deflection Limit: $L/240$.
- B. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated.
- C. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches, in depth matching studs.
 - 1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.
- D. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs.

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, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum 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 runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches on center.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of gypsum board 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.

2. Division 9 Section " Gypsum Board Assemblies" for applying and finishing panels.
 - B. Testing: Test walls indicated to have STC ratings in accordance with referenced standards.
 - C. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support.
 - D. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 1. Where handrails 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 face-layer panel.
 - E. 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, and similar items.
 - F. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.
 - G. Install control joints to maintain fire-resistance rating of assemblies.
 - H. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.

END OF SECTION 09 21 16

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.3 SUBMITTALS

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

1. Studs and Runners: Provide documentation that framing members' certification is according to SFIA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members". SFIA's program certifies that studs and runners comply with the IBC, ASTM C 645, AISI S100, and AISI S220. Mechanical properties, coatings, dimensions, and labeling are checked.
2. Manufacturers' limiting tables indicating products provided.
3. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.
4. Evaluation Reports: For Metal Framing, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

- B. Delegated-Design by Specialty Structural Engineer (SSE) Delegated-Design Submittal: For steel framing, fasteners, accessories and support. The design professional, individual or organization having responsibility for the design of the specialty items. This responsibility shall be in accordance with the state's statues and regulations governing the professional registration and certification of architects or engineers.

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 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design steel framing systems.
 - 1. Design framing systems in accordance with American Iron and Steel Institute Publication S220 "North American Specification for the Design of Cold-Formed Steel Framing – Non-Structural Members", except as otherwise shown or specified.
 - 2. Design loads: 5 PSF minimum as required by the Building Code.
 - 3. Design framing systems to accommodate deflection of primary building structure and construction tolerances and to withstand design loads with a maximum deflection of 1/240 inches and 1/360 where interior plaster is applied, including finish material.
- B. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.
- C. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413.

2.2 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645. Use either steel studs and runners or embossed steel studs and tracks.
 - 1. Steel Studs and Tracks:
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) CEMCO; California Expanded Metal Products Co.
 - 2) Custom Stud.
 - 3) MRI Steel Framing, LLC.
 - 4) Steel Network, Inc. (The).
 - b. Minimum Base-Metal Thickness: As indicated on the drawings, but no less than 20 ga. Must meet deflection requirements, including service load.
 - c. Depth: As Indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to runners while allowing 1-1/2-inch minimum vertical movement.

- a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) CEMCO; California Expanded Metal Products Co.
 - 2) ClarkDietrich Building Systems.
 - 3) Steel Network, Inc. (The).
2. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
3. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
4. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) CEMCO; California Expanded Metal Products Co.
 - 2) ClarkDietrich Building Systems.
 - 3) Steel Network, Inc. (The).
- D. 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. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CEMCO; California Expanded Metal Products Co.
 - b. ClarkDietrich Building Systems.
 - c. Steel Network, Inc. (The).
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
 2. Minimum Base-Metal Thickness: 0.0329 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
 2. Depth: 1-1/2 inches.
 3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
 2. Minimum Base-Metal Thickness: 0.0296 inch.
 3. Depth: As indicated on Drawings.
- H. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
 2. Configuration: Asymmetrical or hat shaped.
- I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 3/4 inch.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
 - 1. Depth: 2-1/2 inches.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 - 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0296 inch.
 - b. Depth: 2-1/2 inches.
 - 3. Embossed Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0190 inch.
 - b. Depth: 2-1/2 inches.
 - 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.0296 inch.
 - 5. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Armstrong World Industries, Inc.
- b. Chicago Metallic Corporation.
- c. United States Gypsum Company.

2.4 AUXILIARY MATERIALS

- A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8-inch-thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 3. Gypsum 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.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types and other assembly components indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Stud Spacing: 16-inches on center unless otherwise indicated.

- E. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: 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.
- F. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- G. Z-Furring Members:
 - 1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- H. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - 3. Do not attach hangers to steel roof deck.
 - 4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

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:
 - 1. Metal lath and accessories.
 - 2. Portland cement plaster.
 - 3. Stucco finishes.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: When used with an entity, "experienced" means having successfully completed a minimum of 5 projects similar in size and scope to this Project; being familiar with special requirements indicated.

1.4 SUBMITTALS

- A. Product Data: Submit product data for each product specified.
- B. Material Certificates: Submit certificate signed by manufacturer for each kind of plaster aggregate certifying that materials comply with requirements.
- C. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components and attachments to other work.
- D. Samples for Verification: For each type of finish coat indicated; 12 by 12 inches and prepared on rigid backing.

1.5 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups for each substrate and finish texture indicated for cement plastering, including accessories.
 - a. Size: 100 sq. ft. in surface area.
 - 2. For interior plasterwork, simulate finished lighting conditions for review of mockups.

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

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 FIELD CONDITIONS

- A. Comply with ASTM C926 requirements.
- B. Exterior Plasterwork:
 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 2. Apply plaster when ambient temperature is greater than 40 deg F.
 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F for at least 48 hours before plaster application, and continuously during and after application.
 1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.
- D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C1550-92, Type 1, natural color.
- B. Masonry Cement: ASTM C90-93, Type S, natural white color.
- C. Lime: ASTM C206-84 (1992), Type S, special finishing hydrating lime.
- D. Aggregate: ASTM C987, natural sand.
- E. Water: Clean, potable, without deposits harmful to stucco.

2.2 LATH

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653, G60, hot-dip galvanized zinc coating.
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:
 - a. Alabama Metal Industries Corporation; a Gibraltar Industries Company.
 - b. Clark Western Building Systems, inc.
 - c. Marino/Ware; Division of Ware Industries, Inc.
 - d. Cemco.
 2. Diamond-Mesh Lath: Self-furring.
 - a. Weight: 3.4 lb/sq. yd.
- B. Paper Backing: FS UU-B-790, Type I Grade D, Style 2, water-vapor permeable, uncreped, unreinforced, asphalt saturated; 60-minute water resistance.
1. Provide paper backing for lath at all locations.

2.3 ACCESSORIES

- A. Plastic Accessories: Manufactured from high-impact PVC.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alabama Metal Industries Company; a Gibraltar Industries company.
 - b. Plastic Components, Inc.
 - c. Vinyl Corp; a division of ClarkDietrich Building Systems.
 2. Cornerbeads: With perforated flanges.
 - a. Smallnose cornerbead; use unless otherwise indicated.
 - b. Bullnose cornerbead, radius 3/4-inch minimum; use at locations indicated on Drawings.
 3. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
 - a. Square-edge style; use unless otherwise indicated.
 - b. Bullnose style, radius 3/4-inch minimum; use at locations indicated on Drawings.
 4. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 5. Reveal Joints: Provide reveal joints in size and shape as indicated on the drawings. At corners provide prefabricated corners with welded joints. Accessory shall have grounds to gage depth of plaster, and keyed flanges.
 6. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged reveal; with perforated concealed flanges.
 7. Siding Step Bead, ASTM D7184, C1063, D4216.

- a. Basis of Design Product and Manufacturer; Plastic PC Components, Inc. model SSB 75-50, with 2" wide striated, perforated flanges.
- b. Color: White.

2.4 SEALERS FOR EXPOSED EXTERIOR CEMENT PLASTER

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; Sherwin Williams, Loxon 40% Silane water repellent.

2.5 MISCELLANEOUS MATERIALS

- A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- B. Bonding Compound: ASTM C 932.
- C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- D. Sealers for exposed exterior cement plaster: Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; Sherwin Williams, Loxon 40% Silane water repellent.

2.6 PLASTER MIXES AND COMPOSITIONS

- A. General: Comply with ASTM C 926 for base, scratch, and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.
- B. Base-Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for each method of application and plaster base indicated. Adjust mix proportions to attain workability.
- C. Scratch Coat Mix: Proportion by volume in accordance with ASTM C926, for substrates indicated.
- D. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
 - 1. Portland Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
- E. Base-Coat Mixes for Use over Unit Masonry and Concrete: Single base (scratch) coat for two-coat plasterwork on high-absorption plaster bases as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
- F. Job-Mixed Finish Coats: Proportion materials for finish coats in accordance with ASTM C926; finish to match Architect's samples.
- G. Mixing: Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF LATH AND FURRING, GENERAL

- A. Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063.

3.2 INSTALLATION OF PLASTERING ACCESSORIES

- A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering.

1. Install according to ASTM C 1063 and at locations indicated on Drawings.

- B. Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

- a. Vertical Surfaces: 144 square feet.
- b. Horizontal and other Non-vertical Surfaces: 100 square feet.

2. At distances between control joints of not greater than 18 feet on center.

3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.

4. Where control joints occur in surface of construction directly behind plaster.

5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.3 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.

2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Bonding Compound: Apply on unit masonry and concrete substrates for direct application of plaster.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness, as follows:
 1. Portland cement mixes.
- D. Walls; Base-Coat Mix: For base (scratch) coat, for two-coat plasterwork and having 3/8-inch thickness on masonry 1/4-inch thickness on concrete, as follows:
 1. Portland cement mix.
- E. Finish Coats: Apply finish coats to comply with PCA Portland Cement Plaster (Stucco) Manual, and the following requirements:
 1. Texture: Match Architect's sample.
- F. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.
- G. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.
 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09 24 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of trim accessory.
- C. Samples for Verification: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Provide gypsum wall board that has been manufactured using synthetic gypsum to the fullest extent possible.
- C. Provide gypsum board of types indicated in standard lengths available, minimizing waste.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Gypsum Board and Related Products:
 - a. Georgia-Pacific Corp.
 - b. Gold Bond Building Products Div., National Gypsum Co.
 - c. Fry Reglet.
 - d. Lafarge Gypsum.
 - e. Pittcon Industries.
 - f. United States Gypsum Company.
 - g. National Gypsum Co.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.

- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396. With moisture- and mold-resistant core and paper surfaces.
 - 1. Thickness: As indicated on Drawings.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- D. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
 - 1. Core: 5/8 inch, Type X.
 - 2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
 - 3. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
 - 4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
 - 5. Long Edges: Tapered.
 - 6. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

- E. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
 - 1. Core: 5/8 inch, Type X.
 - 2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
 - 3. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
 - 4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
 - 5. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements according to test in Annex A1.
 - 6. Long Edges: Tapered.
 - 7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. National Gypsum Company.
 - 2. Core: As indicated on Drawings.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- B. Cementitious Backer Units (For Showers): ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. National Gypsum Company.

- c. USG Corporation.
2. Core: As indicated on Drawings.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 1. Material: Formed metal, Zinc Alloy.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - e. Expansion (control) joint.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- 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.
- D. Joint Compound for Tile Backing Panels:
 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
 2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF 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 Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

- 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 instructions 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 INSTALLATION OF TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings and according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.
 2. Bullnose Bead: Use where indicated.
 3. LC-Bead: Use at exposed panel edges.
 4. L-Bead: Use where indicated.
 5. U-Bead: Use at exposed panel edges.
 6. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

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 for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for tile.
 3. Level 3: Where indicated on Drawings.
 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 5. Level 5: Where indicated on Drawings.
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Tile.
 - 2. Waterproofing and crack suppression membrane.
 - 3. Metal Edge Strips.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Waterproofing.
 - 3. Stone thresholds in 6-inch lengths.
 - 4. Metal edge strips in 6-inch lengths.

1.4 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. Waterproof membrane.
 - 2. Crack isolation membrane.

3. Metal edge strips

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

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed 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 avoided.
- D. 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.

1.6 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.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match 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 5 percent of amount installed, for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 5 percent of amount installed for each color and type indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

2.2 TILE PRODUCTS

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
1. American Olean Tile Co. Inc.
 2. Ceramics Technics, Ltd.
 3. Interceramic Tile Company.
 4. Metropolitan Ceramics.
 5. United States Ceramics.
 6. Summitville Tiles, Inc.

2.3 WATERPROOFING AND CRACK SUPPRESSION MEMBRANE

- A. Thin Set Applications
1. Basis-of-Design Product: Subject to compliance with requirements, provide Custom Building Products; RedGard Waterproofing and Crack Prevention Membrane or a comparable product by one of the following:
 - a. Bostik, Inc.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.

2.4 SETTING MATERIALS

- A. Subject to compliance with requirements, provide products by one of the following:
1. Bostik.
 2. Custom Building Products.
 3. Laticrete International.
 4. Mapei.
- B. Modified Dry-Set Mortar (Thinset): ANSI A118.4 and 118.11.
1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
1. Custom Building Products.
 2. Laticrete International.
 3. Mapei.

2.6 SEALANTS

- A. Products and Manufacturers: Subject to compliance with requirements, available products and manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Keracaulk S (sanded); MAPEI Corporation
 - a. Colors: To be selected by the Architect from manufacturer's full line.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
 - c. Schluter Systems L.P.
 - 2. Where not flush, Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 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 installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare surfaces to receive waterproofing materials in accordance with the manufacturer's instructions and recommendations.
- B. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- C. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
 - 1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- D. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, 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.
- E. Field-Applied Temporary Protective Coating: Where recommended by the tile manufacturer or as needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION, GENERAL

- A. Waterproofing Materials: Install at all floor tile locations. Install in accordance with manufacturer's instructions and recommendations.

- B. Workmanship and Visual Appearance: All tile shall be installed with zero-lippage, with straight and even joints, and smooth and flat. The intent is that all tile installations are to be installed using the best of techniques. Any tile that does not meet or exceed the requirements indicated shall be removed and replaced in accordance with specified requirements.
- C. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- D. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation."
- E. 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.
- F. 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.
- G. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- H. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

3.4 FLOOR TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
- B. Joint Widths: Install tile on floors with the following joint widths:
 - 1. Tile: 1/8 inch
- C. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
 - 2. Do not extend waterproofing or crack isolation membrane under thresholds set in modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.

- D. Metal Edge Strips: Install at locations indicated.

3.5 WALL TILE INSTALLATION

- A. General: Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.
- B. Joint Widths: Install tile on walls with the following joint widths:
 - 1. Tile: 1/8 inch

3.6 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 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 that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- 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 cleaner from tile surfaces.

END OF SECTION 09 30 00

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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. Acoustical Lay-in ceiling panels.
 - 2. Exposed suspension systems for interior ceilings.

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. Samples for Initial Selection: For components with factory-applied finishes.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch-square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items.
7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/4 inch = 1 foot.

- B. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 10 percent of amount installed for each type indicated, but not more than 2 boxes.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: Class A according to ASTM E 1264.
 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
 1. Armstrong Commercial Ceilings.
 2. Certainteed Corporation.
 3. USG Interior Systems.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
 1. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
 1. Armstrong Commercial Ceilings.
 2. Certainteed Corporation.
 3. USG Interior Systems.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
- C. Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.
 1. Structural Classification: Heavy-duty system.
 2. End Condition of Cross Runners: Override (stepped) type.
 3. Face Design: Flat, flush.
 4. Cap Material: Cold-rolled steel or aluminum for Ultima Tile.
 5. Cap Finish: Match Architect's sample.

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated.
 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B633, Class SC 1 (mild) service condition.
 - c. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B164 for UNS No. N04400 alloy.
 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch-diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.
- F. Hold-Down Clips: Manufacturer's standard hold-down, install at vestibules.

2.6 MISCELLANEOUS MATERIALS

- A. Concealed Acoustical Sealant: Nondrying, nonhardening, nonskinning, nonstaining, non-bleeding gunnable sealant complying with requirement specified in Section 07 92 00 "Joint Sealants."

2.7 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - b. Install panels with pattern running in one direction parallel to **[long]** **[short]** axis of space.

- c. Install panels in a basket-weave pattern.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
6. Install hold-down clips at vestibules and in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
- a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.
7. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient Wall Base.
 - 2. Resilient Accessories

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, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

- A. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 3. Roppe Corporation, USA.
- B. Height: As indicated on the Finish Schedule.
- C. Lengths: Coils in manufacturer's standard length.
- D. Outside Corners: Preformed.
- E. Inside Corners: Preformed.
- F. Colors and Patterns: As indicated on the Finish Schedule.

2.2 RESILIENT ACCESSORIES

- A. Provide Products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 3. Roppe Corporation, USA.
- B. Profile and Dimensions: As indicated.
- C. Locations: Provide molding accessories in areas indicated.
- D. Colors and Patterns: As selected by Architect from Manufacturers full range.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturers to suit base and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Luxury Vinyl Tile

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of flooring.
 - 1. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples for Initial Selection: For each type of flooring indicated, and metal edge strips in 6-inch lengths.
- D. Samples for Verification: For each type of flooring indicated, and metal edge strips in 6-inch lengths.
- E. Product Schedule: For flooring. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for flooring installation and seaming methods indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by flooring manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Coordinate mockups in this Section with mockups specified in other Sections.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 90 deg F.
 1. Floor Tile: Store on flat surfaces.
 2. Sheet Flooring: Store rolls upright.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring during the following periods:
 1. 72 hours before installation.
 2. During installation.
 3. 72 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during flooring installation.
- D. Close spaces to traffic for 72 hours after flooring installation.
- E. Install flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 LUXURY VINYL TILE

- A. Basis of Design Product and Manufacturer; As Scheduled on the Finish Schedule, subject to compliance with requirements other Manufacturers offering products which may be incorporated into the work are but not limited to the following:

1. Armstrong World Industries.
2. Mohawk Flooring.
3. Shaw Floors.
4. Tandus Centiva.
 - a. Thickness: As indicated on the Interior Finish Schedule.
 - b. Wearing Surface: As selected by Architect from Manufacturer's full range of textures.
 - c. Colors and Patterns: As selected by Architect from full range of industry colors.

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 plank manufacturer for applications indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
 1. Basis of Design Product and Manufacturer; As Indicated on the Interior Finish Schedule.
- C. Adhesives: Water-resistant type recommended by floor plank and adhesive manufacturers to suit floor plank and substrate conditions indicated.

PART 3 - EXECUTION

- A. Prepare substrates according to floor plank manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor plank manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor plank manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor plank manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

- D. Do not install floor planks until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor plank.

3.2 FLOOR PLANK INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor plank.
- B. Lay out floor planks from center marks established with principal walls, discounting minor offsets, so planks at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half plank at perimeter.
 - 1. Lay planks in pattern indicated.
- C. Match floor planks for color and pattern by selecting planks from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed planks.
 - 1. Lay planks in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor planks to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor planks into toe spaces, door reveals, closets, and similar openings. Extend floor planks 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 planks as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor planks on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of plank installed on covers and adjoining planks. Tightly adhere plank edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor planks to flooring 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.
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, vinyl, wood, or other flooring that finishes flush with top of tile.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor plank.

END OF SECTION 09 65 40

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rubber floor tile.
 - 2. Rubber Sheet Wainscott.
 - 3. Metal Edge Strips.

1.3 COORDINATION

- A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details and locations of the following:
 - 1. Border tiles.
 - 2. Floor and wall patterns.
 - 3. Layout, colors, widths, and dimensions.
 - 4. Locations of floor inserts for athletic equipment installed through flooring.
- C. Samples for Initial Selection:
 - 1. For each type of resilient athletic finish.
 - 2. Metal edge strips in 6-inch lengths.
- D. Samples for Verification:
 - 1. For each type, color, and pattern of finish specified, 6-inch- square in size and of same thickness and material indicated for the Work.
 - 2. Metal edge strips in 6-inch lengths.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resilient athletic finish to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish no fewer than 1 box for each 50 boxes or fraction thereof, of each type, color, pattern, and size of floor tile installed.
 - 2. Sheet finish: Furnish full-width rolls of not less than 10 linear feet for each 500 linear feet or fraction thereof, of each type, color, and pattern of finish installed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.
- B. Store materials to prevent deterioration.
 - 1. Store tiles on flat surfaces.
 - 2. Store rolls upright.

1.8 FIELD CONDITIONS

- A. Adhesively Applied Products:
 - 1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive finish 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
 - 2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
 - 3. Close spaces to traffic during flooring installation.
 - 4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.
- B. Install flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RUBBER FLOOR TILE

- A. Basis of design Product and Manufacturer, as indicated on the Finish Schedule, or subject to compliance with requirements, other available manufacturers offering products that may be incorporated into the Work include:
 - 1. AFCO
 - 2. Burke
 - 3. Gerflor USA.
 - 4. Regupol America.
 - 5. Sport Court.

- B. Description: Athletic flooring consisting of modular rubber tiles with precision cut, square edges, for adhered installation.
- C. Material: Recycled-rubber compound.
- D. Traffic-Surface Texture: Nondirectional, stipple texture.
- E. Size: As indicated.
- F. Thickness: As indicated.
- G. Color and Pattern: As selected by Architect from manufacturer's full range.
- H. Border: Interlocking, beveled-edge tiles, of same material as floor tile; with bevels that transition from thickness of floor tile to surface below it; with straight outside edges; for use where flooring corners and edges do not abut vertical surfaces.
 - 1. Border Color and Pattern: As selected by Architect from manufacturer's full range to contrast with floor tile.

2.2 RUBBER SHEET FINISH

- A. Basis of design Product and Manufacturer, as indicated on the Finish Schedule, or subject to compliance with requirements, other available manufacturers offering products that may be incorporated into the Work include:
 - 1. AFCO
 - 2. Burke
 - 3. Gerflor USA.
 - 4. Regupol America.
 - 5. Sport Court.
- B. Description: Athletic finish consisting of rubber sheet, for adhered installation.
- C. Material: Recycled-rubber compound.
- D. Traffic-Surface Texture: Nondirectional, stipple texture.
- E. Size: As indicated.
- F. Thickness: As indicated.
- G. Color and Pattern: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

- A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by manufacturer.
- B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.
- C. Metal Edge Strips:

1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.
 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of finish.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
 3. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.
 1. Do not install materials until it is the same temperature as space where it is to be installed.

- F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.
- B. Scribe, cut, and fit space to butt neatly and tightly to vertical surfaces, equipment anchors, outlets, and other interruptions of surface.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

3.4 FLOOR TILE INSTALLATION

- A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles in pattern indicated.
- B. Discard broken, cracked, chipped, or deformed tiles.
- C. Tile Matching: Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged if so numbered.
 - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Adhered Floor Tile: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.5 SHEET FINISH INSTALLATION

- A. Unroll sheet finish and allow it to stabilize before cutting and fitting.
- B. Lay out sheet finish as follows:
 - 1. Maintain uniformity of finish direction.
 - 2. Minimize number of seams; place seams in inconspicuous areas, at least 6 inches away from parallel joints in substrates.
 - 3. Match edges of finish for color shading at seams.
 - 4. Locate seams according to approved Shop Drawings.

- C. Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- D. Sheet finish seams: Prepare and finish seams to produce surfaces flush with adjoining surfaces.
 - 1. Chemically Bonded Seams: Comply with ASTM F693. Seal seams to prevent openings from forming between cut edges and to prevent penetration of dirt, liquids, and other substances into seams.

3.6 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum flooring thoroughly.
 - 3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.
- B. Protect finishes from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 - 1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 09 65 67

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. Fluid-applied flake flooring system, including cove base, and accessories.
2. Metal Edge Strips.

1.3 PREINSTALLATION MEETINGS

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

1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous flooring installation.
2. Review details of integral cove bases.
3. Review manufacturer's written instructions for installing resinous flooring systems.
4. Review protection measures for adjacent construction and installed flooring, floor drainage requirements, curbs and base details.

1.4 ACTION SUBMITTALS

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

1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.

- B. Samples for Initial Selection:

1. For each type of exposed finish required.
2. Metal edge strips in 6-inch lengths.

- C. Samples for Verification:

1. For each resinous flooring system required and for each color and texture specified, 12 inches square, applied to a rigid backing by Installer for this Project.
2. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each resinous flooring component.
- C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 96-inch-square floor area selected by Architect.
 - a. Include 96-inch length of integral cove base with inside and outside corner.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in manufacturer's original packaging with identification labels intact and in sizes to suit project. All materials will be in new and unopened containers, shipped directly from manufacturer or manufacturer approved distribution center.
- B. Installer shall be provided with a storage area for all components. The area shall be maintained between 60° and 85° and out of direct sunlight. Store resin materials in a dry, secure area.

1.9 FIELD CONDITIONS

- A. Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Maintain minimum temperature in storage area of 65° F.

- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.
- D. Close spaces to traffic during resinous flooring application and for 48 hours after application unless manufacturer recommends a longer period.
- E. Do not apply resinous flooring in rain, fog or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flammability: Self-extinguishing according to ASTM D 635.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain flooring materials, from single source from single manufacturer.

2.3 MATERIALS – EPX-2

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - 1. Primer: E100-VB5 Primer/vapor barrier.
 - 2. Base Coat: 100-PT4 100% solids pigmented epoxy.
 - 3. Broadcast Flake: Co-poly Vinyl Flakes Broadcast to rejection.
 - 4. Top Coat: SPARTIC-ALL RM Clear Polyaspartic.
 - 5. 2nd Top Coat: SPARTIC-ALL RM Clear Polyaspartic, with Backtrack for slip-resistance.

2.4 ACCESSORIES

- A. Subfloor Filler: Resinous product of resinous flooring manufacturer; type recommended by flooring material manufacturer.
- B. Primers and adhesives: As recommended by flooring manufacturer.
- C. Integral Cove Base: 6 inches high with 1-inch radius.
- D. Joint Sealant: Type recommended by resinous flooring manufacturer for type of service and joint condition indicated.
- E. Metal Edge Strips:
 - 1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
 - a. Blanke Corporation.

- b. Ceramic Tool Company, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that concrete sub-floor surfaces are clean, dry, unfrozen, do not contain petroleum by-products, or other compounds detrimental to overlay material bond to substrate.
- B. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.
 - 1. Test relative humidity for moisture content per ASTM F-2170 standards.
 - 2. The relative humidity in the specific location of the application shall be less than 80%. If installer obtains a result above 80% relative humidity, contact your local Elite Crete representative for further instructions.
 - 3. Alkalinity: pH range per manufacturer's requirements.
 - 4. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Any existing surface coatings or flooring materials will be required to be removed. Mechanically grind or shot blast all surfaces to receive coating to a clean sound surface with a minimum CSP 3 surface profile. Exterior bare concrete surfaces can be pressure washed using 4000 psi pressure washer and a turbo tip.
- B. Remove sub-floor ridges and bumps from new or existing concrete substrates. Fill low spots, cracks, joints, holes, and other defects with approved filler.
- C. Concrete Substrates: Provide structurally sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
- D. Sweep and Vacuum clean substrate.
- E. There shall be no visible moisture present on the surface at the time of application of the system.

3.3 INSTALLATION

- A. Apply primer per manufacturer's recommendations with spread rate at 250-300 sq. feet per gallon with squeegee and back roll method.
- B. Apply epoxy base coat with spread rate at 125-150 sq. feet per gallon with squeegee and back roll method.
- C. Broadcast colored flakes into wet epoxy to rejection. Clean up loose flakes after broadcast coat has dried and vacuum loose materials off floor.

- D. Apply top coat per manufacturer's recommendations with a spread rate at 125-150 sq. feet per gallon with squeegee and back roll method.
- E. Apply 2nd top coat per manufacturer's recommendations mixed with backtrack aggregate with a spread rate at 125-150 sq. feet per gallon with squeegee and back roll method.
- F. Metal Edge Strips: Install at locations indicated, in accordance with Manufacturers requirements.

3.4 INTEGRAL COVE BASE

- A. Apply cove strip to wall at desired height to provide a finished top for the cove. Mix epoxy per cove base instructions and apply to the wall with cove trowel to 6".
- B. The finished cove base will be coated along with the floor during the grout coat application to provide a uniform finished color. Cove base is hand troweled before the flooring is applied.

3.5 CLEAN UP

- A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
- B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.6 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until cured. New floor should be protected from other trades throughout the completion of the project.
- C. Maintenance and care: See manufacturer's maintenance and care instructions.

END OF SECTION 09 67 00

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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. Fluid-applied quartz flooring system, including cove base, and accessories.
 - 2. Metal Edge Strips.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous flooring installation.
 - 2. Review details of integral cove bases.
 - 3. Review manufacturer's written instructions for installing resinous flooring systems.
 - 4. Review protection measures for adjacent construction and installed flooring, floor drainage requirements, curbs and base details.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection:
 - 1. For each type of exposed finish required.
 - 2. Metal edge strips in 6-inch lengths.
- C. Samples for Verification:
 - 1. For each resinous flooring system required and for each color and texture specified, 12 inches square, applied to a rigid backing by Installer for this Project.
 - 2. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each resinous flooring component.
- C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 96-inch-square floor area selected by Architect.
 - a. Include 96-inch length of integral cove base with inside and outside corner.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in manufacturer's original packaging with identification labels intact and in sizes to suit project. All materials will be in new and unopened containers, shipped directly from manufacturer or manufacturer approved distribution center.
- B. Installer shall be provided with a storage area for all components. The area shall be maintained between 60° and 85° and out of direct sunlight. Store resin materials in a dry, secure area.

1.9 FIELD CONDITIONS

- A. Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Maintain minimum temperature in storage area of 65° F.

- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.
- D. Close spaces to traffic during resinous flooring application and for 48 hours after application unless manufacturer recommends a longer period.
- E. Do not apply resinous flooring in rain, fog or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flammability: Self-extinguishing according to ASTM D 635.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain flooring materials, from single source from single manufacturer.

2.3 MATERIALS – EPX-3 AND EPX-4

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - 1. Primer: E100-VB5 Primer/vapor barrier.
 - 2. Base Coat: 100-PT1 (FAST) 100% solids pigmented epoxy.
 - 3. Broadcast Quartz: Colored quartz broadcast to rejection.
 - 4. Build Coat - 2nd Coat: E100-PT1 (Fast).
 - 5. Broadcast Quartz 2nd Coat: Colored quartz broadcast to rejection.
 - 6. Grout/ Top Coat 3rd Coat: SPARTIC-ALL RM Clear Polyaspartic.

2.4 ACCESSORIES

- A. Subfloor Filler: Resinous product of resinous flooring manufacturer; type recommended by flooring material manufacturer.
- B. Primers and adhesives: As recommended by flooring manufacturer.
- C. Integral Cove Base: 6 inches high with 1-inch radius.
- D. Joint Sealant: Type recommended by resinous flooring manufacturer for type of service and joint condition indicated.
- E. Metal Edge Strips:
 - 1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:

- a. Blanke Corporation.
- b. Ceramic Tool Company, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that concrete sub-floor surfaces are clean, dry, unfrozen, do not contain petroleum by-products, or other compounds detrimental to overlay material bond to substrate.
- B. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.
 - 1. Test relative humidity for moisture content per ASTM F-2170 standards.
 - 2. The relative humidity in the specific location of the application shall be less than 80%. If installer obtains a result above 80% relative humidity, contact your local Elite Crete representative for further instructions.
 - 3. Alkalinity: pH range per manufacturer's requirements.
 - 4. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Any existing surface coatings or flooring materials will be required to be removed. Mechanically grind or shot blast all surfaces to receive coating to a clean sound surface with a minimum CSP 3 surface profile. Exterior bare concrete surfaces can be pressure washed using 4000 psi pressure washer and a turbo tip.
- B. Remove sub-floor ridges and bumps from new or existing concrete substrates. Fill low spots, cracks, joints, holes, and other defects with approved filler.
- C. Concrete Substrates: Provide structurally sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
- D. Sweep and Vacuum clean substrate.
- E. There shall be no visible moisture present on the surface at the time of application of the system.

3.3 INSTALLATION

- A. Apply primer per manufacturer's recommendations with spread rate at 250-300 sq. feet per gallon with squeegee and back roll method.
- B. Apply epoxy base coat with spread rate at 125-150 sq. feet per gallon with squeegee and back roll method.
- C. Broadcast quartz aggregate into wet epoxy to rejection. Clean up loose quartz after broadcast coat has dried and vacuum loose materials off floor.

- D. Apply build coat per manufacturer's recommendations with spread rate at 80-100 sq. feet per gallon with squeegee and back roll method.
- E. Broadcast quartz aggregate into build coat to rejection. Clean up loose quartz aggregate after broadcast coat has dried and vacuum loose materials off floor.
- F. Apply grout/top coat per manufacturer's recommendations with spread rate of approximately 80-100 sq. feet per gallon.
- G. Metal Edge Strips: Install at locations indicated, in accordance with Manufacturers requirements.

3.4 INTEGRAL COVE BASE

- A. Apply cove strip to wall at desired height to provide a finished top for the cove. Mix epoxy per cove base instructions and apply to the wall with cove trowel to 6".
- B. The finished cove base will be coated along with the floor during the grout coat application to provide a uniform finished color. Cove base is hand troweled before the flooring is applied.

3.5 CLEAN UP

- A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
- B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.6 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until cured. New floor should be protected from other trades throughout the completion of the project.
- C. Maintenance and care: See manufacturer's maintenance and care instructions.

END OF SECTION 09 67 10

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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. Fluid-applied quartz wall finish system and accessories.
2. Metal Edge Strips.
3. Shower Curbs.

1.3 PREINSTALLATION MEETINGS

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

1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous wall finish installation.
2. Review manufacturer's written instructions for installing resinous wall finish systems.
3. Review protection measures for adjacent construction and installed wall finishes.

1.4 ACTION SUBMITTALS

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

1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous wall finish component required.

- B. Samples for Initial Selection:

1. For each type of exposed finish required.
2. Metal edge strips in 6-inch lengths.

- C. Samples for Verification:

1. For each resinous wall finish system required and for each color and texture specified, 12 inches square, applied to a rigid backing by Installer for this Project.
2. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Material Certificates: For each resinous wall finish component.
- C. Material Test Reports: For each resinous wall finish system, by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous wall finish to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Engage an installer who is certified in writing by resinous wall finish manufacturer as qualified to apply resinous wall finish systems indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 96-inch-square area selected by Architect.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in manufacturer's original packaging with identification labels intact and in sizes to suit project. All materials will be in new and unopened containers, shipped directly from manufacturer or manufacturer approved distribution center.
- B. Installer shall be provided with a storage area for all components. The area shall be maintained between 60° and 85° and out of direct sunlight. Store resin materials in a dry, secure area.

1.9 FIELD CONDITIONS

- A. Comply with resinous manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous wall finish application.
- B. Maintain minimum temperature in storage area of 65° F.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.
- D. Do not apply resinous wall finish in rain, fog or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flammability: Self-extinguishing according to ASTM D 635.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain wall finish materials, from single source from single manufacturer.

2.3 MATERIALS – EPX-3 AND EPX-4

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - 1. Primer: E100-VB5 PT-4 (Fast) Pigmented epoxy.
 - 2. Base Coat: 100-PT1 Clear 100% solids epoxy.
 - 3. Broadcast Quartz: Colored quartz broadcast at a spread rate of 2 square feet per pound.
 - 4. Grout Coat: E100-PT1 – Clear epoxy.
 - 5. Broadcast Quartz 2nd Coat: Colored quartz broadcast at a spread rate of 2 square feet per pound.
 - 6. Top Coat: E100-VR1 – Clear UV resistant epoxy.

2.4 ACCESSORIES

- A. Filler: Resinous product of resinous wall finish manufacturer; type recommended by wall finish material manufacturer.
- B. Primers and adhesives: As recommended by wall finish manufacturer.
- C. Joint Sealant: Type recommended by resinous wall finish manufacturer for type of service and joint condition indicated.
- D. Metal Edge Strips:
 - 1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Interior Finish Schedule, or a comparable product by one of the following:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
- E. Shower Curbs:
 - 1. Subject to compliance with requirements provide Basis of Design Product and Manufacturer; Schluter-KERDI-BOARD-SC.
 - a. Description: trapezoid-imprinted, prefabricated, tiled shower curb base, made of self-extinguishing expanded polystyrene manufacturers standard density.
 - b. Curb dimensions are 6 inch by 4-1/2 inch. Length as Indicated on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are clean, dry, unfrozen, do not contain petroleum by-products, or other compounds detrimental to overlay material bond to substrate.
- B. Verify that surfaces are ready for wall finish installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by wall finish materials manufacturer.
 - 1. Test relative humidity for moisture content per ASTM F-2170 standards.
 - 2. The relative humidity in the specific location of the application shall be less than 80%. If installer obtains a result above 80% relative humidity, contact your local Elite Crete representative for further instructions.
 - 3. Alkalinity: pH range per manufacturer's requirements.
 - 4. Verify that required mounted utilities are in correct location.

3.2 PREPARATION

- A. Any existing surface coatings or wall finish materials will be required to be removed. Mechanically grind or shot blast all surfaces to receive coating to a clean sound surface with a minimum CSP 3 surface profile. Exterior bare concrete surfaces can be pressure washed using 4000 psi pressure washer and a turbo tip.
- B. Remove ridges and bumps from new or existing concrete substrates. Fill low spots, cracks, joints, holes, and other defects with approved filler.
- C. Concrete Substrates: Provide structurally sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous wall finish.
- D. Sweep and Vacuum clean substrate.
- E. There shall be no visible moisture present on the surface at the time of application of the system.

3.3 INSTALLATION

- A. Apply primer per manufacturer's recommendations. Apply using dip and roll method with a spread rate of 250 square feet per gallon.
- B. Apply epoxy base coat. Add (1) quart of cellulose powder per mixed gallon with half epoxy. Apply using dip and roll method with a spread rate of 200 square feet per gallon.
- C. Broadcast quartz aggregate into base coat using mechanical blower and a spread rate of 2 square feet per pound. Clean up loose quartz after broadcast coat has dried and vacuum loose materials off floor and wall finish.
- D. Apply grout coat per manufacturer's recommendations. Apply using dip and roll method with a spread rate of 125 square feet per gallon.

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- E. Broadcast 2nd coat of quartz aggregate into base coat using mechanical blower and a spread rate of 2 square feet per pound. Clean up loose quartz after broadcast coat has dried and vacuum loose materials off floor and wall finish.
- F. Apply top coat per manufacturer's recommendations. With spread rate of 125 square feet per gallon.
- G. Metal Edge Strips: Install at locations indicated, in accordance with Manufacturers requirements.
- H. Shower Curbs: Install at locations indicated, in accordance with Manufacturers requirements.

3.4 CLEAN UP

- A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
- B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION

- A. Barricade area to protect wall finish until cured. New wall finish should be protected from other trades throughout the completion of the project.
- B. Maintenance and care: See manufacturer's maintenance and care instructions.

END OF SECTION 09 67 20

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall covering.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data on physical characteristics, durability, and fire-test-response characteristics.
- B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.
- C. Samples for Initial Selection: For each type of wall covering.
- D. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inch- long in size.
 - 1. Wall-Covering Sample: From same production run to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.

1.5 INFORMATIONAL SUBMITTALS

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

1.6 QUALITY ASSURANCE

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

1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.
- B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire-Growth Contribution: No flashover and heat and smoke release according to NFPA 265.

2.2 WALL COVERING

- A. Basis-of-Design Product and Manufacturer - As indicated on the Interior Finish Schedule.

2.3 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.
- B. Primer/Sealer: Mildew resistant, complying with requirements in and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
 - 2. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - 3. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.
- E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL-COVERING INSTALLATION

- A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
- D. Install wall covering without lifted or curling edges and without visible shrinkage.
- E. Match pattern 72 inches above the finish floor.
- F. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.

- G. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
- H. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 CLEANING

- A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.

END OF SECTION 09 72 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment installed and application of paint coats to all finish coated mechanical and electrical equipment in exterior locations, except as otherwise indicated.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- D. Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
 - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
 - 1. After color selection, the Architect will furnish color chips for surfaces to be coated.

- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
 - 3. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples. On at least 100 square feet of surface, as directed, provide full-coat finish samples until required sheen level, color and texture is obtained; simulate finished lighting conditions for review of in-place work.
- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 degrees F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 degrees F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products and Manufacturers: Subject to compliance with requirements, products and manufacturers specified include, but are not limited to, the following:
 - 1. The Sherwin-Williams Company.
- B. Other Products and Manufacturers: Subject to compliance with requirements, available products and manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Benjamin Moore & Company (Moore).
 - 2. PPG Industries, Inc. (PPG).

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Provide color selections made by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

3.4 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 INTERIOR PAINT SCHEDULE

- A. Concrete Masonry Units:
 - 1. Acrylic Finish, two finish coats over block filler.
 - a. Block Filler: SW Heavy Duty Block Filler (B42W46).
 - b. Second and Third Coats: SW Promar 200 Zero VOC Latex (B31 Series).
 - c. Sheen: See Interior Finish Schedule.
 - 2. Epoxy Finish: two finish coats over primer.
 - a. Primer: SW Promar 200 Zero VOC Latex Primer (B28 Series).
 - b. Second and Third Coats: Pro-Industrial water based Catalyzed Epoxy.
 - c. Sheen: See Interior Finish Schedule.
- B. Concrete Floors (Sealer): Sealed concrete.
 - 1. Acrylic, clear. Two coats over prepared substrate.
 - a. Finish Coats: Groundworks 3214, Water-Based Clear Acrylic Concrete Sealer; Glidden Professional.
- C. Gypsum Board, Wood and Wood Wall Panels:
 - 1. Acrylic, two finish coats over primer.
 - a. Primer: SW Promar 200 Zero VOC Latex Primer (B28 Series).
 - b. Second and Third Coats: SW Promar 200 Zero VOC Latex Semi-Gloss (B31 Series).
 - c. Sheen: See Interior Finish Schedule.

2. Epoxy Finish: two finish coats over primer.
 - a. Primer: SW Promar 200 Zero VOC Latex Primer (B28 Series).
 - b. Second and Third Coats: Pro-Industrial water based Catalyzed Epoxy.
 - c. Sheen: See Interior Finish Schedule.

D. Overhead Steel Structure:

1. Dryfall; two Finish Coats over Primer.
 - a. Finish Coats: 1-coat Tnemec Series 115 Uni-Bond.
 - b. Application: 2.0 - 4.0 DFT
 - c. Sheen: Semi-Gloss.

E. Ferrous Metal.

1. Epoxy Finish: two finish coats over primer.
 - a. Primer: SW Pro Industrial Pro-Cryl Primer.
 - b. Second and Third Coats: Pro-Industrial water based Catalyzed Epoxy.
 - c. Sheen: See Interior Finish Schedule.

3.7 EXTERIOR PAINT SCHEDULE

A. Masonry Concrete and Cement Plaster:

1. Paint System, Acrylic Finish; two Finish Coats over block filler.
 - a. Primer: Loxon primer or Block Surfacer for Masonry.
 - b. Second and Third Coats: Loxon XP.
 - c. Sheen: Satin.

B. Ferrous Metal, Primed and Unprimed:

1. Primer: Tnemac: Series 66 Polyamide Epoxy. 2.5 - 3.5 DFT.
2. Tnemac: Series 1095 Semi-Gloss Acrylic Polyurethane 2.5 - 3.5 DFT.

END OF SECTION 09 91 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes.

1.3 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of product.
- C. Samples for Verification: For each type of finish system and in each color and gloss of finish required.
 - 1. Submit Samples on representative samples of actual wood substrates, 8 inches square or 8 inches long.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

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 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.

- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
 - 1. Behr Paint Company; Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. PPG Paints.

2.2 SOURCE LIMITATIONS

- A. Source Limitations: Obtain each coating product from single source from single manufacturer.

2.3 MATERIALS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each coating 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.
- B. Stain Colors: Match Architect's samples.

2.4 MATERIALS, GENERAL

- A. 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 manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Stain 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 Interior Wood Substrates: 9 percent, when measured with an electronic moisture meter.

- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish 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 hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Interior Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 - 3. Sand surfaces exposed to view and dust off.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage 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 finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Wood trim, architectural woodwork.
 - 1. Polyurethane Varnish over Stain System:
 - a. (1) Stain Coat: Stain, semitransparent.
 - b. (2) Topcoat: Varnish, interior, polyurethane, oil modified.
 - 1) Gloss: Match Architect's sample.

3.6 EXTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Exterior Tongue and Groove Ceiling.
 - 1. Two Coats; Coat of Superdeck Solid Color Stain 9600 Series, Duckback Products, a division of Sherwin Williams.
 - a. Color: Match Architect's sample.

END OF SECTION 09 93 00

Division 10
Specialties

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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. Dimensional characters.
 - a. Cast-Aluminum dimensional characters.

1.3 COORDINATION

- A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, tpestyles, graphic elements, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available tpestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Dimensional Characters: Half-size Sample of each type of dimensional character.
- E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.
- F. Delegated Design Submittal: For signs indicated in "Performance Requirements" Article.

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1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Separation or delamination of sheet materials and components.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design sign structure and anchorage of dimensional character sign type(s) according to structural performance requirements.
- B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
 1. Uniform Wind Load: As indicated on Drawings.

2.2 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A.R.K. Ramos.
 - b. ASI Sign Systems, Inc.
 - c. Gemini Incorporated.
 - d. Southwell Company (The).
 2. Character Material: Cast aluminum.
 3. Character Height: As indicated on Drawings.
 4. Thickness: As indicated on Drawings.
 5. Finishes:
 - a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's standard range.
 6. Mounting: Concealed studs.
 7. Typeface: As indicated on Drawings.

2.3 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

3. Comply with AWS for recommended practices in welding. Provide welds behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.6 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Color: As selected by Architect from Manufacturer's standard range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that electrical service is correctly sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF DIMENSIONAL CHARACTERS

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 19

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior signage.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Room-Identification Signs: Full-size Sample.
 - 2. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
 - 3. Exposed Accessories: Full-size Sample of each accessory type.
 - 4. Full-size Samples, if approved, will be returned to Contractor for use in Project.
- E. Sign Schedule: Use same designations indicated on Drawings.

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- F. Maintenance Data: For signs to include in maintenance manuals.
- G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. APCO Graphics, Inc.
 - 2. ASI Sign Systems, Inc.

3. InPro Corporation.

2.3 SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. Solid-Sheet Sign: Acrylic sheet with integral sheet color, and as follows:
 - a. Thickness: Manufacturer's standard for size of sign.
 - b. Surface-Applied, Raised Graphics: Applied polymer characters and Braille.
 - c. Size and Shape: As indicated.
 - d. Font type and Size: As indicated.
 - e. Color: As indicated.
 - f. Braille Style: As indicated.
- B. Modular Signs: Sign system with removable inserts for graphics and copy attached to a receiver frame system using clips, splines, or comparable method. Provide system with modular increments of height and width, permitting assembly of units with multiple inserts of varying size.
 1. Sign Size: As indicated.
 2. Provide tamper-resistant feature requiring special tool to change inserts.
 3. Backer Panel: Shaped, decorative backing panel mounted behind modular signage system as selected from manufacturer's full range.
 4. Inserts:
 - a. Module Height: As indicated.
 - b. Type: Rigid plastic for applied graphics.
 - c. Size and Shape: As indicated.
 - d. Font type and Size: As indicated.
 - e. Color: As indicated.

2.4 MATERIALS

- A. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

2.5 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- B. Adhesive: As recommended by sign manufacturer.

2.6 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
- B. Graphics: Digitally printed graphics applied direct to acrylic sheet.

2.7 FINISHES, GENERAL

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions and as follows.
 - 1. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 14 23

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. Corner guards.
 - 2. Wall Protection at Mop Sinks.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
 - 2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.
- B. Shop Drawings: For each type of wall and door protection showing locations and extent.
- C. Samples for Initial Selection: For each type of unit indicated, in each color and texture specified.
- D. Samples for Verification: For each type of exposed finish on the following products, prepared on
 - 1. Corner Guards: 12 inches long. Include example top caps.
 - 2. Trim: 12 inches long.
- E. Material Certificates: For each type of exposed plastic material.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall protection product to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

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. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch-long units.
 - 2. Mounting, trim and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store wall protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 - 2. Keep plastic materials out of direct sunlight.
 - 3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall protection units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.

2.3 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
1. Subject to compliance with requirements, provide Basis-of-Design Product and Manufacturer indicated on the Finish Schedule, or a comparable product by one of the following:
 - a. Construction Specialties, Inc.
 - b. Korogard Wall Protection Systems; a division of RJF International Corporation.
 - c. Pawling Corporation.
 2. Cover: Extruded rigid plastic, minimum .080-inch wall thickness; in dimensions and profiles indicated on Drawings.
 - a. Profile: Nominal 3-inch-long leg and 1/4-inch corner radius.
 - b. Height: 6 feet above wall base.
 - c. Color and Texture: Refer to Finish Schedule.
 3. Continuous Retainer: Minimum 0.060-inch-thick, one-piece, extruded aluminum.
 4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
 5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
 6. Locations as indicated.

2.4 MOP SINK WALL PROTECTION

- A. Stainless Steel - Type 304, backsplash with hemmed edges installed on walls above mop sink.
1. Thickness: As indicated.
 2. Height: As indicated.
 3. Finish: Direction No. 4.
- B. Fasteners Type 316 Stainless Steel countersinking wood screws with matching domed finishing washers.
- C. Seal all edges with clear Sanitary Sealant See Section 07 92 00 "Joint Sealants."

2.5 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- C. Adhesive: As recommended by protection product manufacturer.

2.6 FABRICATION

- A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.7 FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.
- B. Examine walls to which wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
 - 3. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

END OF SECTION 10 26 00

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PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes toilet accessory items as scheduled and specified. Refer to the Toilet Accessory Schedule on the Drawings for product numbers.

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. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Samples: Full size, for each exposed product and for each finish specified.
 - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify accessories using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY

- A. Toilet Accessory Warranty: Provide manufacturers one (1) year warranty from the Date of Substantial Completion, against defects in material and workmanship.
- B. Mirror Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within 15 years from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Manufacturer; Bobrick Washroom Equipment, Inc., Subject to compliance with requirements, provide product indicated on the Toilet Accessory Schedule, or comparable product by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bradley Corporation.
 - 3. A&J Washroom Accessories.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. 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.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Stainless Steel Mirror Surfaces: Not less than 0.04-inch (20-gage) AISI Type 302/304 stainless steel sheet, stretcher-leveled with No. 8 polished mirror finish. Bond to 1/4-inch minimum hardboard backing.

2.3 FABRICATION

- A. No names or labels are permitted on exposed faces of toilet and bath accessory units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating Manufacturer's name and product model number.

- B. 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.
- C. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- D. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- E. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theftproof installation, as follows:
 - 1. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. 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 GENERAL INSTALLATION PROVISIONS

- A. Inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.2 INSTALLATION

- A. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to Manufacturer's instructions for type of substrate involved.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.
- C. Provide all items and accessories as required for a complete and total installation in every respect, whether or not specified or indicate don the Drawings.

3.3 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 10 28 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Emergency Key Cabinets.

1.3 SUBMITTALS

- A. Product Data: For each type of product. Include material descriptions, dimensions and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed finish.
- D. Statement of Compliance: The installer shall certify that the specified products or assemblies have been installed in accordance with manufacturer's requirements, and are approved by the Owner and Authority Having Jurisdiction.

1.4 QUALITY ASSURANCE

- A. Contractor Qualifications: Employ experienced Contractors (Installers) skilled in the successful installation of the specified or similar products for a minimum of five years. Installers shall be state-certified or licensed Sub-Contractors, or locally registered Sub-Contractors.
- B. Manufacturer(s) Qualifications: Employ only manufacturers making the specified materials as a current catalog and regular production item.
- C. Verify that product submittals have been successfully submitted, reviewed and returned.

1.5 WARRANTY

- A. Provide Manufacturer's standard Warranty.
 - 1. Warranty Requirements: One (1) year warranty, from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, PRODUCTS, EQUIPMENT, MANUFACTURED UNITS

A. Basis of Design Product and Manufacturer; KNOX, Model KnoxBox 3200.

1. System Description:

- a. Dimensions: Approximately 7" wide X 7" high X 3" deep.
- b. Wall Thickness: Manufacturers standard.
- c. Construction: Cold-Formed Hollow Structural Steel sections conforming to ASTM A 500 grade A.
- d. Finish: Manufacturers standard.
 - 1) Color: Gloss Black.
- e. Mounting: Recessed.
- f. Rating: UL listed as a Fire Control Accessory.
- g. Hardware: Each emergency key cabinet shall be supplied with four (4) tamper proof (security) bolts, nuts and washers that allow installation of the cabinet into the wall. A bolt pattern template shall also be supplied with the cabinet.

B. System Mounting:

- 1. Emergency key cabinet (lock box) shall be installed by the Contractor.
- 2. Location: As Indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Any corrections in emergency key cabinet installation shall be the responsibility of the emergency key cabinet installer.

END OF SECTION 10 41 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets.
 - 2. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.3 PREINSTALLATION CONFERENCE

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire-protection cabinets and fire extinguishers, including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.
 - 1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing semi-recessed method and relationships of box and trim to surrounding construction.
 - 2. Show location of knockouts for hose valves.
- C. Shop Drawings: For fire-protection cabinets.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Initial Selection: For each type of exposed finish required.
- E. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

- F. Product Schedule: For fire-protection cabinets. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.5 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.7 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "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. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.3 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.4 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Babcock-Davis.
 - b. Guardian Fire Equipment, Inc.
 - c. Larsens Manufacturing Company.
 - d. Nystrom.
- B. Cabinet Construction: Nonrated and rated to match adjacent wall rating.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Stainless steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
 - 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Stainless steel sheet.
- F. Door Material: Stainless steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting door pull and friction latch.
 - 2. Provide concealed hinge, permitting door to open 180 degrees.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.

3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Silk-screened.
 - 3) Lettering Color: As selected by Architect.
 - 4) Orientation: Vertical.

K. Materials:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.
 - a. Finish: ASTM A480/A480M No. 4 directional satin finish,
2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.5 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.
 2. Miter corners and grind smooth.
 3. Provide factory-drilled mounting holes.
 4. Prepare doors and frames to receive locks.
 5. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 2. Fabricate door frames of one-piece construction with edges flanged.
 3. Miter and weld perimeter door frames and grind smooth.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Babcock-Davis.
 - b. Guardian Fire Equipment, Inc.
 - c. Larsens Manufacturing Company.
 - d. Nystrom.
 - 2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 - 3. Valves: Manufacturer's standard.
 - 4. Handles and Levers: Manufacturer's standard.
 - 5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
- C. Purple-K Dry-Chemical Type in Aluminum Container: UL-rated 30-B:C, 5-lb nominal capacity, with potassium bicarbonate-based dry chemical in enameled-aluminum container.

2.8 MOUNTING BRACKETS

- A. 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 red baked-enamel finish.
 - 1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
- B. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide semi-recessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

- C. Identification:

1. Apply decals at locations indicated.
2. Apply decals on field-painted fire-protection cabinets after painting is complete.

- D. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: Top of fire extinguisher to be at 42 inches above finished floor.

- E. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

- D. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The Work required under this Section consists of turn-out gear lockers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments.
- D. Samples: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and powder coating applicator.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver wire mesh storage lockers with cardboard protectors on perimeters of panels and doors and with posts wrapped crated to provide protection during transit and Project-site storage. Use vented plastic.

1.7 WARRANTY

- A. Special Warranty: Submit manufacturer's written 10-year limited warranty to repair or replace components that fail in materials or craftsmanship during the warranty period. Failures include the following.
 - 1. Fracturing or breaking components including panels, shelves, or hardware resulting from normal wear and tear and use other than vandalism.
 - 2. Collapse or failure of metal grid locker components not resulting from overloading or vandalism.
 - 3. Delamination or other failures of bonding or assembly.
 - 4. Warping not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
 - 5. Faulty operation of hardware.
- B. This Warranty does not extend to mechanical or electrical component parts made by others such as fans, lights, digital locks and similar items. Component parts of this nature are covered under their independent manufactures' warranties. This Warranty does not extend to items that are consumable in nature such as bulbs, batteries and similar items.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; Ready Rack Wall Mounted Red Rack, Model RRWM-24, or a comparable product buy on of the following:
 - 1. GearGrid Corporation.
 - 2. Pride Enterprises.
 - 3. Wenger Corporation
- B. Configuration: Single Tier, Wall Mounted Lockers.
- C. Size: 24-inches wide compartments.

2.2 MATERIALS

- A. Sides and back: Steel Grid Infill, 2 inch square pattern, welded to steel tube frame.
- B. Apparel Hooks: One double and two single hooks, bolted to locker shelf and sides.
- C. Locker Materials
 - 1. Steel Tube: ASTM A501, hot-formed steel tubing.
 - 2. Steel Wire: ASTM C510, cold drawn steel wire.

3. Provide fire retardant treated type.
4. Anchors and Fasteners:
 - a. Factory Provided: Material, type, and size recommended by manufacturer for secure anchorage to substrate.
 - b. Field Installed: Manufacturer-recommended fasteners furnished by Contractor as required for locker substrate and project requirements.

D. Locker Fabrication:

1. Fabricate components square, and rigid. Make exposed metal safe to touch and free of sharp ends or burrs.
2. Form frames, panels, doors, and accessories from one-piece, or one rigid assembly, unless specifically shown on Shop Drawings.
3. Factory preassemble metal components by welding all joints, and connections; with no bolts, nuts, screws, or rivets used in assembly, except as required for knock down shipping and attachment to mounting surfaces.

E. Metal Locker Accessories:

1. Identification Plates, Name and Brackets: 20-gauge steel, powder-coated paint. 12 inches wide by 2.125 inches high.
2. Apparel Hooks: (3) per locker opening. .192" diameter ASTM 510 cold drawn steel wire resistance welded, cold formed and powder coated. Apparel hooks must securely engage and snap onto side or back grid, to prevent unintentional disengagement of hook.

2.3 FINISH

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine area to receive lockers. Notify architect if area are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers in accordance with manufacturer's instructions.
- B. Use manufacturer's hardware for assembly.
- C. Anchor to mounting surface with proper hardware.

END OF SECTION 10 51 00

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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:
 - 1. Defibrillators.
 - 2. Defibrillator cabinets.
 - 3. Defibrillator accessories.

1.3 SUBMITTALS

- A. Product data for cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
- B. Samples for initial selection purposes in the form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of cabinet finish indicated or exposed to view.
- C. Shop Drawings:
 - 1. Small-scale plans showing locations of defibrillator cabinets.
 - 2. Schedules showing each type of cabinet to ensure proper fit and function.
 - 3. Indicate installation procedures and accessories required for a complete installation.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain defibrillators and cabinets from one source from a single Manufacturer.
- B. Coordination: Verify that cabinets are sized to accommodate type and capacity of defibrillators indicated and provided by Owner under separate Contract.
- C. Contractor's Qualifications: Firm that is skilled in the successful installation of the specified materials and assemblies in previous, similar projects and with not less than 5 years' experience.
- D. Manufacturer's Qualifications: Firm with not less than 5 years' experience making the specified units as current, production item.

1.5 REFERENCES

- A. Provide cabinets and accessories produced by a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and protect defibrillator cabinets and related materials using means and methods that will prevent damage, deterioration, or loss.
 - 1. Deliver components in manufacturer's original packaging, properly labeled for identification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cabinet with Steel Trim and Door: J.L. Industries, Inc., recessed AED cabinet
 - 1. Subject to compliance with requirements, other acceptable Manufacturers offering products which may be incorporated into the work are but not limited to the following:
 - a. J.L. Industries, Inc.
 - b. Philip
 - c. Samaritan AED Package.
 - 2. Suppliers:
 - a. AED Superstore/Allied 100 – Sara Olson (sarao@aeds.com)
 - b. Master Medical Equipment – Baruth Rivera (brivera@mmemed.com)
 - c. AED Brands – Brooke Bauman (bbauman@aedbrands.com)
 - d. Cardio Partners – Mia Pitcock (Mia.Pitcock@CardioPartners.com)
 - 3. Cabinet Style: Recessed.
 - 4. Door and Trim Construction: Cold-rolled steel; flush doors with 5/8-inch door stop attached by continuous hinge and equipped with zinc-plated with roller catch.
 - a. Finish: Factory-applied powder coat paint finish.
 - 1) Standard Color: White.
 - b. Door Style:
 - 1) Style: Full Acrylic Glazing; Pull & AED Graphics
 - 5. Fire-Rating: As Indicated.
 - 6. Alarms: Standard: Audible cabinet-mounted alarm standard (battery operated) to protect against theft or tampering. Alarm deactivated when door is closed.

- a. Alarms Contacts: Roller Reed Ball Contact for existing alarm systems.
- 7. Cabinet Lettering: Manufacturers Standard as required to comply with code.
- B. Accessories:
 - 1. Pair of Electrode Pads & Batteries
 - 2. Soft Carry Case
 - 3. User Manual
 - 4. Quick Reference Instruction Card
 - 5. AED Medical Prescription
 - 6. AED 3D Wall Sign
 - 7. AED Inspection Tag
 - 8. AED Wall Cabinet with alarm and strobe
 - 9. AED/ CPR Responder Kit
 - 10. AED Decal Sticker

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for thickness and framing for cabinets to verify cabinet depth and mounting prior to cabinet installation.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Follow manufacturer's printed instructions for installation.
 - 1. Work shall be in strict accordance with applicable requirements of the following:
 - a. Florida Building Code, Current Edition.
 - b. NFPA 10, Standard for Portable Fire Defibrillators.
 - c. NFPA 101, Life Safety Code.
- B. Prepare recesses in walls for defibrillator cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
- C. Securely fasten cabinets to structure, square and plumb, to comply with manufacturer's instructions.
- D. Maintain fire ratings where cabinets are recessed into fire-rated wall systems.
- E. Cabinet Lettering:
 - 1. Location: Face of glass surface.

3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as defibrillator cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by cabinet manufacturer.
- E. Replace cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 55 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior Roll-up Shutters.

1.3 CODE COMPLIANCE

- A. Exterior roll-up shutters systems shall meet the requirements of the Florida Building Code.
 - 1. Provide product evaluations and installation requirements indicating compliance with Code requirements.

1.4 ACTION SUBMITTALS

- A. Product Approval: Submit current Product Approval documentation in accordance with the Florida Building Code.
- B. Product Data: For each type and size of roll-up shutter and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Include rated capacities, operating characteristics, and accessories.
- C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
- D. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for all components and factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

SANIBEL FIRE AND RESCUE STATION 172
100% Construction Documents

1. Shutter Fabric.
2. Guides.
3. Hood.
4. Bottom Bar.
5. Include similar Samples of accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Special warranty.
- B. Maintenance Data: For roll-up shutters to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roll-up shutters that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: One years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain Roll-up Shutters from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Capable of withstanding the following design wind loads:
 1. Design Wind Load: As indicated on Drawings.
 2. Testing: According to ASTM E330/E330M.
- B. Windborne-Debris Impact Resistance: Comply with protection testing requirements in ASTM E 1996 for Wind Zone indicated, when tested according to ASTM E 1886.
 1. Large-Missile Test: For overhead coiling doors located within 30 ft. of grade.
 2. Small-Missile Test: For overhead coiling doors located between 30 ft. and 60 ft. above grade.

2.3 SHUTTER ASSEMBLY

- A. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; Custom Hurricane Products Super Max Screen.
 - 1. Florida Product Approval Number: FL-16380-R2.
- B. Shutter Material: 28 mil, Hurricane Impact Fabric.
 - 1. Provide with double Layer 0.156 Polyester Webbing at side edges, with added 0.030 x 1.5 polyester web on one face only.
 - 2. Provide Tri-fold Sewn Hem at bottom, with 0625" aluminum rod.
- C. Side Rail: Aluminum Extruded tubes, 6063, 1/8" thick.
- D. Bottom Weight Bar: 1" x 3" x .125" Slotted rectangular tube to accept bottom of fabric and aluminum rod.
- E. Motorized shutter operator: Manufacturer's standard motorized operator, with closure end caps.
- F. Shutter Housing: 0.040" thick aluminum.
- G. Fasteners: Provide fasteners indicated in the Florida Product Approval, and as engineered and recommended by the manufacturer, for attachment of all components.
- H. Aluminum Finishes: Fluoropolymer.

2.4 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled shutter and operating mechanism at opening head.
 - 1. Aluminum: 0.040-inch-thick aluminum sheet complying with ASTM B209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify electrical requirements are installed.

3.2 INSTALLATION

- A. Install roll-up shutter and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install roll-up shutters, hoods, and operators at the mounting locations indicated for each shutter.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that shutters operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roll-up shutters.

END OF SECTION 10 71 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Aluminum flagpoles.

1.3 SUBMITTALS

- A. Product Data: For each type of flagpole required. Include installation instructions.
- B. Shop Drawings: Show general layout, jointing, grounding method, and anchoring and supporting systems.
 - 1. Include details of foundation system for ground-set poles.
- C. Structural Calculations: For flagpoles indicated to comply with design loadings, include structural analysis data signed and sealed by the professional engineer responsible for their preparation, registered in the state of Florida.
- D. Finish Samples for Verification: For each finished metal used for flagpoles and accessories.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each flagpole as a complete unit from a single manufacturer, including fittings, accessories, bases, and anchorage devices.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy kraft paper or other weather tight wrapping and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 PERFORMANCE

- A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to the building code in effect for this Project or NAAMM FP 1001, "Guide Specifications for Design Loads of Metal Flagpoles," whichever is more stringent.
1. Base flagpole design on maximum standard-size flag suitable for use with pole.
 2. Wind Speed: Refer to the Structural Drawings.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include:
1. Baartol Co., Inc.
 2. Eder Flag Manufacturing Co., Inc.
 3. Concord Industries

2.3 FLAGPOLES

- A. Aluminum Flagpoles: Fabricate from seamless, extruded tubing complying with ASTM B 241, alloy 6063, with a minimum wall thickness of 3/16 inch. Heat treat after fabrication to comply with ASTM B 597, temper T6. Provide cone-tapered flagpoles fabricated from seamless extruded tubing. Provide steel bottom and support plate, steel ground spike, steel centering wedges. Galvanize steel after assembly. Construct flagpole in one piece.
1. Flagpole Interior Finish: Treat the interior to prevent corrosion.
 2. Exposed Height: 30 Feet.
- B. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635-inch minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
- C. Flashing Collar: Match Flagpole.

2.4 FITTINGS

- A. Finial Ball: Manufacturer's standard flush-seam ball, sized to match pole-butt diameter.
1. 0.063-inch cast aluminum, with clear anodic finish. Manufacturer's standard flush-seam ball, match flagpole butt diameter. Spun aluminum with gold anodic finish.
 2. Exposed chrome plated Bronze Halyard swivel snap hooks, with braided polypropylene halyard, cleat with lockable cover box, external stationary truck assembly.

- B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
 - 1. Halyard Flag Snaps: Stainless-steel swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.
 - 2. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

- A. Concrete: Provide concrete composed of portland cement, coarse and fine aggregate, and water mixed in proportions to attain a 28-day compressive strength of not less than 3000 psi, complying with ASTM C 94.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- C. Sand: ASTM C 33, fine aggregate.
- D. Flags: Owner furnished.

2.6 FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- B. Manufacturer's Standard treatment for interior to prevent corrosion.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare in-ground flagpoles by painting below-grade portions with a heavy coat of bituminous paint.
- B. Excavation: For foundation, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms, foundation tube, fiberglass sleeve, or anchor bolts in position, braced to prevent displacement during concreting.
- D. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moisture cure exposed concrete for not less than 7 days or use a nonstaining curing compound.
- E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.

3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.
- B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric sealant and cover with flashing collar.

END OF SECTION 10 75 00

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. This Section includes the following:
 - 1. Aluminum framed screen enclosures.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and metal finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Framing Drawings: Show complete fabrication of framing.
 - 2. Delegated design submittal including calculations.
- C. Samples: Submit material samples showing full range of colors available for each type of product, including:
 - 1. Aluminum framing.
 - 2. Screen and spline material.
 - 3. Fasteners.
 - 4. Door Hardware.
- D. Warranties: Submit samples of special warranties indicated.

1.4 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to installation including, but not limited to, the following:
 - 1. Inspect and discuss condition of existing work and other preparatory work performed by other trades.
 - 2. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store components and manufactured items so as not to be damaged or deformed.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

- A. Standard Warranty: Provide a written warranty, executed by manufacturer agreeing to repair or replace the screen enclosure if any portion of the system should fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: Five Years to begin at Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Employ professional Engineer, registered in the state of the project, and acceptable to Owner and Structural Engineer, to perform design. Sign and seal design Shop Drawings and design calculations submitted to Architect for review. Prepare and seal drawings and calculations for submittal to authorities having jurisdiction. Comply with design intent, criteria, and requirements of the Contract Documents.

- B. Design enclosure to withstand the following loads according to governing codes, within limits and under conditions indicated:

- 1. Wind Loads: As indicated on drawings

- C. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installation to prevent buckling, opening of joints, overstressing of components and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

- 1. Temperature Change (Range): 120 deg F ambient 180 deg F material surfaces.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, alloy 6063-T5.

- B. Aluminum Sheet: ASTM B 209, alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

- C. Screen Mesh: 18/14 fiberglass mesh.

1. Color: As selected by Architect from Manufacturers full range.

D. Screen Spline:

1. Shape: Flat.
2. Color: Black.

E. Frames:

1. 2" x 6" x .055" minimum or as required to meet performance requirements.

F. Fasteners: Type 316 stainless steel.

2.3 DOOR HARDWARE

A. Closer on swing door with hold open device.

B. ADA compliant hardware.

C. Door latch shall be lockable from interior.

D. Type of Door: Single swing.

E. Door Size: As indicated.

2.4 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly and disassembly.

1. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location.

2.5 FINISH

A. Baked-Enamel Finish: Manufacturer's standard electrostatic applied, exterior grade, baked enamel paint finish. Apply finish complying with paint manufacturer's specifications for cleaning and painting.

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the screen enclosure system.

1. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with Manufacturer's requirements.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

END OF SECTION 10 82 15

Division 11

Equipment

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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 requirements for equipment as indicated on the Equipment Schedule, and the following:
 - 1. Concealed wall mounted counter brackets.

1.3 SUBMITTALS

- A. Product Data: Include material descriptions, dimensions, profiles, fastening and mounting methods, and finishes for equipment specified.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of equipment or unit and for units exposed to view in same areas, unless otherwise approved by Architect.

1.5 COORDINATION

- A. Coordinate equipment locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing.

1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Warranty: Written warranty, executed by the individual equipment manufacturer agreeing to replace defective units.
 - 1. Minimum Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS EQUIPMENT

- A. Basis of Design Product and Manufacturer; As indicated on the Equipment Schedule.
- B. Concealed wall mounted counter brackets.
 - 1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer; A&M CFLAT 24 concealed flat brackets, or a comparable product approved by the Architect..

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment units according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by the manufacturer. Install equipment units level, plumb, and firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING

- A. Adjust equipment units for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 11 94 13

Division 12

Furnishings

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Manually operated roller shades.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
- C. Samples for Initial Selection: For each type and color of shadeband material.
 - 1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type of roller shade.
 - 1. Shadeband Material: Not less than 10 inches square. Mark interior face of material if applicable.
 - 2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long for each type of roller shade indicated.
 - 3. Installation Accessories: Full-size unit, not less than 10 inches long.
- E. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED SHADES

- A. Basis of Design Product and Manufacturer; as indicated on the Finish Schedule, or subject to compliance with requirements a comparable product by one of the following:
1. Draper, Inc.
 2. Hunter Douglas, Inc.
 3. Lutron Electronics Co., Inc.
 4. MechoShade, Systems, Inc;
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
1. Bead Chains: Stainless steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Chain tensioner, jamb mounted.
 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
 2. Shadeband-to-Roller Attachment: Manufacturer's standard method.
 3. Provide Double Rollers at locations indicating (2) shades are required.
 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 4 inches.
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Shadebands:
 - 1. Shadeband Material: Light-filtering fabric and Light-blocking fabric (locations as indicated).
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.

2.2 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Basis of Design Product and Manufacturer; as indicated on the Finish Schedule, or subject to compliance with requirements a comparable product by one of the following:
 - 1. Draper, Inc.
 - 2. Hunter Douglas, Inc.
 - 3. Lutron Electronics Co., Inc.
 - 4. MechoShade, Systems, Inc;
- C. Openness Factor: As indicated.
- D. Color: As indicated.

2.3 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1.
- B. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 - 2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

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 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12 24 13

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. Concrete countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops.

PART 2 - PRODUCTS

2.1 CONCRETE COUNTERTOP MATERIALS

- A. Glass Fiber Reinforced concrete, conforming to ACI 117, ACI 301, ACI 318. Finish for exposed surfaces shall be as specified by the Architect. Formwork coatings shall be of commercial formulation that will not bond with, stain or adversely affect concrete surfaces or impair subsequent treatment of surfaces. Edge profiles, backsplashes and accessory penetrations shall be coordinate with related equipment and finish schedule.
 - 1. Subject to compliance with requirements, provide Basis of Design Product and Manufacturer indicated on the Finish Schedule.
 - a. Colors and Patterns: Match Architect's sample.
 - b. Texture: Match Architect's sample.
- B. Composition: Portland Cement, select fine aggregate (sand), water, acrylic polymer, glass-fibers, de-foaming agents, pozzalanic material, super water reducers, pigments and mix additives.
 - 1. Compressive Strength: 10,910 PSI.
 - 2. Flexural Strength (without reinforcement): 1,800 PSI.
 - 3. Yield & Weight: 0.42 cu ft of mix = 5 sq ft at 1" thick. Total weight of 10 lbs /sq ft at 1" thick
 - 4. Water Cement Ratio: 0.3.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- B. Configuration: As Indicated.
- C. Countertop thickness: As Indicated.
- D. Backsplash thickness: Manufacturers standard.
- E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- F. Joints: Fabricate countertops in sections for joining in field.
 - 1. Joint Locations: Not within 18 inches of a sink and not where a countertop section less than 36 inches long would result, unless unavoidable.
 - 2. Joint Type: Bonded, 1/32 inch or less in width.
 - 3. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- G. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
 - c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by Manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."
- C. Sealer:
 - 1. Countertops shall be sealed with 3 coats of a Manufacturer's industrial-grade UV-stable products.

2. Sealers shall be 100% reactive and VOC compliant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- 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 07 92 00 "Joint Sealants."

END OF SECTION 12 36 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Quartz agglomerate countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.
 - 1. Basis of Design Product and Manufacturer; As Indicated on the Finish Schedule, or comparable product by one of the following:
 - a. Cambria.
 - b. E. I. du Pont de Nemours and Company.
 - c. Wilsonart LLC.
 - 2. Colors and Patterns: As selected by Architect from Manufacturers full range.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- B. Configuration: As Indicated.
- C. Countertops: Thickness, as indicated.

- D. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- E. Joints: Fabricate countertops in sections for joining in field.
 - 1. Joint Locations: Not within 18 inches of a sink and not where a countertop section less than 36 inches long would result, unless unavoidable.
 - 2. Joint Type: Bonded, 1/32 inch or less in width.
 - 3. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- F. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
 - c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Pre-drill holes for screws as recommended by manufacturer.
- 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 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Bicycle Racks.
 - 2. Bicycle Air Pump.

1.3 SUBMITTALS

- A. Product data, storage and handling requirements and recommendations, installation methods and available colors, styles, patterns and textures.
- B. Shop drawings, including plans and elevations, indicating overall dimensions.

1.4 WARRANTY

- A. Manufacturer's standard warranty: Manufacturer agrees to repair or replace components of bicycle rack and equipment that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BICYCLE RACKS

- A. Subject to compliance with requirements provide Basis of Design Product and Manufacturer; SiteScapes, Model "A-Frame," AF-02-SM, or a comparable product by one of the following:
 - 1. Belson Outdoors.
 - 2. U-line.
 - 3. Sportworks.
- B. Mounting: Surface Mount.
- C. Finish: Stainless Steel.

2.2 BICYCLE AIR PUMP

- A. Subject to compliance with requirements provide Basis of Design Product and Manufacturer; Madrax, Model "Phil-Up," or a comparable product by one of the following:
 - 1. Belson Outdoors.
 - 2. U-line.
 - 3. Sportworks.
- B. Mounting: Surface Mount.
- C. Finish: Electro Polished Stainless Steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 ADJUSTING AND CLEANING

- A. Finish Damage: Repair minor damages to finish in accordance with manufacturer's instructions.
- B. Component Damage: Remove and replace damaged components that cannot be successfully repaired as determined by Architect.
- C. Clean racks and equipment promptly after installation in accordance with manufacturer's instructions.

3.3 PROTECTION

- A. Protect installed racks and equipment to ensure that, except for normal weathering, racks will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 12 93 13

Division 14
Conveying Systems

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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. Full cab vertical platform wheelchair lift installed within a shaftway.

1.3 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
- 2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.

- B. Shop Drawings: For each lift.

- 1. Include plans, elevations, sections, attachment details, and required clearances.
- 2. Indicate dimensions, weights, loads, and points of load to building structure.
- 3. Include details of equipment assemblies, method of field assembly, components, and location and size of each field connection.
- 4. Include diagrams for power, signal, and control wiring.

- C. Samples for Initial Selection: For surfaces and components with factory-applied color finishes.

- 1. Include Samples of integrally colored materials and accessories involving color selection.

- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:

- 1. Include Samples of integrally colored materials and accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

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

- B. Product Certificates: For each type of lift.

1. Include statement that runway, ramp or pit, dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.

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

D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.

1. Parts list with sources indicated.
2. Recommended parts inventory list.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

A. Warranty: Manufacturer shall warrant the wheelchair lift materials and factory workmanship for two years following completion of installation.

B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and factory workmanship for the following additional extended period beyond the initial one year warranty. Preventive Maintenance Agreement required.

1. Five additional years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

2.2 INTERIOR VERTICAL PLATFORM LIFT

- A. Vertical Platform Lift, General: Pre-engineered lift system.
 - 1. Basis of Design Product and Manufacturer; Garaventa Lifts, Model Evoloron CPL, or subject to compliance with requirements, provide products by the following:
 - a. Ascension, Division of AGM Container Controls, Inc.
 - b. Liftavator, Inc.
 - c. Lift-U.

2.3 FULL CAB VERTICAL WHEELCHAIR LIFT

- A. Capacity: 1400 lbs.
- B. Floor to Floor Lifting Height: As indicated.
- C. Nominal Car Dimensions: As indicated.
- D. Car Configuration: As indicated.
- E. Landing Openings: All Landings: Fire Doors interlocked with Lift controls.
- F. Door Construction: Fire Rated Doors: 1-1/2 hour B label rating. Pre-hung, constructed of 16 gauge steel, with a vision panel, delayed action door closer, pull handle and integrated interlock. Doors mount flush to the inside wall of the shaftway.
- G. Power Door Operator: Automatically opens the door/gate when platform arrives at a landing. Will also open at landing by pressing call button.
 - 1. ADA Compliant and obstruction sensitive.
 - 2. Provide power operators at the following locations:
 - a. Lowest Landing: Door.
 - b. Second Landing: Door.
- H. Shaftway Pit at Lower Landing:
 - 1. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturer requirements for the car size specified.
- I. Hydraulic Drive:
 - 1. Drive Type: 1:2 Cable hydraulic.
 - 2. Emergency Operation: Manual device to lower platform.
 - 3. Safety Devices:
 - a. Slack chain safety device.
 - b. Shoring device.
 - 4. Travel Speed: 30 fpm (.15 m/second).
 - 5. Power Supply: As per Garaventa Lift shop drawings
- J. Car Controls: 24 VDC control circuit with the following features.

1. Direction Control: Illuminated constant pressure buttons.
 2. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm equipped with battery backup.
 3. Keyless operation.
 4. Keyed operation.
 5. Emergency Telephone: Platform shall be equipped with ADA compliant integrated telephone with a stainless steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 16.
 6. Digital Floor Display.
- K. Call Station Controls: 24 VDC control circuit with the following features.
1. Direction Control: Illuminated constant pressure buttons.
 2. Keyless operation.
 3. Keyed operation.
 4. Call Station Mounting:
 - a. Lowest:
 - 1) Wall mounted recessed.
 - b. Second Floor:
 - 1) Wall mounted recessed.
- L. Safety Devices and Features:
1. Grounded electrical system with upper, lower, and final limit switches.
 2. At all landings a solenoid activated interlock shall electrically monitor that the door is in the closed position and the lock is engaged before lift can move from landing.
 3. Pit stop switch.
 4. Electrical disconnect shall shut off all power to the lift.
- M. Finishes
1. Car Walls: As selected by Architect from Manufacturers full range.
 2. Car Operating Panel:
 - a. Brushed Stainless Steel
 3. Car Handrail:
 - a. Brushed Stainless Steel
 4. Hall Call Stations:
 - a. Brushed Stainless Steel

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify shaft and machine space are of correct size and within tolerances.
- C. Verify required landings and openings are of correct size and within tolerances.
- D. Verify electrical rough-in is at correct location.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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.

3.3 INSTALLATION

- A. Install lifts in accordance with applicable regulatory requirements including ASME A 17.1, ASME A 18.1 and the manufacturer's instructions.
- B. Install lifts in accordance with applicable regulatory requirements including CSA B355, and manufacturer's instructions.
- C. Install system components and connect to building utilities.
- D. Accommodate equipment in space indicated.
- E. Startup equipment in accordance with manufacturer's instructions.
- F. Adjust for smooth operation.

3.4 FIELD QUALITY CONTROL

- A. Perform tests in compliance with ASME A 17.1 or A18.1 and as required by authorities having jurisdiction.
- B. Perform tests in compliance with CSA B355 and required by authorities having jurisdiction.
- C. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.5 PROTECTION

- A. Protect installed products until completion of project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 14 42 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Full cab vertical platform wheelchair lift installed within a shaftway.

1.3 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
- 2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.

- B. Shop Drawings: For each lift.

- 1. Include plans, elevations, sections, attachment details, and required clearances.
- 2. Indicate dimensions, weights, loads, and points of load to building structure.
- 3. Include details of equipment assemblies, method of field assembly, components, and location and size of each field connection.
- 4. Include diagrams for power, signal, and control wiring.

- C. Samples for Initial Selection: For surfaces and components with factory-applied color finishes.

- 1. Include Samples of integrally colored materials and accessories involving color selection.

- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:

- 1. Include Samples of integrally colored materials and accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

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

- B. Product Certificates: For each type of lift.

1. Include statement that runway, ramp or pit, dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.

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

D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.

1. Parts list with sources indicated.
2. Recommended parts inventory list.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

A. Warranty: Manufacturer shall warrant the wheelchair lift materials and factory workmanship for two years following completion of installation.

B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and factory workmanship for the following additional extended period beyond the initial one year warranty. Preventive Maintenance Agreement required.

1. Five additional years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

2.2 INTERIOR VERTICAL PLATFORM LIFT

- A. Vertical Platform Lift, General: Pre-engineered lift system.
 - 1. Basis of Design Product and Manufacturer; Garaventa Lifts, Model Gensis Enclosure Vertical platform, or subject to compliance with requirements, provide products by the following:
 - a. Ascension, Division of AGM Container Controls, Inc.
 - b. Liftavator, Inc.
 - c. Lift-U.

2.3 ENCLOSED VERTICAL WHEELCHAIR LIFT

- A. Capacity: 750 lbs. rated capacity.
- B. Mast Height: As indicated.
- C. Nominal Clear Platform Dimensions: As indicated.
- D. Platform Configuration: As indicated.
- E. Landing Openings: As indicated.
- F. Doors and Gates: Doors and gates shall be self-closing type.
 - 1. Door Height: Flush mount, 80 inches.
 - 2. Gate Height: Flush mount, 42-1/8 inches.
 - 3. Door Construction: Aluminum frame with:
 - a. Panels of 1/4 inch laminated safety glass with 16 gauge galvanized steel kick plate.
 - b. D-Handle Pull: 12 inch offset D-Handle.
 - 4. Power Door/Gate Operator: Automatically opens the door/gate when platform arrives at a landing. Will also open at landing by pressing call button.
 - a. ADA Compliant and obstruction sensitive.
 - b. Low voltage, 24 VDC with all wiring concealed.
 - c. Location:
 - 1) Lower Landing: Door.
 - 2) Upper landing: Door or Gate.
- G. Lift Components:
 - 1. Machine Tower: Extruded aluminum.
 - 2. Base Frame: Structural steel.
 - 3. Platform Side Wall Panels: 42-1/8 inches high. 16 gauge galvanized steel sheet. Custom aluminum extrusion tubing frame.
 - 4. Enclosure Panels:
 - a. 1/4 inch laminated safety glass.

- H. Enclosure Height Above Upper landing:
 - 1. Enclosure shall extend 83-3/4 inches above the upper landing level.
- I. Infill Panel Kit: Provide 16 gauge galvanized panels and mounting hardware to cover void between side of enclosure, drive mast and adjacent wall at the following locations:
 - 1. Lower landing.
 - 2. Upper landing.
- J. Base Mounting and Access to Lift at Lower Landing:
 - 1. Floor Mount: Base of lift shall be mounted on the floor surface of the lower landing. For access onto the platform provide a ramp of 16 gauge galvanized steel sheet with a slip resistant surface.
- K. Options:
 - 1. Outdoor Protection: Lift shall include modifications recommended by manufacturer for reliable performance in outdoor climate of project site.
- L. Leadscrew Drive:
 - 1. Drive Type: Self-lubricating acme screw drive.
 - 2. Emergency Operation: Manual handwheel device to raise or lower platform.
 - 3. Battery Powered Emergency Lowering: Battery powered platform lowering device that automatically activates in the event of power failure. Allows passenger to drive platform downward to lower landing. Does not operate lift in up direction.
 - 4. Safety Devices:
 - a. Integral safety nut assembly with safety switch.
 - 5. Travel Speed: 10 fpm.
 - 6. Motor: 2.0 hp (560 W).
 - 7. Power Supply:
 - a. 120 VAC single phase; 60 Hz on a dedicated 20-amp circuit.
- M. Hydraulic Drive:
 - 1. Drive Type: Chain hydraulic.
 - 2. Emergency Operation: Manual device to lower platform and use auxiliary battery power to raise or lower platform.
 - 3. Safety Devices:
 - a. Slack chain safety device.
 - b. Shoring device.
 - 4. Travel Speed: 17 fpm.
 - 5. Motor: 3.0 hp (2.2 kW); 24 volts DC.
 - 6. Power Supply:
 - a. 120 VAC single phase; 60 Hz on a dedicated 15-amp circuit.
 - b. Powered by building continuous mains converted to 24 VDC and equipped with auxiliary battery backup power system capable of running lift up and down for a

minimum of 5 trips with rated load. Required for high use lifts and lifts equipped with a fan and ventilation system.

- c. Powered by continuously charged battery system.

N. Platform Controls: 24 VDC control circuit with the following features.

1. Direction Control: Continuous pressure rocker switch.
2. Direction Control: Illuminated tactile and continuous pressure push buttons with dual platform courtesy lights and safety light.
3. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm equipped with battery backup.
4. Keyless operation.
5. Keyed operation.
6. Emergency Telephone: Platform shall be equipped with ADA compliant autodialer telephone with a stainless-steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 16.
7. Arrival Gong and Digital Floor Display.

O. Call Station Controls: 24 VDC control circuit with the following features.

1. Direction Control: Constant pressure rocker switch.
2. Direction Control: Illuminated tactile and constant pressure push buttons with illuminated "In Use" indicator.
3. Keyless operation.
4. Keyed operation.
5. Call Station Mounting:
 - a. Lower:
 - 1) Wall mounted surface.
 - b. Upper:
 - 1) Wall mounted surface.

P. Safety Devices and Features:

1. Grounded electrical system with upper, lower, and final limit switches.
2. Tamper resistant interlock to electrically monitor that the door is in the closed position and the lock is engaged before lift can move from landing.
3. Pit stop switch mounted on mast wall.
4. Electrical disconnect shall shut off power to the lift.

Q. Finishes

1. Extruded aluminum electrostatically applied baked powder finish semi matte Silver Moon.
2. Ferrous Components: Electrostatically applied baked powder finish.
 - a. Color: Semi matte Silver Moon.
3. Lift Finish: Baked powder coat finish, color as selected by the Architect from manufacturers optional RAL color chart.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify shaft and machine space are of correct size and within tolerances.
- C. Verify required landings and openings are of correct size and within tolerances.
- D. Verify electrical rough-in is at correct location.
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END OF SECTION 14 42 10

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