

Project Specifications Volume 1 – Divisions 1 - 12

Williams Architects' Project No. 2021-022

LAKEWOOD FOREST PRESERVE NET ZERO MAINTENANCE FACILITY



For:

Lake County Forest Preserve District

27139 Forest Preserve Road
Mundelein, IL 60060

Issued for Bid:

April 6, 2023



Lake County
Forest Preserves



Architecture | Planning | Aquatics | Interiors
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**SECTION 00 01 01
PROJECT TITLE PAGE**

PROJECT MANUAL

FOR

LAKEWOOD NET ZERO MAINTENANCE FACILITY

ARCHITECT'S PROJECT NUMBER: 2020-008.

**LAKE COUNTY FOREST PRESERVE DISTRICT
27139 FOREST PRESERVE ROAD
WAUCONDA, ILLINOIS 60084**

DATE: 04-04-2023

PREPARED BY:

**WILLIAMS ARCHITECTS
500 PARK BOULEVARD
SUITE 800
ITASCA, IL 60413**

END OF SECTION

**SECTION 00 01 03
PROJECT DIRECTORY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Identification of project team members and their contact information.

1.02 OWNER:

- A. Name: Lake County Forest Preserve District
1. Address Line 1: 1899 West Winchester Road.
 2. City: Libertyville.
 3. State: IL.
 4. Zip Code: 60048.
 5. Telephone: (847) 367-6640.
- B. Primary Contact: All correspondence from the Construction Manager to the Architect will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
1. Title: Superintendent of Construction and Building Trades.
 2. Name: Mr. Pat Bovill.
 3. Email: pbovill@lcfpd.org.

1.03 CONSULTANTS:

- A. Architect: Design Professional of Record. All correspondence from the Construction Manager regarding construction documents authored by Architect's consultants will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
1. Company Name: Williams Architects.
 - a. Address Line 1: 500 Park Boulevard.
 - b. Address Line 2: Suite 800.
 - c. City: Itasca.
 - d. State: IL.
 - e. Zip Code: 60143.
 - f. Telephone: (630) 221-1212.
 2. Primary Contact:
 - a. Title: Senior Project Manager.
 - b. Name: Mr. Marc Rohde, AIA, LEED AP.
 - c. Email: MCRohde@williams-architects.com.
- B. Civil Engineering Consultant:
1. Company Name: Gewalt, Hamilton Associates, Inc.
 - a. Address Line 1: 625 Forest Edge Drive.
 - b. City: Vernon Hills.
 - c. State: IL.
 - d. Zip Code: 60061.
 - e. Telephone: (847) 478-9700.
 2. Primary Contact:
 - a. Title: Vice President.
 - b. Name: Mr. Don Matthews.
 - c. Email: dmatthews@gha-engineers.com.
- C. Structural Engineering Consultant:
1. Company Name: IMEG.
 - a. Address Line 1: 263 Shuman Boulevard.
 - b. City: Naperville.
 - c. State: IL.
 - d. Zip Code: 60563.
 - e. Telephone: (630) 753-8541.

2. Primary Contact:
 - a. Title: Associate Principal / Client Executive.
 - b. Name: Mr. Karl Pennings.
 - c. Email: Karl.R.Pennings@imegcorp.com.
- D. Mechanical, Plumbing and Fire Protection Consultant:
 1. Company Name: IMEG.
 - a. Address Line 1: 263 Shuman Boulevard.
 - b. City: Naperville.
 - c. State: IL.
 - d. Zip Code: 60563.
 - e. Telephone: (630) 753-8541.
 2. Primary Contact:
 - a. Title: Senior Engineer.
 - b. Name: Mr. Dave Hickman.
 - c. Email: David.A.Hickman@imegcorp.com.
- E. Electrical Engineering Consultant:
 1. Company Name: IMEG.
 - a. Address Line 1: 63 Shuman Boulevard2.
 - b. City: Naperville.
 - c. State: IL.
 - d. Zip Code: IL.
 - e. Telephone: (630) 753-8541.
 2. Primary Contact:
 - a. Title: Associate / Electrical Project Designer.
 - b. Name: Mr. Paul Siliunas.
 - c. Email: Paulius.A.Saliunas@imegcorp.com.
- F. Audiovisual Systems Consultant:
 1. Company Name: Sentinel Technologies, Inc.
 - a. Address Line 1: 2550 Warrenville Road.
 - b. City: Downers Grove.
 - c. State: IL.
 - d. Zip Code: 60515.
 - e. Telephone: (630) 769-4300.
 2. Primary Contact:
 - a. Title: Design Consultant.
 - b. Name: Mr. Jim Michalek.
 - c. Email: jmmichalek@sentinel.com.

1.04 CONSTRUCTION MANAGER:

- A. Company Name: Gilbane Building Company.
 1. Address Line 1: 123 North Upper Wacker Drive.
 2. Address Line 2: 26th Floor.
 3. City: Chicago.
 4. State: IL.
 5. Zip Code: 60606.
 6. Telephone: (773) 951-7482.
- B. Primary Contact:
 1. Title: Project Executive.
 2. Name: Mr. Walter Hadeler.
 3. Email: WHadeler@gilbanebuildingco.com.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 00 31 00
AVAILABLE PROJECT INFORMATION**

PART 1 GENERAL

1.01 EXISTING CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
- B. Site and Utility Survey: Entitled "Topographical Survey of Lakewood Forest Preserve", dated 4-8-2020.
 - 1. Original copy is available for inspection at Owner's offices during normal business hours.
 - 2. This survey identifies grade elevations prepared primarily for the use of Architect in establishing new grades and identifying natural water shed.
- C. Geotechnical Report: Entitled "Geotechnical Investigation Lakewood Forest Preserve New Grounds Maintenance Facility", dated December 7, 2022.
 - 1. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
 - 2. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
 - 3. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

3.01 OBTAINMENT OF PERMITS

- A. Owner will obtain the following permits, at no cost to the Construction Manager:
 - 1. Building Permit for all trades.

END OF SECTION



Office: 847-870-0544
Fax: 847-870-0661
us@soilandmaterialconsultants.com
www.soilandmaterialconsultants.com

December 7, 2022
File No. 26934

Mr. Patrick Bovill
Lake County Forest Preserves
19808 W. Grand Avenue
Lake Villa, IL 60046

Re: Geotechnical Investigation
Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, Illinois

Dear Mr. Bovill:

We are submitting our report for the subsurface investigation completed for the above referenced project in Lake County, Illinois.

The investigation was requested to determine current subsurface soil and water conditions at select boring locations. The findings of the field investigation and the results of laboratory testing are intended to assist in the planning, design and construction of proposed site improvements.

PROPOSED IMPROVEMENTS

We understand it is proposed to construct a new grounds maintenance facility building supported on shallow depth foundations. The interior is expected to have at-grade slabs supported on prepared subgrade soils. Improvements exterior to the building are expected to include storage bins, pavement areas, sidewalks and related underground improvements.

SCOPE OF THE INVESTIGATION

The field investigation included obtaining 11 borings at the locations requested and as indicated on the enclosed location sketch. The boring locations were established in the field by the client. Surface elevations were estimated to the nearest 0.5 ft. using data presented on the topographic survey.

We auger drilled the 6 building borings to depths of 20.0 feet below existing surface elevations. Soil samples were obtained using a split barrel sampler advanced utilizing an automatic SPT hammer. The 5 pavement and storage bin area borings were drilled and sampled in a similar manner to depths of 10.0 feet. Soil profiles were determined in the field and soil samples returned to our laboratory for additional testing including determination of moisture content. Cohesive soils obtained by split barrel sampling were tested further to determine dry unit weight and unconfined compressive strength.

The results of all field determinations and laboratory testing are included in summary with this report.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORINGS • SITE INVESTIGATIONS • PAVEMENT INVESTIGATIONS • GEOTECHNICAL ENGINEERING
TESTING OF • SOIL • ASPHALT • CONCRETE • MORTAR • STEEL

RESULTS OF THE INVESTIGATION

Enclosed are boring logs indicating the soil conditions encountered at each location. Site surface conditions include vegetation, topsoil and fill soil conditions. The topsoil is classified as dark brown to black silt/clay mixtures with traces of roots usually present.

Fill soil conditions were encountered at each of the borings with the exception of boring B-11. Composition of the fill includes the presence of topsoil, clay/silt, silt/clay/sand, silt/clay, and silt/sand/gravel/clay mixtures extending to depths of 2.0 inches to 3.5 feet at these borings with the exception of boring B-8 where the fill extended to the bottom of the boring. The limits of fill placement were not determined within the scope of this investigation. Larger debris may also be present within the fill but was not encountered during the investigation.

Underlying natural soil conditions include the presence of cohesive soils. These are classified as very tough to very hard clay/silt mixtures with lesser portions of sand and gravel.

Non-cohesive soils were also encountered as indicated at borings B-1, B-2 and B-6. These include medium dense silt/clay/gravel and sand mixtures. The non-cohesive granular soils are often in a saturated condition. Cobbles and boulders were encountered within the site soils as noted on the boring logs, additional cobbles and boulders are expected to be present within the site soils at any elevation.

A significant depth of fill soils were encountered extending to the bottom of boring B-8. These conditions may be present in other areas of the site but were not discovered within the scope of this investigation.

The following table summarizes depth ranges below existing grade, the magnitude of soil strength within these ranges and other information:

<u>Boring</u>	<u>Surface Elevation (feet)</u>	<u>Depth Range Below Existing Surface (feet)</u>	<u>Soil Strength (lbs./sq.ft.)</u>	<u>Recorded Water Levels, W.D./A.D. (feet)</u>
1	848.0	1.0 to 4.0 4.0 to 6.0 6.0 to 12.0 12.0 to 17.0	*500 4,000 8,000 5,000	dry/dry
2	848.0	0.5 to 3.0 3.0 to 13.0 13.0 to 17.0	*2,000 8,000 4,000	dry/dry
3	847.5	0.5 to 4.0 4.0 to 12.0 12.0 to 17.0	3,000 8,000 6,000	dry/dry
4	847.5	1.0 to 4.0 4.0 to 8.0 8.0 to 17.0	3,000 8,000 5,000	dry/dry
5	848.0	1.0 to 3.5 3.5 to 7.0 7.0 to 17.0	*2,000 4,000 8,000	dry/dry
6	848.0	1.5 to 4.0 4.0 to 13.0 13.0 to 17.0	3,000 8,000 4,000	16.5/dry
7	847.5	0.5 to 7.0	8,000	dry/dry
8	848.0	0.5 to 7.0	*2,000	dry/dry
9	848.0	1.0 to 4.0 4.0 to 7.0	4,000 8,000	dry/dry
10	847.5	2.0 to 7.0	8,000	dry/dry
11	845.0	1.5 to 4.0 4.0 to 7.0	6,000 8,000	dry/dry

* Not recommended for support of foundations. Deeper foundation depths or foundations supported on coarse crushed stone fill may be needed to reduce the magnitude of long-term total and differential settlement.

It is expected that foundations can be supported on undisturbed natural soils located at any elevation within the depth ranges indicated in the above table, except as noted at borings B-1, B-2, B-5 and B-8. Above these depth ranges the soils are not considered able to support foundations, even at reduced design bearing values, due to long-term settlement considerations.

SUBSURFACE WATER

The boring logs and the above table indicate the depth at which subsurface water was encountered in the bore holes at the time of the drilling operations and during the period of these readings. It is expected that fluctuations from the water levels recorded will occur over a period of time due to variations in rainfall, temperature, subsurface soil conditions, soil permeability and other factors not evident at the time of the water level measurements.

BUILDING PAD

The site topography and soil conditions encountered indicate a building pad should be constructed prior to foundation excavation. This site preparation is necessary to establish adequate support of floor slabs and possibly foundations depending on proposed foundation elevations. The procedure should include the removal of unsuitable surface conditions including vegetation, topsoil, fill soils, soft or unstable soils, and other deleterious conditions. Variations in the depth of removal can be expected due to filled and naturally changing soil conditions. The soil removal should extend beyond the outside edge of the exterior foundation wall footings to a distance at least equal to the depth of fill that will be present beneath the footings. The exposed subgrade soil should then be proof-rolled in the presence of the Soil Engineer. Proof-rolling is expected to reveal some areas of unstable soil, especially in areas of existing fill, requiring additional removal.

Structural fill should be placed on the prepared subgrade and in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed the minimum compaction requirement prior to placement of the next lift. We recommend a minimum of 95% compaction based on the modified proctor test, ASTM D-1557. If high soil moisture content prevents achieving minimum compaction requirements then it will be necessary to disc and aerate the soil. Compaction requirements also apply to backfill placement around foundations and within trench excavations located below subgrade supported improvements.

FOUNDATIONS

Based on the results of this investigation it is our opinion that continuous and isolated footing foundations may be considered for support of building loads. These foundations can be supported on structural fill and/or undisturbed natural soils located below all topsoil, debris, unsuitable fill soils, low strength soils and other unsuitable conditions which may be encountered. Soil strength values and the depths at which they are expected to be encountered at these boring locations are indicated in the above table. A net allowable bearing value of 3,000 lbs./sq.ft. is available for design. This value can be used to size foundations for support of structure dead and live loads. Increased bearing values may be available at some locations

and elevations. The feasibility of using a higher value is best determined after our review of proposed foundation details and elevations.

All exterior building foundations should extend at least 42.0 inches below exposed surface elevations to provide adequate protection against uplift due to freezing of the supporting soils. Foundations for unprotected improvements should extend at least 48.0 inches below exposed surface elevations. We recommend providing adequate reinforcing steel in foundation walls and piers to minimize the effects of long-term differential settlement.

Weak soil conditions may be discovered locally at design foundation elevations and may require extending the foundation to a deeper elevation. Alternately, removal of the weak soil followed by replacement with properly compacted coarse crushed granular fill (CA01) may be feasible. When removal is approved by the Soil Engineer, the removal of the weak soil should also extend beyond the face of footings and/or piers to a distance at least equal to the depth of fill that will be present beneath the footings and/or piers. A capping layer of finer crushed granular fill (CA06) can be utilized to establish a working surface.

FLOOR SLABS

Floor slabs planned for support on the existing soil conditions are expected to undergo some degree of long-term settlement as the soils consolidate under loading and as they shrink due to desiccation. Slabs may be considered for support on suitable natural soils or on properly placed and compacted fill soils. This is feasible when the soils supporting the slabs are prepared in accordance with the Building Pad recommendations above. These include the removal of topsoil as well as removal or aeration of underlying high moisture content soils.

DEWATERING

Excavations may require dewatering due to subsurface water seepage and/or surface precipitation. This water can likely be removed to depths of several feet by standard sump and pump operations. Soils exposed at foundation, slab or undercut elevations should not be permitted to become saturated. Loss of bearing strength and stability may occur, requiring additional soil excavation.

Fill soils, organic soils, non-cohesive soils and others can be unstable when saturated. These soils tend to cave or run when submerged or disturbed. The stability of exposed embankments is minimal to non-existent as confining soil pressures are removed. Proper drainage within excavations is necessary at all times, particularly when excavations extend below anticipated water levels and below saturated soils.

The contractor should be made responsible for designing and constructing stable temporary excavations. Also, the contractor should shore, slope, bench or restrain the sides of the excavations as required to maintain stability of both the excavation sides and bottom. In no case, should the slope, slope heights, or excavation depth exceed those in the local, state, and federal safety regulations.

SUBGRADE SOIL PREPARATION

Subgrade soil preparation should be accomplished where needed within the building area prior to excavation for foundations. The procedure in all areas of subgrade supported improvements should include the removal of unsuitable surface conditions including vegetation, topsoil, unsuitable fill soils, significant debris, weak or unstable soils, and other deleterious conditions which may be encountered. Above grade areas should be cut to design subgrade elevations. Exposed subgrade soils should be leveled, compacted and proof-rolled in the presence of the Soil Engineer.

Proof-rolling may reveal areas of unstable soil conditions. Discing and aeration of high moisture content soils can be effective to depths of up to 1.0 foot, depending upon the equipment utilized. Removal of unstable soils may be necessary if high moisture content conditions extend to depths greater than the effective depth of discing. If the depth of undercut appears to be significant, it may be economical to limit the depth of undercut to that needed to establish adequate support of slabs and remediate weak soil conditions at foundation elevations at the time of foundation construction.

Soft or unstable soil conditions in pavement areas can often be bridged by use of an effective depth of crushed granular material. The placement of the crushed granular bridging material, possibly in conjunction with the use of an appropriate geotextile fabric, should only proceed after review of the proof-roll conditions by the Soil Engineer. Long-term settlement of pavement surfaces may occur locally as the bridged soils desiccate.

Structural fill can be placed on soils prepared to the satisfaction of the Soil Engineer. The fill should be placed in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed minimum compaction requirements prior to placement of the next lift. We recommend a minimum of 95% compaction based on the modified Proctor test, ASTM D-1557, be achieved within building areas. A minimum of 90% compaction should be achieved beneath exterior improvements such as pavements and sidewalks. Compaction requirements also apply to backfill placement around foundations and within trench excavations located below subgrade supported improvements.

FILL SOURCES

The onsite non-organic soils are generally suitable for reuse as fill. Offsite sources may also be used provided they are approved in advance by the Soil Engineer. Aeration may be necessary to reduce soil moisture content prior to compaction. Soil borrowed from near the surface where seasonal fluctuations in soil moisture content occur may require particular attention. The moisture content of fill soils should be within approximately 3.0% of optimum moisture content as determined by the modified Proctor test for the soils to meet or exceed minimum compaction requirements.

CONCLUSION

The information within this report is intended to provide initial information concerning subsurface soil and water conditions on the site. Variations in subsurface conditions are expected to be

present between boring locations due to naturally changing soil conditions. Variations are also expected within areas of disturbed (filled) soil conditions.

Our understanding of the proposed improvements is based on limited information available to us at the writing of this report. The findings of the investigation and the recommendations presented are not considered applicable to significant changes in the scope of the improvements or applicable to alternate site uses. We recommend that proposed foundation, pavement and grading plans be reviewed by our office to determine if additional considerations are necessary to address anticipated subsurface conditions. Obtaining additional soil borings may be warranted to further define the depth and limits of restrictive subsurface conditions.

The soils exposed in soil undercut areas should be evaluated for suitability prior to placement of structural fill, as previously indicated in this report. Soils and aggregates placed as structural fill should be tested as the work progresses to verify that minimum compaction requirements have been met. We recommend that soil conditions encountered at foundation elevations be tested to verify the presence of design soil strength prior to concrete placement.

If you have any questions concerning the findings or recommendations presented in this report, please let me know.

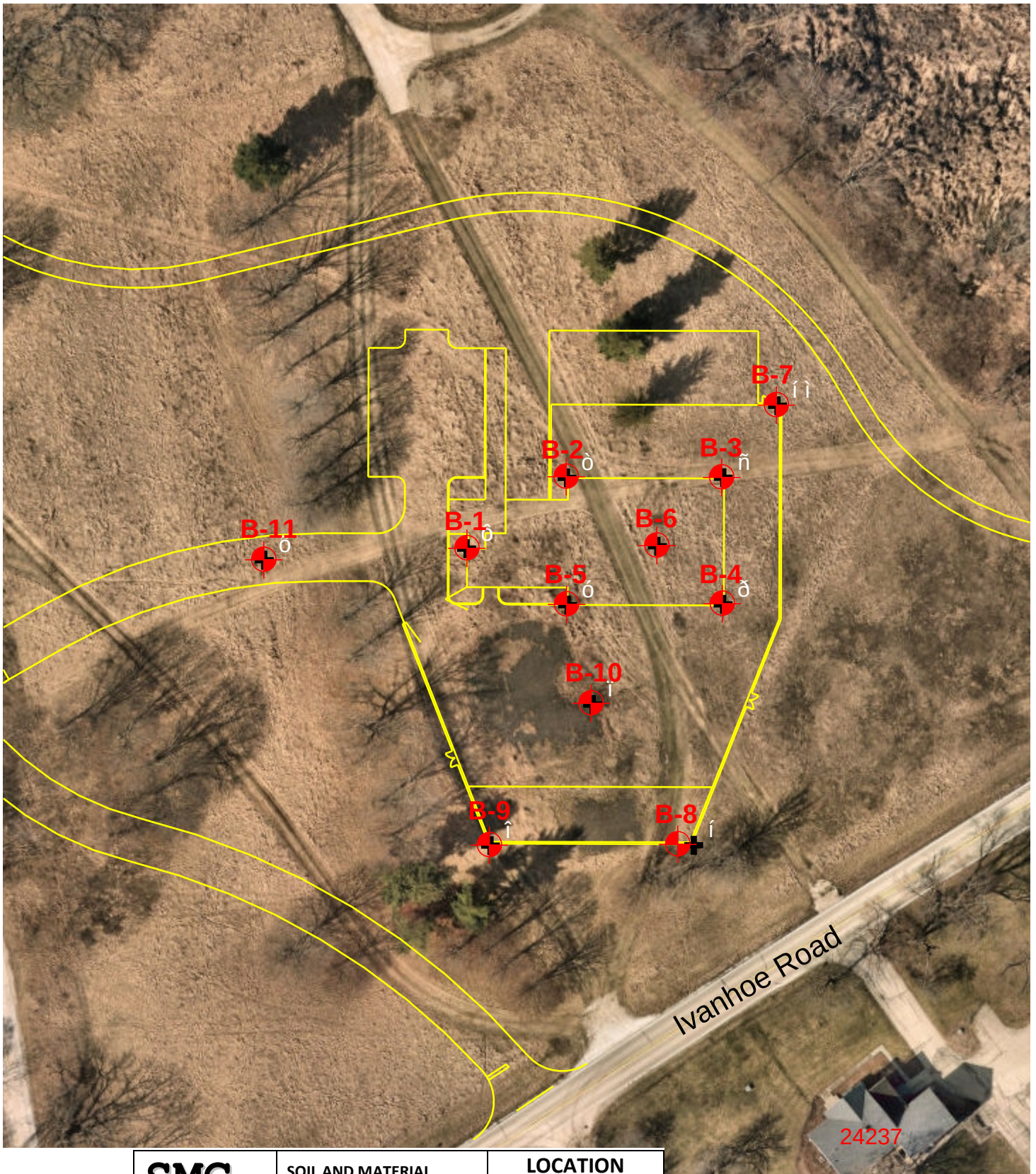
Very truly yours,

SOIL AND MATERIAL CONSULTANTS, INC.

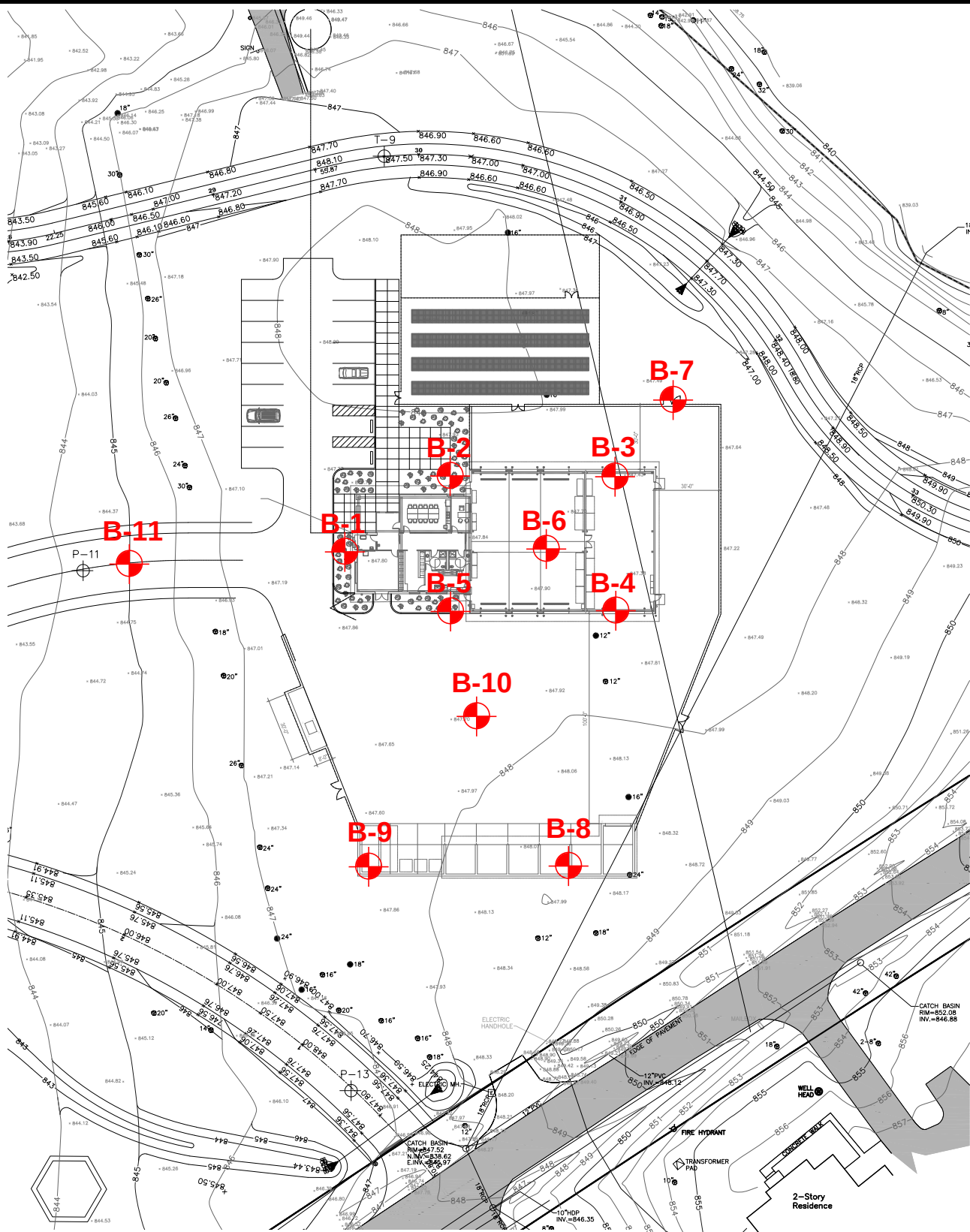
A handwritten signature in blue ink, appearing to read "Thomas P. Johnson", is written over a horizontal line.

Thomas P. Johnson, P.E.
President

TPJ:ek
Enc.



SMC		SOIL AND MATERIAL CONSULTANTS, INC.		LOCATION SKETCH	
Client:		LAKE COUNTY FOREST PRESERVES			
Project:		NEW GROUNDS MAINTENANCE FACILITY			
Location:		WAUCONDA, ILLINOIS			
File No.	26934	Date:	12-5-22	Scale:	1" ≈ 100'



SMC		SOIL AND MATERIAL CONSULTANTS, INC.		LOCATION SKETCH	
Client:		LAKE COUNTY FOREST PRESERVES			
Project:		NEW GROUNDS MAINTENANCE FACILITY			
Location:		WAUCONDA, ILLINOIS			
File No. 26934		Date: 12-5-22		Scale: 1" ≈ 100'	

SOIL BORING LOG 1

Logged By: CS

Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration	moisture content	dry unit weight lbs./cu.ft.	unconfined compressive strength	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					× standard penetration "N", blows/ft. △ moisture content, % 10 20 30 40			
	Elevation 848.0' Existing Surface	×	△	×	○				
	(a) see below								
	Brown clay, some silt, trace sand & gravel damp, soft - Fill	3	26.1						
	(b) see below								
5	Brown silt, some clay & gravel, trace sand damp, medium dense	22	19.6			×		△	
			22.0					△	
	Brown clay, some silt, trace sand & gravel damp, hard to very hard	16	14.2					×	
10									
		25	14.4	122.1	6.5			△	6.5
	Brown clay, some silt, trace sand & gravel damp, hard	24	14.4	126.3	8.8			×	8.8
15									
		24	14.6	120.0	6.9			△	6.9
		13	15.5	118.2	6.6	×		△	6.6
20									
	Brown clay, some silt, trace sand & gravel damp, very tough	6	18.7	117.1	2.5	×		△	2.5
	End of Boring								
25	(a) Dark brown silt, some clay, trace sand & roots, damp (topsoil) - Fill 6.0"								
	(b) Dark brown silt, some clay & sand, very damp - Fill								
30									
35									
40									

Water encountered at feet during drilling operations (W.D.)
 Water recorded at dry feet on completion of drilling operations (A.D.)
 Water recorded at feet hours after completion of drilling operations (A.D.)

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 2

Logged By: CS

Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration	moisture content	dry unit weight lbs./cu.ft.	unconfined compressive strength	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					× standard penetration "N", blows/ft. △ moisture content, % 10 20 30 40			
	Elevation 848.0' Existing Surface	×	△	×	○				
	Dark brown silt, some clay, trace sand & gravel, damp, loose - Fill								
		7	21.0						
			21.1			×			
5	Brown clay, some silt, trace sand & gravel damp, hard (large rock at 4.5')	25	15.3	119.1	5.2		△	×	○
		20	15.0	117.6	6.3		△	×	○
10		21	16.2	115.3	5.2		△	×	○
		23	14.6	120.5	7.6		△	×	○
15		16	15.3	116.3	4.9		△	×	○
	Brown fine sand, very damp		11.8				△		
20	Brown clay, some silt, trace sand & gravel damp, hard	18	16.2	119.8	4.3		△	×	○
	End of Boring								
25									
30									
35									
40									

Water encountered at feet during drilling operations (W.D.)
 Water recorded at dry feet on completion of drilling operations (A.D.)
 Water recorded at dry feet hours after completion of drilling operations (A.D.)



SOIL BORING LOG 3

Page: 1 of 1

Date Drilled: 12/6/22

Comments:

[illegible]

Water encountered at	dry	feet during drilling operations (W.D.)
Water recorded at	dry	feet on completion of drilling operations (A.D.)
Water recorded at		feet hours after completion of drilling operations (A.D.)



SOIL BORING LOG 4

Page: 1 of 1

Date Drilled: 12/5/22

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration	moisture content	dry unit w lbs./cu.ft.	unconfined compress	1.0 2.0 3.0 4.0				
	CLASSIFICATION					× standard penetration "N", blows/ft. Δ moisture content, %				
							10	20	30	40
	Elevation 847.5' Existing Surface	×	Δ	⋈	○					
	(a) see below		25.1							
5	Brown clay,some silt,trace sand & gravel damp,very tough to very hard	13	25.4	96.1	2.6	×	Δ	●		
		21	19.0	120.5	7.9		Δ×		1.9	
		19	14.6	121.6	8.8		Δ×		8.8	
10	Brown clay,some silt,trace sand & gravel damp,hard (large rock at 9.5')	50+	12.8	127.1	6.9	Δ			6.9	
		9	16.7	117.2	3.1	×	Δ	●	○	
15	Brown clay,some silt,trace sand & gravel damp,very tough to hard	7	17.0	120.2	2.8	×	Δ	●	○	
20	End of Boring	18	16.3	117.5	5.8		Δ×		5.8	
25	(a) Dark brown silt & clay,trace sand & roots,damp - Fill - 6.0"									
30										
35										
40										

Water encountered at	dry	feet during drilling operations (W.D.)
Water recorded at	dry	feet on completion of drilling operations (A.D.)
Water recorded at		feet hours after completion of drilling operations (A.D.)

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration	moisture content	dry unit weight lbs./cu.ft.	unconfined compressive strength	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					× standard penetration "N", blows/ft. △ moisture content, % 10 20 30 40			
	Elevation 848.0' Existing Surface	×	△	×	○				
	(a) see below								
	Brown clay, some silt, trace sand & gravel damp, very tough - Fill		23.2						
	(b) see below	5	19.5	108.3	2.0	×			
			23.3						
5	Brown clay, some silt, trace sand & gravel damp, very tough to very hard	8	19.1	108.8	2.5	×			
	(large rock at 6.5')								
		34	15.4	111.7	6.4				6.4 ○
10		19	14.1	123.4	6.7				6.1 ○
		22	14.2	122.8	7.5				1.5 ○
15		23	13.6	126.7	10.0+				10.0+ ○
20	Brown clay, some silt, trace sand & gravel damp, hard	22	14.1	122.1	5.8				5.8 ○
	End of Boring								
	(a) Black silt, some clay, trace sand & roots, damp (topsoil) - Fill - 6.0"								
25	(b) Dark brown silt, some clay & sand, very damp, loose - Fill								
30									
35									
40									

Water encountered at feet during drilling operations (W.D.)
 Water recorded at dry feet on completion of drilling operations (A.D.)
 Water recorded at dry feet hours after completion of drilling operations (A.D.)

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 6

Logged By: CS

Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration	moisture content	dry unit weight lbs./cu.ft.	unconfined compressive strength	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					× standard penetration "N", blows/ft. △ moisture content, % 10 20 30 40			
	Elevation 848.0' Existing Surface	×	△	×	○				
	(a) see below								
	Brown clay, some silt, trace sand & gravel damp, very tough to very hard	8	27.5	94.2	2.7	×		●	
5		23	13.4				△	×	4.5 × ●
		21	14.4	120.1	8.6		△	×	8.5 ○
10	(large rock at 9.5')	50+	13.4	124.5	8.2		△		8.5 ✓ ○
		28	17.1	116.1	9.6		△	×	9.5 ○
	(large rock at 14.0')								
15	Brown clay, some silt, trace sand & gravel damp, hard	23	14.0	110.8	5.1		△	×	5.1 ○
	Brown fine sand, saturated		14.0				△		
	Brown clay, some silt, trace sand & gravel damp, very tough						×	△	●
20	End of Boring	14	19.2	124.2	3.7		×	△	●
	(a) Dark brown-black silt, some clay, trace sand, gravel & roots, damp (topsoil) - Fill - 15.0"								
25									
30									
35									
40									

Water encountered at 16.5 feet during drilling operations (W.D.)
 Water recorded at dry feet on completion of drilling operations (A.D.)
 Water recorded at hours after completion of drilling operations (A.D.)

SOIL BORING LOG 7

Logged By: CS Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934 Date Drilled: 12/6/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration X	moisture content Δ	dry unit weight lbs./cu. ft. γ	unconfined compressive strength O	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					X standard penetration "N", blows/ft. Δ moisture content, % 10 20 30 40			
	Elevation 847.5' Existing Surface								
	(a) see below								
1	Brown clay, some silt, trace sand & gravel, damp, hard to very hard								
2									
3		11	14.1	117.8	5.3	X			
4									
5	(large rock between 8.5'-9.0')	15	14.5	121.8	7.2	X			
6									
7									
8		21	14.4	125.1	8.5	X			
9									
10		31	13.7						X

End of Boring

(a) Dark brown silt, some clay, trace sand, gravel & roots, damp - Fill 3.0"

Water encountered at
Water recorded at
Water recorded at

dry
dry

feet during drilling operations (W.D.)
feet on completion of drilling operations (A.D.)
feet hours after completion of drilling operations (A.D.)

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 8

Logged By: CS

Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration X	moisture content Δ	dry unit weight lbs./cu. ft. γ	unconfined compressive strength O	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					X standard penetration "N", blows/ft. Δ moisture content, % 10 20 30 40			
	Elevation 848.0' Existing Surface								
1	Brown-dark brown silt, some sand, gravel & clay, trace glass, damp, loose - Fill	7	10.4						
2									
3									
4	Brown clay, some silt, trace sand & gravel, damp, very tough - Fill	8	15.8	110.7	2.9	X	Δ	○	●
5									
6									
7		7	14.2	119.4	2.6	X	Δ	○	●
8									
9									
10	Brown-dark brown clay, some silt, trace sand, gravel & crushed concrete, damp, very tough - Fill	11	17.7						
11						X	Δ	●	

End of Boring

Water encountered at dry feet during drilling operations (W.D.)
 Water recorded at dry feet on completion of drilling operations (A.D.)
 Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL BORING LOG ⁹

Logged By: CS

Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration X	moisture content Δ	dry unit weight lbs./cu.ft. γ	unconfined compressive strength O	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0			
	CLASSIFICATION					X standard penetration "N", blows/ft. Δ moisture content, %			
	Elevation 848.0' Existing Surface					10	20	30	40
	Dark brown clay & silt, trace sand & gravel, damp - Fill		17.2				Δ		
1	Brown clay, some silt, trace sand & gravel, damp, very tough to hard								
2									
3		10	24.3	98.5	3.2	X	Δ	●	
4									
5		15	18.9	111.6	4.0	X Δ		●	
6									
7									
8		14	16.1	117.0	5.9	X Δ		●	5.9
9									
10	End of Boring	21	15.2	116.3	4.6	Δ X		●	4.6

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL BORING LOG 10

Logged By: CS

Page: 1 of 1

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration X	moisture content Δ	dry unit weight lbs./cu. ft. γ	unconfined compressive strength O	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0				X standard penetration "N", blows/ft. Δ moisture content, % 10 20 30 40			
	CLASSIFICATION												
	Elevation 847.5' Existing Surface												
1	Dark brown-black silt, some clay, trace sand, gravel & roots, damp (topsoil) - Fill		21.6										
2	Brown clay, some silt, trace sand & gravel, damp, hard	17	23.6	99.9	6.5		X	Δ				6.5	○
3													
4													
5		17	13.1	115.9	5.2		Δ	X				5.2	○
6													
7													
8		15	17.5	111.8	4.7		X	Δ				4.7	○
9													
10	End of Boring	22	13.8	118.7	7.1		Δ	X				7.1	○

Water encountered at dry feet during drilling operations (W.D.)
 Water recorded at dry feet on completion of drilling operations (A.D.)
 Water recorded at dry feet hours after completion of drilling operations (A.D.)

Client: Lake County Forest Preserves

File No. 26934

Date Drilled: 12/5/22

Reference: Lakewood Forest Preserve
New Grounds Maintenance Facility
Wauconda, IL

Comments:

depth, ft.	Equipment: ☐ D - 25 ☒ D - 50 ☐ Hand Auger ☐ Other	standard penetration X	moisture content Δ	dry unit weight lbs./cu.ft. γ	unconfined compressive strength O	○ unconfined compressive strength, tons/sq. ft. ● penetrometer reading, tons/sq. ft. 1.0 2.0 3.0 4.0				X standard penetration "N", blows/ft. Δ moisture content, % 10 20 30 40			
	CLASSIFICATION												
	Elevation 845.0' Existing Surface												
1	Dark brown silt, some clay, trace sand & roots, damp (topsoil)		28.7										
2	(large rock between 1.0'-1.5')												
3	Brown clay, some silt, trace sand & gravel, damp, very tough to hard	10	17.2	109.5	3.5								
4													
5		14	15.3	118.0	5.8								
6													
7													
8		16	14.3	122.9	6.6								
9													
10	End of Boring	21	14.3	122.9	6.2								

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at dry feet hours after completion of drilling operations (A.D.)

GENERAL NOTES

SAMPLE CLASSIFICATION

Soil sample classification is based on the Unified Soil Classification System, the Standard Practice for Description and Identification Soils (Visual-Manual Procedure), ASTM D-2488, the Standard Test Method for Classification of Soils for Engineering Purposes, ASTM D-2487 (when applicable), and the modifiers noted below.

CONSISTENCY OF COHESIVE SOILS

Term	Qu-tons/sq.ft.	N (unreliable)
Very soft	0.00 – 0.25	0 – 2
Soft	0.26 – 0.49	3 – 4
Stiff	0.50 – 0.99	5 – 8
Tough	1.00 – 1.99	9 – 15
Very Tough	2.00 – 3.99	16 – 30
Hard	4.00 – 7.99	30 +
Very Hard	8.00 +	

RELATIVE DENSITY OF GRANULAR SOILS

Term	N – blows/foot
Very Loose	0 – 4
Loose	5 – 9
Medium Dense	10 – 29
Dense	30 – 49
Very Dense	50 +

IDENTIFICATION AND TERMINOLOGY

Term	Size Range
Boulder	over 8 in.
Cobble	3 in. to 8 in.
Gravel - coarse	1 in. to 3 in.
- medium	3/8 in. to 1 in.
- fine	#4 sieve to 3/8 in.
Sand - coarse	#10 sieve to #4 sieve
- medium	#40 sieve to #10 sieve
- fine	#200 sieve to #40 sieve
Silt	0.002 mm to #200 sieve
Clay	smaller than 0.002mm

Modifying Term Percent by Weight

Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

Moisture Content

Dry
Damp
Very Damp
Saturated

DRILLING, SAMPLING & SOIL PROPERTY SYMBOLS

CF	- Continuous Flight Auger
HS	- Hollow Stem Auger
HA	- Hand Auger
RD	- Rotary Drilling
AX	- Rock Core, 1-3/16 in. diameter
BX	- Rock Core, 1-5/8 in. diameter
NX	- Rock Core, 2-1/8 in. diameter
S	- Sample Number
T	- Type of Sample
J	- Jar
AS	- Auger Sample
SS	- Split Spoon (2 in. O.D. with 1-3/8 in. I.D.)
ST	- Shelby Tube (2 in. O.D. w/1-7/8 in. I. D.)
R	- Recovery Length, in.
B	- Blows/6 in. interval, Standard Penetration Test (SPT)
N	- Blows/foot to drive 2 in. O.D. split-spoon sampler with 140 lb. hammer falling 30 in., (STP)
Pen.	- Pocket Penetrometer readings, tons/sq.ft.
W	- Water Content, % dry weight
Uw	- Dry Unit Weight of soil, lbs./cu.ft.
Qu	- Unconfined Compressive Strength, tons/sq.ft.
Str	- % Strain at Qu.
WL	- Water Level
WD	- While Drilling
AD	- After Drilling
DCI	- Dry Cave-in.
WCI	- Wet Cave-in.
LL	- Liquid Limit, %
PL	- Plastic Limit, %
PI	- Plasticity Index (LL-PL)
LI	- Liquidity Index [(W-PL)/PI]

**SECTION 01 10 00
SUMMARY**

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Lakewood Net Zero Maintenance Facility
- B. Owner's Name: Lake County Forest Preserve District.
- C. Architect's Name: Williams Architects.
- D. Additional Project contact information is specified in Section 00 01 03 - Project Directory.
- E. The Project consists of the construction of a new Net Zero Maintenance Facility, a solar array system, site amenities, parking and circulation, fencing and other items as shown in the Construction Documents.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: Multiple prime contracts, each based on a Stipulated Price as described in the Construction Manager's Project Manual.

1.03 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Date of Substantial Completion. Some items include:
 - 1. Movable cabinets.
 - 2. Furnishings.
 - 3. Small equipment.
 - 4. Rugs.
 - 5. Artwork.

1.04 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Provide access to and from site as required by law and by Owner:
 - 1. Do not obstruct roadways, sidewalks, or other public ways without permit.
 - 2. All construction traffic will have to come from Highway 176.

1.06 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Construction Manager's Project Manual.
- B. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.
- F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
- G. Include separately from each line item, a direct proportional amount of Construction Manager's overhead and profit.
- H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit one electronic and three hard-copies of each Application for Payment.
- J. Include the following with the application:
 - 1. Transmittal letter as specified for submittals in Section 01 30 00.
 - 2. Construction progress schedule, revised and current as specified in Section 01 30 00.
 - 3. Partial release of liens from major subcontractors and vendors.
 - 4. Affidavits attesting to off-site stored products.
- K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Construction Manager.
- B. For other required changes, Architect will issue a document signed by Owner instructing Construction Manager to proceed with the change, for subsequent inclusion in a Change Order.
 - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Construction Manager shall prepare and submit a fixed price quotation within 5 days.
- D. Construction Manager may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 - 1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Construction Manager's price quotation.
 - 2. For change requested by Construction Manager, the amount will be based on the Construction Manager's request for a Change Order as approved by Architect.
 - 3. For change ordered by Architect without a quotation from Construction Manager, the amount will be determined by Architect based on the Construction Manager's substantiation of costs as specified for Time and Material work.
- F. Substantiation of Costs: Provide full information required for evaluation.
 - 1. On request, provide the following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - 2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 - 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

- G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. All closeout procedures specified in the Construction Manager's Project Manual.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 25 00
SUBSTITUTION PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.
- B. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.
- C. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.03 DEFINITIONS

- A. Substitutions: Changes from Contract Documents requirements proposed by Construction Manager to materials, products, assemblies, and equipment.
 - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Construction Manager's control.
 - a. Unavailability.
 - b. Regulatory changes.
 - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
 - a. Substitution requests offering advantages solely to the Construction Manager will not be considered.

1.04 REFERENCE STANDARDS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. A Substitution Request for specified installer constitutes a representation that the submitter:
 - 1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
 - 1. Note explicitly any non-compliant characteristics.
- D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
 - 1. No specific form is required. Construction Manager's Substitution Request documentation must include the following:
 - a. Project Information:

- 1) Official project name and number, and any additional required identifiers established in Contract Documents.
- 2) Owner's, Architect's, and Construction Manager's names.
- b. Substitution Request Information:
 - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
 - 2) Indication of whether the substitution is for cause or convenience.
 - 3) Issue date.
 - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
 - 5) Description of Substitution.
 - 6) Reason why the specified item cannot be provided.
 - 7) Differences between proposed substitution and specified item.
 - 8) Description of how proposed substitution affects other parts of work.
- c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
 - 1) Physical characteristics.
 - 2) In-service performance.
 - 3) Expected durability.
 - 4) Visual effect.
 - 5) Sustainable design features.
 - 6) Warranties.
 - 7) Other salient features and requirements.
- d. Impact of Substitution:
 - 1) Savings to Owner for accepting substitution.
 - 2) Change to Contract Time due to accepting substitution.

E. Limit each request to a single proposed substitution item.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
1. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- B. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
 3. Bear the costs engendered by proposed substitution of:
 - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
 - b. Other unanticipated project considerations.
- C. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
 2. Without a separate written request.
 3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Construction Manager in writing of decision to accept or reject request.
 - 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION

**SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Construction progress schedule.
- G. Contractor's daily reports.
- H. Progress photographs.
- I. Coordination drawings.
- J. Submittals for review, information, and project closeout.
- K. Number of copies of submittals.
- L. Requests for Interpretation (RFI) procedures.
- M. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Construction Manager's Project Manual.
- B. Section 01 60 00 - Product Requirements: General product requirements.

1.03 PROJECT COORDINATOR

- A. Project Coordinator: Construction Manager.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for vehicle and pedestrian access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
 - 1. Requests for Information.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Construction Manager's correction punchlist, and any other document any participant wishes to make part of the project record.
 - 2. Construction Manager and Architect are required to use this service.
 - 3. It is Construction Manager's responsibility to submit documents in allowable format.
 - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 - 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 - 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 - 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Cost: The cost of the service is to be paid by Construction Manager; include the cost of the service in the Contract Sum.
- C. Submittal Service: Use one of the following:
 - 1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.
 - 2. EADOC LLC (tel: 1-877-305-3844): www.eadocsoftware.com/#sle.
 - 3. Newforma ConstructEx: www.newforma.com/our-solutions/constructex/#sle.
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Construction Manager participating; further training is the responsibility of the user of the service.
 - 1. Representatives of Owner are scheduled and included in this training.
- E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Project Coordinator will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Construction Manager.
- C. Agenda:
 - 1. Execution of Owner-Construction Manager Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Submission of initial Submittal schedule.
 - 6. Designation of personnel representing the parties to Contract and Architect.

7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 8. Scheduling.
 9. Scheduling activities of a Geotechnical Engineer.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

- A. Project Coordinator will schedule meeting at the Project site prior to Construction Manager occupancy.
- B. Attendance Required:
1. Construction Manager.
 2. Owner.
 3. Architect.
 4. Construction Manager's superintendent.
 5. Major subcontractors.
- C. Agenda:
1. Use of premises by Owner and Construction Manager.
 2. Owner's requirements.
 3. Survey and building layout.
 4. Security and housekeeping procedures.
 5. Schedules.
 6. Application for payment procedures.
 7. Procedures for testing.
 8. Procedures for maintaining record documents.
 9. Requirements for start-up of equipment.
 10. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

- A. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
1. Construction Manager.
 2. Owner.
 3. Architect.
 4. Construction Manager's superintendent.
 5. Major subcontractors.
- C. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Other business relating to work.

- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 - 1. Date.
 - 2. High and low temperatures, and general weather conditions.
 - 3. List of subcontractors at Project site.
 - 4. List of separate contractors at Project site.
 - 5. Approximate count of personnel at Project site.
 - a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
 - 6. Major equipment at Project site.
 - 7. Material deliveries.
 - 8. Safety, environmental, or industrial relations incidents.
 - 9. Meetings and significant decisions.
 - 10. Unusual events (submit a separate special report).
 - 11. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Construction Manager's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
 - 12. Meter readings and similar recordings.
 - 13. Emergency procedures.
 - 14. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
 - 15. Change Orders received and implemented.
 - 16. Testing and/or inspections performed.
 - 17. List of verbal instruction given by Owner and/or Architect.
 - 18. Signature of Construction Manager's authorized representative.

3.07 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- C. Photography Type: Digital; electronic files.
- D. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- E. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.
 - 2. Excavations in progress.
 - 3. Foundations in progress and upon completion.

4. Structural framing in progress and upon completion.
 5. Enclosure of building, upon completion.
 6. Final completion, minimum of ten (10) photos.
- F. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
 4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.08 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.

3.09 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
 3. Prepare using software provided by the Electronic Document Submittal Service.
 4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Construction Manager's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).

3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Construction Manager for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 2. Owner's, Architect's, and Construction Manager's names.
 3. Discrete and consecutive RFI number, and descriptive subject/title.
 4. Issue date, and requested reply date.
 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 7. Construction Manager's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 2. Highlight items requiring priority or expedited response.
 3. Highlight items for which a timely response has not been received to date.
- H. Review Time: Architect will respond and return RFIs to Construction Manager within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Construction Manager's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
 4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:

1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.
 6. Manufacturer's field reports.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
1. After review, produce duplicates.
 2. Retained samples will not be returned to Construction Manager unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
1. Use a separate transmittal for each item.
 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 3. Transmit using approved form.
 - a. Use Construction Manager's form, subject to prior approval by Architect.
 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 5. Identify: Project; Construction Manager; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on

- each copy.
6. Apply Construction Manager's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Construction Manager, or without Construction Manager's stamp will not be acknowledged, reviewed, or returned.
 7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Upload submittals in electronic form to Electronic Document Submittal Service website.
 8. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Construction Manager.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
 9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 10. When revised for resubmission, identify all changes made since previous submission.
 11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 13. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Submit concurrently with related shop drawing submittal.
 4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Do not reproduce Contract Documents to create shop drawings.
 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
1. Transmit related items together as single package.
 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.15 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Architect's and consultants' actions on items submitted for review:

1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Approved", or language with same legal meaning.
 - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
 - 1) At Construction Manager's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
 - 1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
 - 2) Non-responsive resubmittals may be rejected.
 2. Not Authorizing fabrication, delivery, and installation:
 - a. "Revise and Resubmit".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - 2) Non-responsive resubmittals may be rejected.
 - b. "Rejected".
 - 1) Submit item complying with requirements of Contract Documents.
- E. Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
 - a. "Received" - to notify the Construction Manager that the submittal has been received for record only.
 2. Items for which action was taken:
 - a. "Reviewed" - no further action is required from Construction Manager.

END OF SECTION

**SECTION 01 33 10
DISTRIBUTION OF ARCHITECT'S ELECTRONIC CAD / BIM DRAWING FILES**

SUMMARY

1.01 THE ARCHITECT MAY, UPON REQUEST, DISTRIBUTE ELECTRONIC CAD DRAWING FILES (.DWG) AND/OR BIM FILES (.RVT) TO CONTRACTORS ONLY WHEN THE FOLLOWING STIPULATIONS ARE SATISFIED:

- A. Contractor is required to sign, date, and submit this specification section to Williams Architects, indicating that the requirements of this section are agreed to.
- B. Contractor shall list all sheets being requested to be transmitted in electronic format.
- C. The CAD drawings in electronic file format (.dwg) and/or the BIM files (.rvt) are being provided at the Contractor's request. The Contractor's use of the files constitutes an acceptance of all of the terms and conditions referenced herein.
- D. Williams Architects makes no and specifically disclaims all representations or warranties concerning the compatibility of the files (.dwg or .rvt) with the Contractor's hardware and software. Williams Architects does not convey any right in the software used to generate the data.
- E. The information contained in the files is proprietary in nature, and may only be utilized for the current project. All drawing and/or modeling information contained in the files is proprietary to Williams Architects including, but not limited to, all associated copyrights, trademarks, service marks, trade secrets, blocks, lettering fonts, symbol libraries, details, .rvt families, etc., and may not be reproduced, sold, distributed, or utilized in any form on other projects without the express written permission of Williams Architects.
- F. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Williams Architects, its officers, principals, employees, agents, or subconsultants which may arise out of or in conjunction with the Contractor's use of the files. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless Williams Architects, on demand, from all claims, damages, losses and expenses including but not limited to reasonable attorney's fees arising out of or resulting from the Contractor's use of the electronic files.
- G. Due to the unsecured nature of these electronic files and inability of the originator to establish controls over the use thereof, Williams Architects assumes no responsibility for any consequences arising out of the use of the data. It is the sole responsibility of the user to check the validity of all information contained in the electronic files. The Contractor/User understands that electronic files can deteriorate or be modified and that errors or anomalies can be introduced into the files from the use of software application packages, operating systems, or computer hardware differing from those used to produce the files. Contractor/User acknowledges and assumes all such risks.
- H. The user shall, at all times, refer to the signed and sealed construction drawings and project manual for the project during all phases of the project. The user is reminded that the electronic files are not contract documents and shall not be relied upon legally in any shape or form. Significant differences may exist between the electronic files and corresponding hard copy contract documents due to addenda, change orders, other revisions, or the formatting and display of the building information model as applicable. If the Contractor discovers a conflict between the signed contract documents and the electronic files, the signed contract documents shall govern. If the Contractor discovers a conflict within the building information model (if applicable) as to the proper design intent (example: duct below ceiling), the Contractor shall immediately notify Williams Architects in writing and shall be reminded that the signed contract documents govern.
- I. Williams Architects makes no and specifically disclaims all representations and warranties regarding the accuracy or completeness of the electronic files including the building information model as applicable. The user shall assume all risks and liabilities resulting from the use of this data. By using the files, the Contractor is not relieved of the duty to fully comply with the contract documents, including and without limitation, the need to check, confirm, and

Distribution of Architect's
Electronic CAD / BIM drawing files

coordinate the work with that of other contractors for the project.

CONTRACTOR'S SIGNATURE

NOTE: CERTAIN FILES MAY BE TOO LARGE TO BE E-MAILED. THESE WILL EITHER BE TRANSMITTED VIA THE FTP SITE OR SENT TO THE CONTRACTOR/USER ON A CD DISK.

1. I AGREE TO THESE REQUIREMENTS FOR THE USE OF ELECTRONIC FILES:

1. Sheet Number(s) requested

1. Company

DATE

E-MAIL ADDRESS

END OF SECTION

**SECTION 01 40 00
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Construction Manager's construction-related professional design services.
- F. Construction Manager's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Construction Manager's Project Manual.
- B. Document 00 31 00 - Available Project Information: Soil investigation data.
- C. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- D. Section 01 42 16 - Definitions.
- E. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. IAS AC89 - Accreditation Criteria for Testing Laboratories 2021.

1.04 DEFINITIONS

- A. Construction Manager's Quality Control Plan: Construction Manager's management plan for executing the Contract for Construction.
- B. Construction Manager's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
 - 1. Design Services Types Required:
 - a. Construction-Related: Services Construction Manager needs to provide in order to carry out the Construction Manager's sole responsibilities for construction means, methods, techniques, sequences, and procedures.
 - b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
- C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Construction Manager, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Construction Manager's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
 - 1. Temporary sheeting, shoring, or supports.

2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary foundation underpinning.
5. Temporary stairs or steps required for construction access only.
6. Temporary hoist(s) and rigging.
7. Investigation of soil conditions to support construction equipment.

1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Construction Manager's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
 1. Submit a Request for Information to Architect if the criteria indicated are not sufficient to perform required design services.
- C. Scope of Construction Manager's Professional Design Services: Provide for the following items of work:
 1. Structural Design of Formwork: As described in Section 03 10 00 - Concrete Forming and Accessories.
 2. Concrete Mix Design: As described in Section 03 30 00 - Cast-in-Place Concrete. No specific designer qualifications are required.
 3. Structural Design of Steel Connections: As described in Section 05 12 00 - Structural Steel Framing.
 4. Structural Design of Steel Connections: As described in Section 05 21 00 - Steel Joist Framing.
 5. Structural Design of Steel Decking: As described in Section 05 31 00 - Steel Decking.
 6. Structural Design of Metal Framing: As described in Section 05 40 00 - Cold-Formed Metal Framing.
 7. Structural Design of Metal Fabrications: As described in Section 05 50 00 - Metal Fabrications.
 8. Design of Structural Components: As described in Section 14 24 00 - Hydraulic Elevators.
 9. Sprinkler Layout: Coordinate with ceiling installation, detailed pipe layout, and hydraulic calculations as described in Section 21 13 00 - Fire-Suppression Sprinkler Systems.

1.07 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
 1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Construction Manager.
 - a. Full name.
 - b. Professional licensure information.
 - c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Construction Manager.
- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
 2. Include required product data and shop drawings.
 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

- D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Construction Manager.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 - 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Construction Manager or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
 - 1. Submit report within 30 days of observation to Architect for information.
 - 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
- H. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
 - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
 - 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.08 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 - 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Construction Manager by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Construction Manager's Quality Control (CQC) Plan:

1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
 - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
 - 1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
 - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
 - 1) Management and control of documents and records relating to quality.
 - 2) Communications.
 - 3) Coordination procedures.
 - 4) Resource management.
 - 5) Process control.
 - 6) Inspection and testing procedures and scheduling.
 - 7) Control of noncomplying work.
 - 8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
 - 9) Control of testing and measuring equipment.
 - 10) Project materials certification.
 - 11) Managerial continuity and flexibility.
 - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
 - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Construction Manager to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.
- D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.09 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection. Payment for cost of services will be derived from allowance specified in the Construction Manager's Project Manual.
- B. Employment of agency in no way relieves Construction Manager of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Notify Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.
- D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- G. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
 - 1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
 - 2. Make corrections as necessary until Architect's approval is issued.
- H. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- I. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.
- J. Where possible salvage and recycle the demolished mock-up materials.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.

- B. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Construction Manager.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Construction Manager in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect and Construction Manager of observed irregularities or non-compliance of Work or products.
 - 6. Perform additional tests and inspections required by Architect.
 - 7. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Construction Manager.
 - 4. Agency has no authority to stop the Work.
- D. Construction Manager Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Construction Manager beyond specified requirements.
 - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Construction Manager beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Construction Manager.

3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 30 days in advance of required observations.
 - 1. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.

- B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 42 16
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Provide: To furnish and install.
- E. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 60 00
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Identification of Owner-supplied products.
- B. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- C. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.
- D. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 REFERENCE STANDARDS

- A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content Current Edition.
- B. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute Current Edition.
- C. EN 15804 - Sustainability of Construction Works - Environmental Product Declarations - Core Rules for the Product Category of Construction Products 2022 (Corrigendum 2021).
- D. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action Current Edition.
- E. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action Current Edition.
- F. ISO 14025 - Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures 2006.
- G. ISO 14040 - Environmental Management - Life Cycle Assessment - Principles and Framework 2006, with Amendment (2020).
- H. ISO 14044 - Environmental Management - Life Cycle Assessment - Requirements and Guidelines 2006, with Amendment (2020).
- I. ISO 21930 - Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services 2017.

1.04 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.05 QUALITY ASSURANCE

- A. Chain-of-Custody (COC): A procedure that tracks a product from the point of harvest or extraction to its end use, including successive stages of processing, transformation, manufacturing, and distribution.
- B. Chain-of-Custody Certificates: Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.
- C. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
- D. Cradle-to-Cradle Certified: End use product certified Cradle-to-Cradle v2 Basic or Cradle-to-Cradle v3 Bronze, minimum, as evidenced by C2C (DIR).
- E. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
 - 1. Good: Product-specific; compliant with ISO 14044.
 - 2. Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
 - 3. Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
 - 4. Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.
- F. GreenScreen Chemical Hazard Analysis: Ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).
 - 1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
 - 2. Better: GreenScreen Full Assessment.
 - 3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
 - 4. Acceptable Evidence: GreenScreen report.
- G. Health Product Declarations (HPD): Complete, published declaration with full disclosure of known hazards, prepared using one of the HPDC (HPD-OLT) online tools.
- H. Leadership Extraction Practices: Products that meet at least one of the responsible extraction criteria, which include: extended producer responsibility; bio-based materials; FSC wood products; materials reuse; recycled content; and other programs approved by sustainability certification system used for the project.
- I. Manufacturer's Inventory of Product Content: Publicly available inventory of every ingredient identified by name and Chemical Abstract Service Registration Number (CAS RN).
 - 1. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are given.
- J. Rapidly Renewable Materials: Made from agricultural products that are typically harvested within a 10-year or shorter cycle.
- K. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
 - 1. Previously used, reused, refurbished, and salvaged products are not considered recycled.
 - 2. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.
 - 3. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of materials in the item.

4. Determine value of recycled content of each item separately, by multiplying the content percentage by the value of the item.
5. Acceptable Evidence:
 - a. For percentage of recycled content, information from manufacturer.
 - b. For cost, Construction Manager's cost data.
- L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles from the Project site.
- M. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
 1. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit <http://www.fsccanada.org>, for the USA visit <http://www.fscus.org>.
 2. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
 1. Made outside the United States, its territories, Canada, or Mexico.
 2. Made using or containing CFC's or HCFC's.
 3. Made of wood from newly cut old growth timber.
 4. Containing lead, cadmium, or asbestos.
- D. Where other criteria are met, Construction Manager shall give preference to products that:
 1. If used on interior, have lower emissions, as defined in Section 01 61 16.
 2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
 3. Are extracted, harvested, and/or manufactured closer to the location of the project.
 4. Have longer documented life span under normal use.
 5. Result in less construction waste. See Section 01 74 19
 6. Are made of vegetable materials that are rapidly renewable.
 7. Are made of recycled materials.
 8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
 9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
 10. Are Cradle-to-Cradle Certified.
 11. Have a published Environmental Product Declaration (EPD).
 12. Have a published Health Product Declaration (HPD).
 13. Have a published GreenScreen Chemical Hazard Analysis.
 14. Have a published Manufacturer's Inventory of Chemical Content.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 01 25 00 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Provide off-site storage and protection when site does not permit on-site storage or protection.
 - 1. Execute a formal supplemental agreement between Owner and Construction Manager allowing off-site storage, for each occurrence.
- H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- I. Comply with manufacturer's warranty conditions, if any.
- J. Do not store products directly on the ground.
- K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- M. Prevent contact with material that may cause corrosion, discoloration, or staining.
- N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

- O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 61 16
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.
- C. Requirement for installer certification that they did not use any non-compliant products.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.
- C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.
- D. Section 07 92 00 - Joint Sealants: Emissions-compliant sealants.

1.03 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings applied on site.
 - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
 - 3. Composite wood.
 - 4. Products making up wall and ceiling assemblies.
 - 5. Thermal and acoustical insulation.
 - 6. Free-standing furniture.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings applied on site.
 - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
- C. Interior of Building: Anywhere inside the exterior weather barrier.
- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
 - 1. Concrete.
 - 2. Clay brick.
 - 3. Metals that are plated, anodized, or powder-coated.
 - 4. Glass.
 - 5. Ceramics.
 - 6. Solid wood flooring that is unfinished and untreated.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings 2005 (Reapproved 2018).
- C. BIFMA e3 - Furniture Sustainability Standard; Business and Institutional Furniture Manufacturers Association 2019.

- D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2 2017.
- E. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; California Air Resources Board current edition.
- F. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board 2020.
- G. CHPS (HPPD) - High Performance Products Database Current Edition.
- H. CRI (GLP) - Green Label Plus Testing Program - Certified Products Current Edition.
- I. SCAQMD 1113 - Architectural Coatings 1977, with Amendment (2016).
- J. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2022).
- K. SCS (CPD) - SCS Certified Products Current Edition.
- L. UL (GGG) - GREENGUARD Gold Certified Products Current Edition.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.
- C. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

1.06 QUALITY ASSURANCE

- A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
 - 1. Wet-Applied Products: State amount applied in mass per surface area.
 - 2. Paints and Coatings: Test tinted products, not just tinting bases.
 - 3. Evidence of Compliance: Acceptable types of evidence are the following;
 - a. Current UL (GGG) certification.
 - b. Current SCS (CPD) Floorscore certification.
 - c. Current SCS (CPD) Indoor Advantage Gold certification.
 - d. Current listing in CHPS (HPPD) as a low-emitting product.
 - e. Current CRI (GLP) certification.
 - f. Test report showing compliance and stating exposure scenario used.
 - 4. Product data submittal showing VOC content is NOT acceptable evidence.
 - 5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.
- B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
- C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scs-certified.com.
 - b. Report of laboratory testing performed in accordance with requirements.
 - c. Published product data showing compliance with requirements.
- D. Furnishings Emissions Standard and Test Method: BIFMA e3 Sections 7.6.1 and 7.6.2, tested in accordance with BIFMA M7.1.

1. Evidence of Compliance:
 - a. Test report showing compliance and stating exposure scenario used.
- E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
 1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
 2. Furnishings: Comply with Furnishings Emissions Standard and Test Method.
 3. Inherently Non-Emitting Materials.
- C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
 2. Joint Sealants: SCAQMD 1168 Rule.
 3. Paints and Coatings: Each color; most stringent of the following:
 - a. 40 CFR 59, Subpart D.
 - b. SCAQMD 1113 Rule.
 - c. CARB (SCM).

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Construction Manager.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood.
 - 5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 10 00 - Site Clearing for use options.
 - 6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
 - 7. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
 - 8. Precast concrete panels: May be used for erosion control or landscape features.
 - 9. Asphalt paving: May be recycled into paving for project.
 - 10. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 11. Glass.
 - 12. Gypsum drywall and plaster.
 - 13. Plastic buckets.
 - 14. Paint.
 - 15. Plastic sheeting.
 - 16. Rigid foam insulation.
 - 17. Windows, doors, and door hardware.
 - 18. Plumbing fixtures.
 - 19. Mechanical and electrical equipment.
 - 20. Fluorescent lamps (light bulbs).
 - 21. Acoustical ceiling tile and panels.
- E. Construction Manager shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- F. Construction Manager shall develop and follow a Waste Management Plan designed to implement these requirements.
- G. The following sources may be useful in developing the Waste Management Plan:
- H. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
 - 5. Incineration, either on- or off-site.
- I. Regulatory Requirements: Construction Manager is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Construction Manager's Project Manual.
- B. Section 00 31 00 - Available Project Information: All Owner provided environmental and hazardous materials reports, describing the recommendations for disposal of items that have been demolished so that they do not enter the demolition waste stream for landfill disposal.
- C. Section 01 10 00 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.
- D. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- E. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- F. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.

2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 2. Submit Report on a form acceptable to Owner.
 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 4. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
 5. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
 6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

- A. See Section 01 60 00 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:
 1. Relative amount of waste produced, compared to specified product.
 2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Price.
 3. Proposed disposal method for waste product.
 4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Prebid meeting.
 - 2. Preconstruction meeting.
 - 3. Regular job-site meetings.
 - 4. Job safety meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.
 - c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
 - 4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
 - 5. Locate enclosures out of the way of construction traffic.
 - 6. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
 - 8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

**SECTION 01 79 00
DEMONSTRATION AND TRAINING**

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Conveying systems.
 - 6. Landscape irrigation.
 - 7. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Fixtures and fittings.
 - 4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Owner.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Construction Manager.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
 - 1. Identification of each training session, date, time, and duration.
 - 2. Sign-in sheet showing names and job titles of attendees.
 - 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.

- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
 - 1. Format: DVD Disc.
 - 2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Construction Manager.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Construction Manager for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 - 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
 - 1. Review the applicable O&M manuals.
 - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.

6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Construction Manager.
 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 02 41 00 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Construction Manager's Project Manual.
- B. Section 00 31 00 - Available Project Information: Existing building survey conducted by Owner; information about known hazardous materials.
- C. Section 01 10 00 - Summary: Limitations on Construction Manager's use of site and premises.
- D. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Construction Manager.
- E. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- F. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 DEFINITIONS

- A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.04 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Site Plan: Indicate:
 - 1. Vegetation to be protected.
 - 2. Areas for temporary construction and field offices.
- C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 - 2. Summary of safety procedures.
- D. Demolition firm qualifications.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.06 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.

PART 3 EXECUTION

2.01 DEMOLITION

- A. Remove all other paving and curbs within site boundaries.
- B. Remove concrete slabs on grade within site boundaries.
- C. Remove fences and gates.
- D. Remove other items indicated, for salvage, relocation, and recycling.
- E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 6. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 - 7. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 - 8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.
- D. Protect existing structures and other elements to remain in place and not removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. Hazardous Materials:
 - 1. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.
- F. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

2.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if

necessary.

- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.04 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

**SECTION 03 05 16
UNDERSLAB VAPOR BARRIER**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 20 00 - Concrete Reinforcing.
- C. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Test Data: Submit report of tests showing compliance with specified requirements.
- D. Samples: Submit samples of underslab vapor barrier to be used.
- E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Underslab Vapor Barrier:
 - 1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
 - 2. Thickness: 15 mils.
 - 3. Basis of Design:
 - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.
 - b. Other acceptable manufacturers:
 - 1) W.R. Meadows, Inc.: www.wrmeadows.com.
 - 2) ISI Building Products: www.isilp.com.
 - c. Substitutions: Not permitted.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Lap joints minimum 6 inches.

- D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION

**SECTION 03 10 00
CONCRETE FORMWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Design, construction and treatment of formwork and related accessories to confine and shape concrete to the required dimensions.
- B. Installation of embedded items such as waterstops, dovetail anchors, flashing reglets, shelf angles, and PVC weeps.
- C. Structural notes indicated on the drawings regarding concrete formwork shall be considered a part of this specification.

1.02 RELATED WORK

- A. Pertinent Sections of Division 01.
- B. Section 03 20 00 - Concrete Reinforcement.
- C. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCES

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards except where more stringent requirements are shown or specified. Where provisions of the pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
 - 1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
 - 5. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 6. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 7. NIST - PS 1: Structural Plywood

1.04 DESIGN REQUIREMENTS

- A. Design and engineering of formwork is the responsibility of the Contractor. Design, engineer and construct formwork, shoring, and bracing to conform to Contract Documents and in accordance with building code requirements. Formwork design shall be under direct supervision of a Structural engineer experienced in the design of this work and licensed in the State where the project is located. Design for construction loads, lateral pressure, and requirements of the applicable building code to conform to the required shape, line, and dimensions. Contractor is responsible for formwork camber calculations.
- B. Foundation concrete may be placed directly into neat excavations, provided the foundation trench walls are stable as determined by the Geotechnical Engineer. In such case, the minimum formwork indicated on the drawings is mandatory to ensure clean excavations immediately prior to and during the placing of concrete.
 - 1. When forms are omitted, provide additional 1" concrete minimum on each side of the minimum design profiles and dimensions shown on the drawings.
- C. Drawings show the design requirements and dimensions for structural strength, but structural drawings do not show all detail dimensions to fit intricate architectural and mechanical detail. Contractor shall construct the concrete work so that it will conform to the clearance required by the architectural, mechanical, and electrical design.
- D. Maximum deflection of facing materials forming concrete surfaces exposed to view shall be 1/240 of the center-to-center span between structural members of the formwork.
- E. Carry vertical and lateral loads to the ground by a formwork system and in-place construction that has attained adequate strength for that purpose. Where adequate foundations for shores and struts cannot be secured, provide trussed supports.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions and specifications for each of the following:
 - 1. Waterstop profiles
 - 2. Form sealer
 - 3. Form release agent(s), including certification that agent is compatible with finish
 - 4. Form ties and spreaders
- B. Shop Drawings: Prepare and submit shop drawings for formwork, including dimensional layout for foundations, beams, columns, piers, walls and slabs.
- C. Pour Sequence: Submit sequence of concrete operations for supported structural slab, beams, columns, and walls.
- D. Construction Joints: Submit layout of construction joints and details of construction joints.

1.06 COORDINATION

- A. Coordinate with other sections of work that require attachment of components to formwork.
- B. If formwork is placed after reinforcement, resulting in insufficient concrete cover to reinforcement, request instructions from the Owner's Representative or Architect or Structural Engineer before proceeding.

PART 2 PRODUCTS

2.01 MATERIALS AND ACCESSORIES

- A. Formwork Accessories: Use commercially manufactured accessories for formwork accessories partially or completely embedded in concrete, including ties and hangers.
- B. Sealer: Clear, penetrating, synthetic resin sealer.
- C. Formwork Release Agent: Use commercially manufactured form release agents that will prevent formwork absorption of moisture, prevent bond with concrete, and will not stain the concrete surface. Reapply to cleaned forms before each reuse. Formwork release agent shall be compatible with paint or any other finish applied to the concrete; submit data indicating compatibility.
- D. Waterstops: Waterstop materials shall be non-metallic polyvinyl chloride (PVC) or thermoplastic elastomeric rubber (TPE-R) material.
 - 1. Waterstop shall be fabricated from prime virgin resin material.
 - 2. PVC material shall meet Corp of Engineers CRD - C572. TPE-Rubber shall meet EPA Title 40 CFR Section 265.193.
 - 3. Profile shall be 6 inches long, multi-ribbed, center bulb type with 3/16-inch minimum thickness.
 - 4. Splices shall be field welded butt splices as recommended by the manufacturer. Provide shop made fittings for all changes in direction and intersections, which maintain continuity of the waterstop profile. All splices shall provide not less than 80% tensile strength of the parent section. Edge welding is not permitted.
 - a. Manufacturers:
 - 1) Greenstreak. - PVC Waterstop
 - 2) J.P. Specialties - Earth Shield (TPE-Rubber) Waterstop
 - 3) Westec Barrier Technologies - TPE-R Waterstop
- E. Form Material:
 - 1. No aluminum shall be allowed in the concrete work unless coated to prevent aluminum-concrete reaction.
 - 2. Concrete form materials must be used in a manner to provide the surface finish specified.
 - 3. Design formwork in accordance with the provisions of the building code or the following standards if not covered in the building code:
 - a. Wood - AWC "National Design Specification".
 - b. Plywood - American Plywood Association "Plywood Design Specification".
 - c. Steel - AISC "Manual of Steel Construction".
 - d. Aluminum - Aluminum Association "Aluminum Construction Manual"
 - e. Concrete - ACI 318.

- f. Other materials - as directed by manufacturer.
- F. Chamfer Strips:
 - 1. Chamfer strips shall be the size as indicated on the drawings. Provide in maximum possible lengths.
- G. Keyways:
 - 1. Provide keyways as shown on the drawings. Unless noted otherwise, keyways shall be a minimum of 1-1/2 inches deep and 3-1/2 inches wide. Bevel edges of keyways 10 degrees to facilitate stripping.

2.02 FORM FINISHES

- A. Rough Form Finish:
 - 1. Concrete surfaces not exposed to view in the finished work shall have a rough-form finish. No form-facing material is specified for rough-form finish.
 - 2. Set and maintain forms so finished concrete dimensions shall conform to the tolerances. Rough form finish is Designated Surface Finish-1.0 from ACI 301, except that surface tolerance Class C is required as specified in ACI 117.
- B. Smooth Form Finish:
 - 1. Concrete surfaces exposed to view in the finished work or surfaces to receive finishes of any type (paint, textured paint, etc.) shall have a smooth form finish. Form-facing material shall be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper, or other acceptable material capable of producing the desired finish. Form-facing material shall produce a smooth, uniform texture on the concrete. Do not use form facing material with raised grain, torn surfaces, worn edges, patches, dents, or other defects that might impair the texture of the concrete surfaces.
 - 2. Set and maintain forms so finished concrete dimensions shall conform to the tolerances. Smooth form finish is Designated Surface Finish-3.0 from ACI 301, including surface tolerance Class A as specified in ACI 117.
- C. Patching and repairing concrete finishes are specified under Section 03 30 00.

2.03 FABRICATION AND MANUFACTURE

- A. Form Ties and Spreaders: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms, hold inner and outer forms for vertical concrete together, and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1-1/2 inch to the plane of the exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
 - 4. At horizontal pour lines, locate ties not more than 6" below the pour lines. Tighten after concrete has set and before the next pour is made.
 - 5. For exposed concrete surfaces, provide form ties of removable type with permanent plugs and a system approved by the Architect for fixing the plugs in place.
- B. Waterstops: Fabricate pieces of premolded waterstop with a maximum practicable length to hold the number of end joints to a minimum. Fabricate joints in waterstops in accordance with the manufacturer's recommendations.

PART 3 EXECUTION

3.01 CONSTRUCTION OF TEMPORARY FORMWORK

- A. In accordance with ACI 301, construct formwork:
 - 1. Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until the concrete structure can support such loads.
 - 2. Obtain approval before framing openings in structural members not indicated on the drawings.

- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.
 - 2. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
 - 3. Chamfer wood inserts for forming keyways, reglets, recesses, and the like to allow wood to swell without spalling concrete and to ensure easy removal.
- C. Falsework:
 - 1. Provide positive means of adjustment (wedges or jacks) of shores and struts. Do not adjust formwork after concrete has taken its initial set. Brace formwork securely against lateral deflection and lateral instability.
 - 2. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete. Formwork camber calculations are the responsibility of the formwork designer. Set formwork and intermediate screed strips for slabs accurately to produce designated elevations and contours of the finished surface prior to removal of formwork. Ensure edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds when the finish specified requires the use of such equipment.
 - 3. When formwork is cambered, set screeds to a like camber to maintain required concrete thickness.
 - 4. Verify lines, levels, and centers before proceeding with formwork. Ensure dimensions agree with the drawings.
 - 5. Fasten form wedges in place after final adjustment of forms and prior to concrete placement.
 - 6. Anchor formwork to shores, supporting surfaces, or members to prevent upward or lateral movement of the formwork system during concrete placement.
 - 7. Securely brace and shore forms to prevent displacement and to safely support construction loads.
 - 8. Construct forms plumb and straight to conform to slopes, lines, and dimensions shown.
 - 9. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
 - 10. Provide runways for moving equipment and support runways directly on formwork or structural member without resting on the reinforcing steel.
- D. Where end-of-work sequence requires a joint in the concrete, provide adequately designed additional formwork. Extend reinforcement through formwork as indicated on the drawings. Location of the construction joint is subject to approval by the Architect and the Structural Engineer.
- E. Forms for Exposed Concrete:
 - 1. At construction joints, lap contact surface of the form sheathing for flush surfaces exposed to view over the hardened concrete in the previous placement by not more than 1 inch. Ensure formwork is held firmly against hardened concrete to prevent offsets or loss of mortar at construction joints and to maintain a true surface.
 - 2. Provide watertight formwork when architectural exposed concrete is specified.
 - 3. Unless specified in the Contract Documents, construct formwork so concrete surfaces conform to tolerance limits. The class of surface for offset between adjacent pieces of formwork facing material shall be Class C, unless specified otherwise.
 - 4. Do not use metal cover plates for patching holes or defects in forms.
 - 5. Provide sharp, clean corners at intersecting plans, without visible edges or offsets.
 - 6. Fill all unwanted joint openings with specified joint filler and finish flush to match adjacent form surfaces.
- F. Construct formwork for wall openings to facilitate removal and to counteract swelling of wood formwork. Keep wood forms wet as necessary to prevent shrinkage.
- G. Do not use rust-stained steel form-facing material.

- H. Provide temporary openings at the base of column and wall formwork and at other points where necessary to facilitate cleaning and inspection.
- I. Unless noted otherwise, all footings shall be centered under walls, piers, or columns.
- J. Provisions for Other Trades:
 - 1. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for support of adjoining work prior to concrete placement.
 - 2. Position and support expansion joint material and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.
- K. Projecting corners of beams, walls and columns shall be formed with a 3/4-inch chamfer, unless noted otherwise on architectural drawings.
- L. Cleaning:
 - 1. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign material before concrete is placed.
 - 2. Cover surfaces of formwork with acceptable formwork release agent. Apply form release agent before placing reinforcing steel and concrete according to manufacturer's written instructions. Do not allow formwork release agent to puddle in forms. Do not allow formwork release agent to contact reinforcing steel or hardened concrete against which fresh concrete is to be placed. Do not apply form release agent to concrete surfaces receiving special finishes or applied coverings affected by the agent.
 - 3. Clean and inspect formwork immediately before concrete is placed.
- M. Provide forms for concrete work adjacent to earth banks including sides of footings, except where footing excavation is vertical rock cut.
- N. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.
- O. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.02 COORDINATION

- A. Install all required pipe sleeves, cavities or slots. Notify appropriate trades in due time so they may furnish information and make necessary installations. Check sizes, location and alignment of all openings, frames and other work, which are to be built-in including electrical boxes and conduit.
- B. Layout the run of partitions and establish location of openings so other trades may properly locate their work.
- C. Core drilling concrete is not permitted unless noted otherwise or approved in writing by the Architect. Notify the Architect in advance of conditions not shown on the drawings.

3.03 INSTALLATION OF EMBEDDED ITEMS

- A. Built-In Items:
 - 1. Confirm with Architect that all materials to be embedded are suitable for embedment in concrete.
 - 2. Build in anchors, inserts, and other devices indicated or required for various portions of work.
 - 3. Build in sleeves, thimbles, and other items furnished or set in place by other trades.
 - 4. Accurately position and support all embedded items prior to concrete placement. Secure embedded items against displacement during concrete placement operations.
 - 5. Fill voids with readily removable material to prevent entry of concrete into voids.
 - 6. Mechanical and Electrical shall provide and set required sleeves.
 - 7. Coordinate setting of all embedded items.
- B. Waterstops:
 - 1. Locate waterstops in joints where indicated on the drawings.
 - 2. Build in waterstops using longest unbroken lengths possible to hold the number of end splices to a minimum.
 - 3. Form splices and intersections strictly according to the manufacturer's instructions so waterstops are continuous and develop an effective watertight joint.

4. Center waterstops in joints. Take care to prevent waterstops from bending over during placing of concrete.

3.04 TOLERANCES

- A. Construction formwork to maintain tolerances required by ACI 301 and ACI 117.

3.05 REMOVAL OF FORMS

- A. When removal of formwork is based on concrete reaching a specified compressive strength, concrete will be presumed to have reached this strength when either of the following requirements has been met:
 1. Test cylinders, molded and cured under the same conditions for moisture and temperature as used for the concrete they represent, have reached the specified compressive strength.
 2. Concrete has been cured in accordance with the specifications for the same length of time as laboratory-cured cylinders, which have reached the specified strength. Determine the length of time concrete has been cured in the structure by the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50°F and the concrete has been damp or thoroughly sealed from evaporation and loss of moisture.
- B. Forms shall remain in place for the following periods of time. These periods represent cumulative number days or hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50°F:
 1. Walls and Footings: 67% specified compressive strength or minimum 24 hours.
- C. When finishing is required, remove forms as soon as removal operations will not damage concrete.
- D. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform needed repairs or treatment required at once and follow immediately with specified curing.
- E. Loosen wood formwork for wall openings when this can be accomplished without causing damage to concrete.
- F. Do not allow removal of formwork to damage the fresh concrete for columns, walls, sides of beams, and other parts supporting the weight of the concrete. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing.

3.06 FASTENER REMOVAL

- A. Remove all protruding fasteners left as a result of securing inserts to forms by Contractor responsible for insert.
- B. Cutting flush with surface is not acceptable.
- C. Patch exposed concrete surfaces if damaged during fastener removal process.

3.07 REMOVING AND REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- B. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by the Architect.

END OF SECTION

**SECTION 03 20 00
CONCRETE REINFORCEMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabrication and placement of reinforcing steel for concrete and all related accessories.
- B. Reinforcing steel for use in bond beams, masonry columns, and lintels is specified in Division 4 and is not a part of the work in this section.
- C. Structural notes indicated on the drawings regarding concrete reinforcement shall be considered a part of this specification.

1.02 RELATED WORK

- A. Pertinent Sections of Division 01.
- B. Section 03 10 00 - Concrete Formwork.
- C. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCES

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified. Where provisions of other pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
 - 1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI SP-066 - ACI Detailing Manual.
 - 5. ASTM A184 - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
 - 6. ASTM A370 - Standard Test Methods and Definitions for Mechanical Testing of Steel Products
 - 7. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 8. ASTM A706 - Standard Specification for Deformed and Plain Low-Allow Steel Bars for Concrete Reinforcement.
 - 9. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - 10. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
 - 11. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.

1.04 SUBMITTALS

- A. Placing Drawings: Submit placing drawings showing fabrication dimensions and locations for placement of reinforcement and reinforcement accessories. Indicate bar sizes, spacing, locations, and quantities of reinforcing steel, bending and cutting diagrams, anchors, and supporting and spacing devices. Dowels shall be shown in placing drawings for the element that is to be placed first. Reinforcing steel descriptions or shop drawings shall be inch-pound sizes.
- B. Product Data: Submit product data sheets for all specified products.
- C. Manufacturer's Certifications:
 - 1. Submit mill certifications at time of delivery.
 - 2. Submit carbon equivalent (CE) for reinforcing bars to be welded.
- D. Splices: Submit request for splices not indicated in the Contract Documents. Request shall indicate locations, types, and lengths of splices for approval.
- E. Field Bending: Submit requests and procedure for field bending or straightening of reinforcement partially embedded in concrete not described in the Contract Documents.
- F. Reinforcement Relocation: Submit requests to adjust reinforcement spacing necessitated by conflicts with other reinforcement, conduits, etc. for approval.

- G. Mechanical Connections: Submit request for the use of mechanical connections not shown on the project drawings. Include engineering data on proprietary connection devices for approval.

1.05 COORDINATION

- A. Coordinate reinforcement installation with the placement of formwork and other embedded items such as inserts, conduit, pipe sleeves, drains, metal supports, anchor rods, etc.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to the jobsite in bundles sorted and labeled with durable tags indicating bar size, length, and shop drawing mark. Bundles shall also bear testing laboratory tags indicating identified steel.
- B. Store elevated clear of ground and protect at all times from contamination and deterioration.
- C. Prevent bending, coating with earth, oil, or other material, or otherwise damaging the reinforcement.
- D. For handling coated reinforcement, use equipment having contact areas padded to avoid damaging the coating. Lift bundles of coated reinforcement at multiple pick points to prevent bar-to-bar abrasion from sags in the bundles.
- E. Do not drop or drag coated reinforcement. Take all necessary steps to minimize damage to coating. Damaged coatings shall be patched.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bar Deformations: Bars used for reinforcement shall be deformed except column spirals and welded wire reinforcement, which may be plain.
- B. Reinforcing Steel: Reinforcing steel shall conform to the ASTM standard and grade indicated in the General Notes on the drawings.
- C. Welded Wire Reinforcement: Welded wire reinforcement shall conform to the ASTM standard indicated in the General Notes on the drawings.
- D. Joint Dowel Bars: Plain-steel bars. Cut bars true to length with square ends and free of burrs.
- E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, precast concrete, or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
 - 2. Concrete cast against earth: Bars may be supported by precast concrete bricks or approved prefabricated wire bar supports complying with CRSI recommendations with footpads large enough to support the weight of the bars and construction traffic without being pushed into underlying grade. Precast concrete blocks shall have a minimum compressive strength of 6,000 psi.

2.02 FABRICATION

- A. Fabrication Tolerances: Reinforcing steel shall be shop fabricated within tolerances according to ACI 117 and other applicable codes, and shall conform in size, shape, quantity, dimensions, etc. to the construction drawings and approved shop drawings.
- B. Bar Condition: Bars shall be free from mill scale, excessive rust, and other coatings, which would reduce or destroy the bond with the concrete. Wipe oil from forms before reinforcement is placed on or adjacent to so that oil will not be tracked over or in any way come into contact with the reinforcement.
- C. Bars Bending: Bars shall be bent cold, and no method of fabrication shall be used which would be injurious to the material. Heating of bars for bending is not permitted.
- D. Identification: After fabrication, bars shall be sorted, bundled, and tagged with metal tags bearing the bar mark before delivery to the jobsite.

- E. Splicing:
 - 1. Continuous reinforcing in beams and grade beams shall be lapped as follows unless noted otherwise:
 - a. Top bars: Midspan
 - b. Bottom bars: Directly over support
 - 2. Column splice reinforcing bars shall have shop fabricated offset bends at splices. Column lap splices shall be 30 bar diameters unless noted otherwise.
 - 3. Locate reinforcing splices not indicated on drawings at point of minimum stress. Review location of splices with the Structural Engineer and obtain written approval prior to proceeding.
- F. Where beams and grade beams are simple span, top bars shall be continuous for full length and hooked down at each end.
- G. Reinforcing for continuous footings shall extend into spread footings a minimum of 2'-0".
- H. Bending of Epoxy-Coated Bars: Bending of epoxy coated reinforcing bars shall conform to the epoxy manufacturer's specified requirements.
- I. Dowels between footings and walls or columns shall be the same grade, size and spacing or number as the vertical reinforcing respectively, unless noted otherwise.

PART 3 EXECUTION

3.01 PLACING

- A. Reinforcement Relocation: When necessary to move reinforcement beyond the specified spacing to avoid interference with other reinforcement, or embedded items, submit resulting arrangement of reinforcement to Structural Engineer for approval.
- B. Reinforcement Cutting: Cutting of reinforcement which conflicts with embedded objects is not acceptable.
- C. Welded Wire Reinforcement: Extend welded wire reinforcement to within 1 inch of the concrete edge. Lap edges and ends of fabric sheets a minimum of two full mesh squares. Lace edges with 16-gauge tie wire. Support welded wire reinforcement during placing of concrete to assure required positioning in the slab. Do not place wire reinforcement on grade or metal deck and raise into position in freshly-placed concrete.
- D. Wire Tie Orientation: Set wire ties so ends are directed away from the concrete surface.
- E. Slab on Grade Reinforcement Placement: Place shrinkage and temperature reinforcement 1/3 of the slab thickness from the top surface of the slabs on grade unless noted otherwise on the drawings.
- F. Do not cut, displace, or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- G. Support for Reinforcement: Unless noted otherwise, supports for reinforcement shall have Class 2 protection as defined in the CRSI Manual of Standard Practice. Submit data on supports indicating class of protection at all different locations for approval. Supports shall not be used as bases for runways for concrete-conveying equipment and similar construction loads. Do not place reinforcing bars more than 2" beyond last leg of any continuous bar support.
- H. Support for Bars in Concrete Cast on Ground: Bar supports for slabs on grade, grade beams, footings, and all other concrete cast directly onto grade shall be supported at an average spacing of 4 feet or less in each direction.
- I. Securing Reinforcing Bars: All bars must be placed, spaced, secured, and supported prior to casting concrete. Bars embedded in hardened or partially hardened concrete shall not be bent unless approved in writing prior to placement by the Structural Engineer.
- J. Foot Traffic: Restrict foot traffic over the slab on grade reinforcing after it has been properly positioned.
- K. Reinforcement at Expansion Joints: Do not continue reinforcement or other embedded metal items bonded to concrete through expansion joints. Dowels bonded on only one side of a joint and waterstops may extend through joint.

- L. Pumping Concrete: When using a pump to place concrete, pump hose shall be supported directly on forms. Do not allow hose to rest on reinforcing bars if doing so could cause displacement of bars.

END OF SECTION

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. All items required for executing and completing the cast-in-place concrete work and related work shown on the drawings or specified herein. Work shall include installation of items furnished in other sections of these specifications.
- B. Concrete paving, walks, and curbs are specified in Division 3 or 32.
- C. Structural notes indicated on the drawings regarding cast-in-place concrete shall be considered a part of this specification.

1.02 RELATED WORK

- A. Pertinent Sections of Division 01.
- B. Section 03 10 00 - Concrete Formwork.
- C. Section 03 20 00 - Concrete Reinforcement.
- D. Section 03 38 10 - Unbonded Post-Tensioned Concrete.
- E. Section 05 31 00 - Steel Deck.

1.03 REFERENCES

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified. Where any provision of other pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
 - 1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 302.1R - Guide to Concrete Floor and Slab Construction.
 - 4. ACI 302.2R - Guide for Concrete Slabs that Received Moisture-Sensitive Flooring Materials.
 - 5. ACI 303.1 - Standard Specification for Cast-in-Place Architectural Concrete.
 - 6. ACI 304R - Guide to Measuring, Mixing, Transporting, and Placing Concrete.
 - 7. ACI 305.1 - Specification for Hot Weather Concreting.
 - 8. ACI 306.1 - Guide to Cold Weather Concreting.
 - 9. ACI 308R - Guide to External Curing of Concrete.
 - 10. ACI 309R - Guide for Consolidation of Concrete.
 - 11. ACI 318 - Building Code Requirements for Structural Concrete.
 - 12. ACI 347R - Guide to Formwork for Concrete.
 - 13. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 14. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 15. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 16. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 17. ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - 18. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
 - 19. ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - 20. ASTM C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - 21. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 22. ASTM C150 - Standard Specification for Portland Cement.
 - 23. ASTM C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

24. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
25. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
26. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
27. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
28. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
29. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
30. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
31. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
32. ASTM C1017 - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
33. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic Cement Concrete.
34. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
35. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
36. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
37. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.
38. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
39. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
40. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.
41. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
42. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.

1.04 SAMPLING AND TESTING REQUIREMENTS

- A. Maintain records verifying materials used are of the specified and accepted types and sizes and are in conformance with the requirements of the Contract Documents.
- B. Use of testing services will not relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
- C. Take samples of fresh concrete at the job site for each mix design placed each day. Sampling and testing shall be done after the final addition and proper mixing of any water or admixtures that are added on site.
 1. Personnel and testing equipment shall meet the requirements of ASTM E329.
 2. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 3. Testing Frequency: Obtain at least one composite sample for each 150 cu. yd. or 5,000 sq. ft. of surface area, whichever is less or fraction thereof of each concrete mixture placed each day.
 - a. On a given project, 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 class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
 4. A strength test shall be the average of the strengths of two 6x12 inch or three 4x8 inch cylinders made from the same sample of concrete and tested at 28 days.

- D. For each sample of fresh concrete, perform the following duties:
 - 1. Measure and record slump in accordance with ASTM C143.
 - 2. Measure and record temperature in accordance with ASTM C1064.
 - a. Provide one test hourly when air temperature is 40°F and below and when 80°F and above, and one test for each composite sample.
 - 3. Measure and record air content by volume in accordance with either ASTM C231 or ASTM C173.
 - a. Wet cure specimens for a period of seven (7) days (including the period of time the specimens are in the mold). Wet cure may be achieved through storage in a moist cabinet or room in accordance with ASTM C511, or through storage in lime-saturated water.
 - b. Slump of concrete for testing shall match job requirements and need not be limited to the restrictions as stated in ASTM C157.
 - c. Report results in accordance with ASTM C157 at 0, 7, 14 and 28 days of drying.
 - 4. Mold three 6x12 inch or four 4x8 inch cylinders (laboratory cylinders) in accordance with ASTM C31 to be laboratory-cured. Protect from moisture loss and maintain at 60°F to 80°F for 24 to 48 hours before moving. Deliver cylinders to testing laboratory for curing and testing.
 - 5. Mold one cylinder (field cylinder) in accordance with ASTM C31 to be field-cured. Field cylinder shall be placed as near as possible to the in-place concrete from which it was taken, protected, and cured in the same manner. Deliver field-cured cylinder to testing laboratory, and measure and record compressive strength in accordance with ASTM C39. Field cylinder shall be used to determine if concrete footings, walls, or piers have reached the required compressive strength for steel erection to begin.
- E. Measure and record compressive strength in accordance with ASTM C39 for laboratory cylinders. Test one laboratory cylinder at 7 days and all other cylinders at 28 days. Acceptance is based on the average of the two 6x12 inch or three 4x8 inch laboratory cured 28-day tests. Notify Architect in the event strength levels do not meet the acceptance requirements of ACI 318.
 - 1. Any additional cylinders molded for Contractor to have a compressive strength test done before seven days shall be at the Contractor's expense.
- F. Prepare and submit test reports to the Architect, Engineer, Contractor and Supplier. Reports shall be completed and furnished within 48 hours of testing. Refer to description in Submittals.
- G. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- H. Should the strength of any grade of concrete for any portion of work, as indicated by molded test cylinders, fall below the minimum 28-day compressive strength specified on the drawings, upon approval of the Structural Engineer, the concrete supplier shall adjust the concrete mix for remaining portion of construction so that the resulting concrete meets the minimum strength requirements.

1.05 SUBMITTALS

- A. Concrete Materials: Submit information on concrete materials as listed below.
 - 1. Cementitious materials: Submit type, class, producer name, and certification not more than 90 days old of compliance with applicable ASTM standard.
 - 2. Aggregates: Submit type, pit or quarry location, producer name, gradations, specific gravity, water content, and certification not more than 90 days old.
 - 3. Admixtures: Submit product data sheet. Product data shall include: dosages and performance data, brand names, producers, chloride ion concentrations, and certifications of compliance with applicable ASTM standard. Certifications shall not be more than 90 days old.
 - 4. Water: Submit name of source.
- B. Product Data: Prepare and submit product and performance data for materials and accessories, including patching compounds, joint systems, curing compounds, finish materials, and other concrete related items.

- C. Testing Agency Qualifications: When requested, the proposed testing agencies shall submit data on qualifications for acceptance.
- D. Concrete Mix Design:
 - 1. Concrete mix design submittals shall be submitted to the Structural Engineer for review and approval at least 14 days prior to placing concrete.
 - 2. Obtain Structural Engineer approval for each mix design prior to use, including new mix designs required to be prepared should there be a change in materials being used.
 - 3. Submit concrete mixture proportions and characteristics for each concrete mix. Include standard deviation analysis or trial batch data with mix design. Submit historical field test data to demonstrate the average compressive strength for approval. Concrete mix proportions, materials, and handling methods for field test data or trial batches shall be the same as used for the work. Include the following information for each mix design:
 - a. Water/cementitious materials ratio.
 - b. Slump per ASTM C143
 - c. Air content per ASTM C231 or ASTM C173
 - d. Unit weight of concrete per ASTM C138
 - e. Compressive strength at 28 days per ASTM C39
 - f. Shrinkage (length change) as measured in accordance with ASTM C157 with the modifications included in Section 1.3.
 - 4. If trial batches are used, submit representative samples of each proposed ingredient to independent testing laboratory for use in preparation of mix design.
 - 5. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Indicate amounts of mix water to be withheld for later addition at Project site.
 - 6. Provide a record copy of the final mix designs and test results to the testing agency prior to commencement of the concrete work.
- E. Concrete Finish Shop Drawings: Submit drawings indicating type of finish to be used at each location.
- F. Slab-on-Grade Joint Layout: Submit drawings for proposed slab-on-grade control joint and construction joint layout for approval.
- G. Construction Sequence Submittal: Contractor shall submit an elevated slab construction sequence indicating construction joints and the pour sequence.
- H. Test Reports: Submit laboratory test reports for concrete materials, mix design, compressive strength, slump, air content, and temperature. Each report shall indicate date of sampling, date of test, mix design, and location of concrete in structure.
- I. Repair Methods: When stains, rust, efflorescence, and surface deposits must be removed, submit the proposed method of removal.
- J. Certificates: Submit written certification regarding the design mix from the ready-mix supplier and the admixture manufacturer stating all concrete and admixtures do not contain chloride ions in excess of concentrations specified herein.
- K. Placement Notification: Notify the Architect at least 24 hours in advance of concrete placement.
- L. Adjustments: Submit any adjustments to mixture proportions or changes in materials, suppliers, or sources, along with supporting documentation, during the course of the work.
- M. Cold Weather Procedure Submittal: Refer to Cold Weather Concreting article in Part 3 for more information.
- N. Record Documents: Accurately record actual locations of embedded utilities and components that are concealed from view.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cementitious materials: Store cementitious materials in dry weather tight buildings, bins, or silos that exclude contaminants.

- B. Aggregates: Store and handle aggregate in a manner that will avoid segregation and prevent contamination with other materials or other sizes of aggregates. Store aggregates so as to drain freely.
- C. Admixtures: Protect stored admixtures against contamination, evaporation, or damage. Protect liquid admixtures from freezing and temperature changes, which would adversely affect their performance. Handle chemical admixtures in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Portland Cement: Portland cement shall conform to ASTM C150, Type I Normal, and be a standard brand of Portland cement. Use one brand of cement throughout project, unless approved in writing by the Engineer. Cement, which conforms to ASTM C150 Type II, may be used if it also meets the requirements of ASTM C150 Type I. Cement used in concrete shall be of the same brand and type as the cement used in the concrete represented by the submitted field test data or used in the trial mixtures. Maintain consistent cement color throughout project unless directed otherwise by architectural requirements.
 - 1. Total replacement of Portland cement by supplementary cementitious materials in design mixture shall not exceed 50% (by weight).
- B. Supplementary Cementitious Materials
 - 1. Fly Ash: Fly ash shall conform to ASTM C618, Class C or Class F. Replacement of Portland cement by fly ash shall not exceed the following (percentages are by weight):
 - a. Concrete Flatwork: 20 percent.
 - b. Mass Concrete (more than two feet thick): 50 percent.
 - c. All other concrete: 25 percent.
 - d. Concrete to be placed in cold weather as defined herein: No fly ash allowed unless the cold weather procedure submitted has compensated for the increased setting time and decreased rate of strength gain due to cold weather and fly ash.
 - 2. Slag Cement: ASTM C989, Grade 100 or 120.
 - a. Ground Granulated Blast-Furnace Slag Limit: 50% by weight of total cementitious materials.
 - b. In mass concrete more than 2 feet thick, the usage rate may be 80% by weight of total cementitious materials.
 - 3. Combined Fly Ash and Ground Granulated Blast-Furnace Slag:
 - a. Supplementary Cementitious Materials Limit: 50% with fly ash not exceeding 25% by weight of total cementitious materials.
 - b. In mass concrete more than 2 feet thick: 80% with fly ash not exceeding 50% by weight of total cementitious materials.
- C. Coarse Aggregate for Normal Weight Concrete: Comply with ASTM C33. Provide coarse aggregate from a single source for exposed concrete. Gradations shall be similar to that described in the following table:

COARSE AGGREGATE GRADATIONS							
SIEVE SIZE - PERCENT PASSING							
Grade No.	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 16
4	90-100 Note 1	20-55	0-15	---	0-5	---	---
57	100	95-100	---	25-60	0-10	0-10	---
67	---	100	90-100	---	20-55	0-10	---
89	---	---	---	100	90-100	20-55	0-10

- 1. Shall be 100 percent passing the 2" sieve.

FINE AGGREGATE GRADATIONS							
SIEVE SIZE - PERCENT PASSING							
Grade No.	3/8	No. 4	No. 8	No. 16	No. 50	No. 80	No. 100
FA	100	95-100	80-100	50-85	5-30	---	0-10

- D. Do not use aggregates containing deleterious substances that could cause spalling on any exterior exposed surface. These include, but are not limited to the following:
1. Organic impurities.
 2. Ferrous metals.
 3. Soluble salts.
 4. Coal, lignite, or other lightweight materials.
 5. Soft particles.
 6. Clay lumps and friable particles.
 7. Cherts of less than 2.40 specific gravity.
- E. Water: Mixing water for concrete shall meet the requirements of ASTM C94. Water shall be clean and free from injurious amounts of acids, alkalis, organic materials, chloride ions and oils deleterious to concrete or reinforcing steel.
- F. Testing agency shall be given access to plants and stockpiles to obtain samples for testing for compliance with the Contract Documents.

2.02 ADMIXTURES

- A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures. Calcium chloride thiocyanates or admixtures containing intentionally added chlorides are not permitted.
- B. Water Reducing Admixture: Material shall comply with ASTM C494, Type A.
1. Acceptable:
 - a. BASF Corporation - MasterPozzolith Series or MasterPolyheed Series.
 - b. Chemical Company - Eucon WR Series.
 - c. Sika Chemical Corp. - Plastocrete 161.
 - d. GRT - Polychem 400 NC.
 - e. Grace Construction Products - WRDA 82.
- C. High Range Water Reducing Admixture (superplasticizer): Material shall comply with ASTM C494, Type F or Type G.
1. Acceptable:
 - a. BASF Corporation - MasterRheobuild 1000 or MasterGlenium Series.
 - b. Euclid Chemical Company - Eucon 37 or Plastol Series.
 - c. Sika - ViscoCrete 2100.
 - d. GRT - Melchem.
 - e. Grace Construction Products - Mira 110.
 - f. .
- D. High Range Water Reducing, Slump Retaining Admixture: Material shall comply with ASTM C494, Type F or Type G.
1. Acceptable:
 - a. BASF Corporation - MasterGlenium 7700.
 - b. Euclid Chemical Company - Eucon 537, Eucon 1037, or Plastol Series.
 - c. Sika - Sikament 686.
 - d. GRT - Melchem - M.
 - e. Grace Construction Products - ADVA FLEX.

- E. Water Reducing and Retarding Admixture: Material shall comply with ASTM C494, Types B and D.
 - 1. Acceptable:
 - a. BASF Corporation - MasterSet R Series or MasterSet DELVO Series.
 - b. Euclid Chemical Company - Eucon Retarder Series.
 - c. Sika Chemical Corporation - Plastiment.
 - d. GRT - Polychem - R.
 - e. Grace Construction Products - Daratard 17 or Recover.
- F. Set Accelerating Corrosion-Inhibiting Admixture: Admixture shall contain at least 30% calcium nitrite, while meeting the requirements of ASTM C494 as a Type C admixture.
 - 1. Acceptable:
 - a. BASF Corporation - MasterLife CI 30.
 - b. Euclid Chemical Company - Eucon CIA.
 - c. Grace Construction Products - DCI.
- G. Admixtures used in concrete shall be the same brand, type, and dosage used in concrete represented by field test data or used in trial mixes.

2.03 CURING PRODUCTS

- A. Moisture Retaining Cover
 - 1. Plastic Film: Use 6 mil polyethylene film sheet materials that meet the requirements of ASTM C171.
 - 2. White burlap-polyethylene sheet meeting ASTM C171.
 - 3. Reinforced curing paper complying with ASTM C171.
 - 4. Moisture Retaining Fabric: A naturally colored, non-woven, polypropylene fabric with a 4-mil, non-perforated reflective (white) polyethylene coating containing stabilizers to resist degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture retention. Acceptable manufacturers and products include:
 - a. PNA Construction Technologies, Inc.: Hydracure S16.
 - b. PNA Construction Technologies, Inc.: Hydracure M5.
 - c. Reef Industries Incorporated: Transguard 4000.
- B. Dissipating Resin Curing Compound: Clear, waterborne, membrane-forming curing compound complying with ASTM C309, Type 1, Class B shall be composed of hydrocarbon resins and dissipating agents that begin to break down upon exposure to ultraviolet light and traffic approximately 4 to 6 weeks after application, providing a film that is removable with standard degreasing agents and mechanized scrubbing actions so as to not impair the later addition of applied finishes.
 - 1. Curing compounds used on interior enclosed environments shall be a water-borne product and VOC compliant as required by the U.S. EPA Architectural Coating Rule.
- C. Non-dissipating Curing Compound: Clear, membrane-forming curing compound complying with ASTM C309, Type 1, Class B.
 - 1. Curing compounds used on interior enclosed environments shall be a water-borne product and VOC compliant as required by the U.S. EPA Architectural Coating Rule.
- D. Curing and Sealing Compound: Clear, membrane-forming curing and sealing compound complying with ASTM C309, Type 1, and ASTM C1315, Type 1, Class A. Compound shall dry to a clear finish, resist yellowing due to ultraviolet degradation and provide a long-lasting finish that has high resistance to chemicals, oil, grease, deicing salts, and abrasion.
 - 1. Curing and sealing compounds used on interior enclosed environments shall be a water-borne product and VOC compliant as required by the U.S. EPA Architectural Coating Rule.

2.04 MISCELLANEOUS MATERIALS

- A. Dry-Pack: Mix 1 part Portland cement, 2 parts fine aggregate, and enough water to hydrate cement and provide a mixture that can be molded with the hands into a stable ball (a stiff mix). Do not mix more than the amount that can be used within 30 minutes.
- B. Expansion Joint Material: Preformed, resilient, non-extruding asphalt-impregnated fiber conforming to ASTM D1751. Thickness of expansion joint material shall be 1/2" unless noted otherwise on the drawings.

- C. Magnesium phosphate patching cement specially designed for cold weather grouting and anchoring.
 - 1. Acceptable:
 - a. BASF Corporation - MasterEmaco T545.
 - b. Euclid Chemical Company - Eucospeed MP.
- D. Vapor Barrier: ASTM E 1745, Class A, not less than 15 mils thick.
 - 1. Acceptable:
 - a. Stego Industries, LLC - Stego Wrap.
 - b. W.R. Meadows, Inc. - Perminator.
 - c. Raven Industries - Vapor Block.
 - d. Insulation Solutions - Viper VaporCheck II.
 - e. <Insert>.
- E. Penetrating Liquid Floor Treatment: Chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. Manufacturers and products:
 - a. BASF Corporation - MasterKure HD 200WB.
 - b. Conspec Marketing & Manufacturing Co., Inc. - Intraseal
 - c. Curecrete Chemical Co., Inc. - Ashford Formula
 - d. Dayton Superior Corporation - Day-Chem Sure Hard (J-17)
 - e. Euclid Chemical Company - Eucosil
 - f. L&M Construction Chemicals, Inc. - Seal Hard
 - g. Vexcon Chemicals, Inc - Vexcon Starseal PS
 - h. SpecChem - SpecHard
- F. Control Joint Filler: Flexible, single-component polyurethane sealant with backer rod compliant with ASTM C 920, Type S, Grade P, Class 25. Apply sealant per manufacturers written recommendations.
 - 1. Acceptable:
 - a. Dayton Superior - Perma 230 SL.
 - b. Euclid Chemical Company - Eucolastic I.
 - c. BASF Corporation - MasterSeal SL 1.

2.05 STRENGTH AND PROPERTIES

- A. Concrete Mix Designs: Refer to the drawings for specified compressive strength. Proportion concrete mixes according to the properties in the following table. The concrete supplier may produce a mix at a lower water-cement ratio to allow for adjustment of slump at the site by adding water. The addition of site water shall be in accordance with ASTM C94, and the total water-cement ratio shall not exceed the value specified below.

Class	Coarse Aggregate Gradation	Fine Aggregate Gradation	Range of Slump	Max. w/c	Air Content	Other Requirements
A	57 or 67	FA	1" to 4"	0.40	5% to 8%	
B	57 or 67	FA	1" to 4"	0.45	5% to 8%	
C	57 or 67	FA	1" to 4"	0.50	n/a	
D	57 or 67	FA	4" to 6"	0.50	n/a	Use water reducing admixture to achieve slump specified
E	4 or 57	FA	1" to 4"	0.50	n/a	

Class	Coarse Aggregate Gradation	Fine Aggregate Gradation	Range of Slump	Max. w/c	Air Content	Other Requirements
F	4 or 57	FA	5" to 8"	0.50	n/a	Use retarder
H	89	FA	5" to 8"	0.50	n/a	
J	Light-weight	FA	5" max	0.5	4% to 7%	

- B. Schedule of Concrete Classes: Provide concrete of the specified class according to the following:
1. Footings: Class E
 2. Exterior foundation walls and piers: Class B
 3. Interior slabs on grade: Class D
- C. Slump of Superplasticized Concrete: Concrete containing high-range water reducing admixtures (superplasticizer) shall have 8" maximum slump, unless otherwise approved by Structural Engineer.
- D. Accelerators: Add non-chloride accelerator to all concrete slabs placed at air temperatures below 50°F only when approved in the mix design. Use of admixtures will not relax cold weather placement requirements.
- E. Water Reducer: Add water reducing admixture or high range water reducing admixtures (superplasticizers) as follows:
1. All pumped concrete.
 2. Fiber reinforced concrete.
 3. As required for placement or workability.
 4. As required by high temperatures, low humidity, or other adverse placement conditions.
 5. Concrete with water-cementitious materials ratio below 0.50.
- F. No other admixtures shall be used unless approved by Structural Engineer.
- G. Chlorides: Admixtures or other ingredients including aggregates containing calcium chloride or more than 0.05% chloride ions by weight shall not be used.
- H. Workability: Concrete shall have a workability such that it will fill the forms without voids, honeycombs, or rock pockets with proper vibration without permitting materials to separate or excess water to collect on the surface.
- I. Concrete Temperatures: Minimum concrete temperature of fresh concrete varies in relation to average air temperature over a 24-hour period as follows:
1. Air temperature below 0°F Concrete temperature 70°F min.
 2. Air temperature 0°F to 30°F Concrete temperature 65°F min.
 3. Air temperature 30°F to 50°F Concrete temperature 50°F min.
 4. Air temperature above 50°F No minimum temperature
 5. The maximum temperature of concrete at the time of delivery shall be 90°F. When concrete temperature exceeds 90°F, concrete supplier shall attempt to reduce temperature by shading aggregates and cement and cooling mix water. When these methods fail to reduce the concrete temperature below 90°F, supplier shall use ice in the water to reduce the concrete temperature. Use set retarding admixtures only when approved in the mix design.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- C. Do not place concrete until data on materials and mix designs have been approved, Architect has been notified, and all other affected trades have coordinated their work.

- D. Remove snow, ice, frost, water, mud, and other foreign material from surfaces, reinforcing bars and embedded items against which concrete will be placed.
- E. Prepare previously placed concrete by cleaning with sandblasting, steel brush, or water blast to expose aggregate to minimum 1/4" amplitude.

3.02 SLABS

- A. Slab on Grade:
 - 1. All interior slabs on grade shall have a polyethylene vapor retarder conforming to ASTM E1745. Lap all joints minimum 6" and seal edges with adhesive tape. Fit vapor retarder around utilities and seal with adhesive tape as required. Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.
 - 2. Refer to[drawings][and][Section 31 23 00] for required sub-grade preparation beneath slabs on grade.
 - 3. Where vapor retarder is not used below the slab on grade, wet sub-grade below slab prior to placing concrete. Subgrade shall be moist with no free water and no muddy or soft spots.
 - 4. Saw cut control joints: Cut with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Control joints shall be located along column lines, with intermediate joints spaced at a maximum distance indicated on the drawings, unless noted otherwise. Control joints shall be continuous, not staggered or offset. Slab panels shall have a maximum length to width ratio of 1.5 to 1. Provide additional control joints at all reentrant or isolated corners formed in the slab on grade. Refer to the drawings for typical control joint detailing.
 - 5. Provide isolation joints[around each column,][against grade beams,][and][along foundation walls]. Form isolation joints with 1/2" expansion joint material. Extend isolation joint material full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - 6. Depress slabs as required for[mats,][architectural finishes,][pits,][and][kitchen equipment]. Obtain layout and locations from Architect.
 - 7. Verify completion of all under slab work with mechanical and electrical trades before placing slabs.
 - 8. Slope slabs as indicated on the drawings and to provide positive drainage. Slope slab keeping bottom level and varying top. Maintain minimum thickness of concrete as indicated on the drawings. Refer to floor finishes for tolerances.
- B. All supported slabs, including slabs-on-steel decking and cast-in-place concrete slabs:
 - 1. Supported slabs have deflections that may cause areas of concrete to have thicknesses greater than indicated on the drawings. Contractor is expected to provide that volume as needed to finish the floor at the specified elevation. If specified floor finish tolerances are not achieved during the concrete floor construction[, after formwork removal], the Contractor shall install, at no cost to the project, a self-leveling cementitious underlayment [BASF Corporation - MasterTop 110 SL]<Insert>[or approved equivalent] to correct the floor flatness and levelness.
- C. Embedded Items:
 - 1. The outside diameter of embedded conduit or pipe shall not exceed one-third of the slab thickness in structural slabs, including at crossovers, and shall be placed between the top and bottom reinforcing with a minimum 3" clear cover. Conduit or pipe running parallel to each other shall be spaced at least 8" apart and no more than 2 runs stacked vertically in the slab. Conduit or pipe shall not be embedded in any supported slab less than 6" thick. No embedded conduit or pipe is allowed in any concrete slab-on-steel deck.

3.03 CONSTRUCTION JOINTS

- A. Beams: Locate construction joints for beams, joists, and girders in middle 1/3 of span, unless otherwise indicated on the drawings. When a beam intersects a girder at this point, the joint in the girder shall be offset a distance equal to or greater than twice the width of the beam. Make joints perpendicular to the main reinforcement.

- B. Slabs: Where slab pour is to receive a subsequent topping or additional concrete, expose aggregate in top surface by brooming in two directions at right angles to each other.
- C. Reinforcing: Stop all welded wire reinforcement and/or reinforcing at construction joints in slabs on grade and provide dowel bars as detailed. Provide reinforcement at other construction joints as detailed. Roughen and thoroughly clean the surface of the concrete, remove all laitance, and wet the surface before placing new concrete against the joint.
- D. Wall Control Joints: Locate vertical control joints in exposed walls at a minimum uniform spacing not to exceed 25'-0". Coordinate joint locations with architectural drawings.

3.04 CONCRETE PLACEMENT

- A. Place concrete as continuously as possible until placement is complete. Do not place against concrete that has attained initial set, except at authorized joints. If, for any reason, concrete pour is delayed for more than 45 minutes, bulkhead off pour at last acceptable construction joint. Immediately remove excess concrete and clean forms.
- B. Do not begin to place concrete during periods of rain, sleet, or snow unless adequate protection is provided.
- C. No concrete shall be cast onto or against sub-grades containing free water, frost, ice, or snow. If earth at bottom of forms has dried out, rewet so the soil is moist, but free of standing water and mud.
- D. Notify the Architect in advance if concrete is to be pumped.
- E. Do not place concrete until all reinforcement is in place, forms have been thoroughly cleaned and approval has been given.
- F. Do not accept concrete delivered to the job site more than 90 minutes after initial mixing.
- G. Concrete from its point of release to mixers, hoppers, or conveyances, shall not be permitted to drop more than 5 feet (10 feet for concrete containing high range water reducers). Deposit concrete directly into conveyances and directly from conveyances to final points of deposit. Sufficient transportation equipment in good working order shall be on hand before work begins. All conveying equipment must be clean and kept clean during concreting operations. Take every possible precaution to prevent segregation or loss of ingredients.
- H. Regulate rate of placement so concrete surface is kept level throughout; a minimum being permitted to flow from one area to another. Use tremie heads spaced at approximately 10-foot intervals for placing concrete in walls. Control rate of placement consistent with form design.
- I. Deposit concrete in one continuous operation until section being placed has been completed. For slab thicknesses greater than 12 inches, prevent excessive segregation of aggregate and high temperatures in accordance with ACI 304 and ACI 308. Place concrete in wall forms in layers not greater than 12 inches in depth, each layer being compacted by internal vibration before succeeding layer is placed.
- J. Place concrete as near as possible to its final position to prevent segregation or loss of materials. Do not use vibrators to transport concrete within forms. Consolidate concrete in walls, columns, beams, and slabs or joist construction thicker than 8" with internal vibrators (8,000 to 12,000 VPM). Slabs less than 8" thick may be consolidated with internal vibrators (9,000 to 13,500 VPM) or vibrating screeds supported on forms, boards, or rails, approved by the Structural Engineer, supplement vibration by forking or spading by hand along surfaces adjacent to forms and construction joints. Be sure an adequate number of operating vibrator units are on hand to properly consolidate quantity of concrete to be placed, including spares for emergency use.
 - 1. Vertically insert and remove handheld vibrators at constant intervals 18 to 30 inches apart. Vibrate concrete the maximum amount and time required for complete consolidation, without segregation, and release of entrapped air bubbles, but in no instance exceed 15 seconds per square foot of exposed surface.
- K. Re-tempering of concrete shall not be permitted. Concrete that has stood more than 15 minutes after leaving the mixer shall be discarded.

- L. Exercise care in placing concrete over waterproof membranes, rigid insulation, and/or protection boards to avoid damaging those materials. Report damage immediately, and do not proceed until damage is repaired.
- M. Remove loose debris from hardened surfaces of previous pours by sandblasting surfaces and expose clean coarse aggregate firmly embedded in cement matrix.
- N. Remove loose debris from hardened surfaces of previous pours, thoroughly wet and slush with a neat cement grout immediately before placing new concrete or apply bonding compound to surface and let dry before placing new concrete.
- O. Protect existing concrete work to be exposed to view and other finished materials from damage and staining resulting from concreting operations. Handle concrete carefully to avoid dripping and spillage. Remove spilled concrete from existing surfaces immediately. Covering sills, ledges, and other surfaces with protective coverings may be necessary to protect the work.
- P. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- Q. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor rods for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- R. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on the drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.05 CONCRETE FINISHES AND TOLERANCES

- A. Exposed Smooth Formed Surfaces: Remove forms and perform necessary repairs and patch to produce surface finish-3.0 as specified in ACI 301. Apply the following to smooth-formed finished concrete exposed to view in the finished work. Confirm finishes with the Architect prior to concrete placement by submitting shop drawings indicating locations of all types of finishes.
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.06 CONCRETE SLAB FINISHES AND TOLERANCES

- A. Trowel Finish:
 - 1. Screed concrete to an even plane, float, then power trowel the surface.
 - 2. Hand trowel the surface smooth and free of trowel marks. Continue hand troweling until a ringing sound is produced as the floor is troweled.
 - 3. Provide trowel finish as indicated on the drawings and at the following locations:
 - a. Concrete floors exposed in finished work unless otherwise indicated.
 - b. Slabs to receive curing compounds and sealers.
 - c. Slabs to receive resilient flooring or carpet.
 - d. Slabs to receive waterproof membranes.
- B. Fine Broom Finish:
 - 1. Screed concrete to an even plane, float, then power trowel the surface. Provide fine hair broom finish perpendicular to slope, free of loose particles, ridges, projections, voids, and concrete droppings.
 - 2. Provide fine broom finish as indicated on the drawings and at the following locations:
 - a. Stoop slabs.
 - b. Raised curbs and walkway areas.
 - c. Slabs to receive thin set ceramic tile.

- C. Broom Finish:
1. Screed concrete to an even plane and then float. Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a coarse broom across the surface.
 2. Provide as indicated on the drawings and at the following locations:
 - a. ADA ramp slabs.
 - b. Exterior walkway slabs.
- D. Floor Finish Tolerances: Floor finish tolerances as measured in accordance with ASTM E1155, Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System (Inch Pound Units), shall be as follows:

Floor Profile Quality Classification	Minimum Flatness Number Required			
	Test Area		Minimum Local F-Number	
	Flatness F _F	Level F _L	Flatness F _F	Level F _L
Slab on Grade (Office, School)	25	20	15	12

***** OR *****

- E. Floor Finish Tolerances: Floor finish tolerances shall be measured by placing a freestanding (unleveled) 10-foot straightedge anywhere on the slab and allowing it to rest upon two high spots within 72 hours after placement of slab and removal of shoring (if present). The gap at any point between the straightedge and the floor (and between the high spots) shall not exceed:
1. Slab on Grade (Office, School): 1/4"
 2. Slab on Grade (General Warehouse): 3/16"
 3. Suspended Slabs (Steel frame): 1/4"
- F. Slab Drainage: Finish all concrete slabs to proper elevations to ensure that all surface moisture will drain freely to floor drains, and that no puddle areas exist. Contractor shall bear the cost of corrections to provide positive drainage.
- G. Special Tolerances for Concrete Slabs: No abrupt change in vertical elevation of 1/4" or more is acceptable at the interface between slabs and within areas where pedestrian traffic is expected.

3.07 CONCRETE CURING

- A. Freshly placed concrete shall be protected from premature drying and excessively hot temperatures.
- B. Concrete other than high-early strength shall be maintained above 50°F and in a moist condition for at least the first 7 days after placement, except when special curing is used. Special curing procedures shall not be used without written permission from the Structural Engineer.
- C. High-early strength concrete shall be maintained above 50°F and in a moist condition until it has reached 2/3 of the specified 28-day compressive strength, but not less than 3 days unless special curing is used with written permission from the Structural Engineer.
- D. Formed surfaces shall be cured by leaving the formwork in place during the curing period.
- E. Protect concrete from excessive changes in temperature during the curing period and at the termination of the curing process. Changes in the temperature of the concrete shall be as uniform as possible and shall not exceed 5°F in any one hour or 50°F in any 24-hour period.
- F. Protect concrete from injury from the elements until full strength is developed. Protect from mechanical injury.
- G. During cold weather construction, all [footings]<Insert> shall be protected from frost penetration until the building is enclosed and temporary heat is provided.

3.08 SLAB CURING

- A. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface. Use one of the methods described below.

- B. Moisture-Retaining-Cover Curing for Concrete Floors Not Exposed in Final Condition: Cover concrete surface with waterproof sheet material as soon as finishing operations are complete and the concrete is sufficiently hard to be undamaged by covering. The cover shall be placed flat on the concrete surface, avoiding wrinkles. Sprinkle concrete with water as necessary during application of covering. Place in widest practicable width, with sides and ends lapped at least 12 inches, and seal with waterproof tape or adhesive. Verify the concrete is continuously wet under the sheets; otherwise, add water through soaker hoses under the sheets. Weight down covering to prevent displacement. Immediately repair any holes or tears during the curing period using polyethylene sheet and waterproof tape. Curing process shall be maintained for a minimum of 7 days.
- C. Moisture-Retaining-Fabric Curing for Concrete Floors to Remain Exposed: Cover concrete surface with moisture retaining fabric as soon as finishing operations are complete and the concrete is sufficiently hard to be undamaged by covering. The cover shall be installed in accordance with the manufacturer's written recommendations, in largest practical widths. Wet the slab to rejection, then thoroughly wet fabric side of cover and install with poly side up. Lap over adjacent covers a minimum of 18". Wet all laps and outside edges to prevent displacement and to ensure intimate contact with concrete and adjacent covers. Rewet as necessary and protect covers from damage during curing process.
 - 1. After minimum 7-day cure, remove moisture retaining fabric in sections.
 - 2. A maximum of 3,500 square feet of concrete curing cover may be removed at any one time. At no time shall the exposed area be permitted to dry prior to completion of the floor scrubbing process.
 - 3. Using a high-powered floor scrubber capable of a minimum 80 pounds head pressure, and a mild citrus-based detergent that does not damage or mar the surface in any way, scrub the floor to remove any minerals or soluble salts that may have accumulated at the floor surface. Rinse area thoroughly with clean fresh water. Remove water and allow floor to dry. If whitening occurs during drying, repeat scrubbing process before floor dries until no whitening occurs during drying.
 - 4. All areas of the floor shall remain wet during floor scrubbing process. Expose only the amount of floor surface that can be cleaned before any drying occurs without exceeding the maximum allowable exposed area.
- D. Curing Compound: Apply uniformly in continuous operation by low pressure spray equipment or roller as soon as finishing operations are complete, free water on the surface has disappeared, and no water sheen can be seen. Follow the manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. Verify compatibility of the curing compound with paint, finishes, or toppings that require positive bond to the concrete. If curing compound is not compatible with paint finishes or toppings, utilize a dissipating curing compound and remove in accordance with the manufacturer's recommendations.

3.09 PENETRATING LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
- B. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs in accordance with manufacturer's written instructions.
- C. Do not apply to concrete that is less than seven days old.
- D. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
- B. Do not fill joints until construction traffic has permanently ceased.
- C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.11 APPLICATION OF FLOOR SEALER - FINISH COAT

- A. Give concrete floors, as indicated in the Room Finish Schedule and where exposed in finished Work, a second coat of curing and sealing compound immediately prior to Substantial Completion.
- B. Clean floors and apply sealer strictly according to manufacturer's instructions. Dilution and coverage shall be as recommended by the manufacturer. Apply sealer evenly.

3.12 COLD WEATHER CONCRETING

- A. Definition: Cold weather shall be defined as a period when for more than three successive days the average daily outdoor temperature drops below 40°F. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50°F occur during more than half of any 24-hour duration, the period shall not be regarded as cold weather.
- B. All cast-in-place concrete work occurring during cold weather shall conform to all requirements of ACI 306.1, "Standard Specification for Cold Weather Concreting", published by the American Concrete Institute, Detroit, Michigan, except as modified by the contract documents or this specification.
- C. Planning: The General Contractor, concrete contractor, concrete supplier, and Architect shall have a pre-construction conference to outline the cold weather concreting operations concerning the placing, finishing, curing and protection of the concrete during cold weather. Pre-construction conference shall occur before cold weather is expected to occur.
- D. Detailed procedure submittal: Concrete contractor shall prepare and submit for review detailed procedures for the production, transportation placement, protection, curing and temperature monitoring of concrete during cold weather. Include procedures to be implemented upon abrupt changes in weather conditions. Do not begin cold weather concreting until these procedures have been reviewed and approved.
- E. Mixing: Concrete flatwork poured in cold weather shall be proportioned to obtain a lower slump to minimize the amount of bleed water during finishing. All bleed water should be skimmed off flatwork prior to troweling. Concrete that will be exposed to cycles of freezing and thawing while saturated should be properly air entrained as outlined in this specification.
- F. Protection of Concrete: Cure and protect concrete against damage from freezing for a minimum period of 72 hours, unless approved by the Structural Engineer. The protection period may be reduced according to ACI 306.1 requirements. Concrete contractor shall submit a letter of request to reduce the protection period, by outlining the method used to achieve the reduction per ACI 306.1.
 1. When practical for the construction schedule, formwork shall be insulated and remain in place for at least the required protection period.
- G. Concrete Temperatures: The minimum temperature of concrete immediately after placement shall be as specified in the following table.

Section Size	Minimum temperature of concrete as placed and maintained during the protection period	Maximum gradual decrease in surface temperature during any 24 hours after the end of the protection.	Mixing Temperatures		
			Above 30°F	0 to 30°F	Below 0°F
Less than 12 in	55°F	50°F	60°F	65°F	70°F
12-36 in	50°F	40°F	55°F	60°F	65°F
36-72 in	50°F	30°F	50°F	55°F	60°F
Greater than 72 in	50°F	20°F	45°F	50°F	55°F

- H. **Mixing Temperatures:** As the ambient air temperature decreases, the concrete mixing temperature shall be increased to compensate for the heat lost in the period between mixing and placement. The concrete supplier shall use one or both of the following methods for increasing the concrete temperature.
 - 1. Heating the mixing water to a temperature necessary to offset the temperature losses during transport. Supplier shall not heat water to temperatures in excess of 140°F, without taking special precautions as outlined in ACI 306.
 - 2. Heating the aggregate with a circulated steam piping system.
- I. **Temperature measurements:** The Contractor shall be responsible for monitoring and recording the concrete temperatures during placement and throughout the protection period.
 - 1. Inspection personnel shall keep a record of the date, time, outside air temperature, temperature of concrete as placed, and weather conditions.
 - 2. Temperature of the concrete and the outside air shall be recorded at regular intervals but not less than twice in a 24-hour period. The record shall include temperatures at several points within the enclosure and on the concrete surface of sufficient frequency to determine a range of temperatures.
 - 3. Inspection agency shall submit the temperature logs to the Architect for permanent job records.

3.13 HOT WEATHER PROTECTION

- A. **Definition:** Hot weather shall be defined as any combination of high ambient temperature, low relative humidity, high winds, and intense solar radiation that leads to higher than usual evaporation. The table below defines low relative humidity based on air temperature. For a given air temperature, if the relative humidity is equal to or less than the specified minimum, provisions for hot weather concreting shall be as follows:

Air Temperature	Minimum Relative Humidity
105°F	90%
100°F	80%
95°F	70%
90°F	60%
85°F	50%
80°F	40%
75°F	30%

- B. **Scheduling:** When hot weather is expected, adjust concrete placement schedules to avoid placing or finishing during the period from noon until 3:00 pm. When possible, slab pours should be delayed until the building is enclosed to protect the concrete from wind and direct sunlight. The construction schedule shall account for 7-day moist curing period.
- C. **Mixing:** Concrete supplier shall adjust mix designs and admixtures to minimize slump loss. Concrete shall be mixed at a water-cement ratio, which is lower than the specified maximum, to allow for the adjustment of slump by addition of water in the field. Water reduction shall be accomplished without reducing initial slump by increasing dosage of a water reducing admixture.
- D. **Preparation:** Do not order concrete earlier than is required to avoid delays. Cool forms, subgrades and reinforcing bars with water spray from fog nozzle prior to concrete placement.
- E. **Delivery:** Site traffic shall be coordinated, and delivery times scheduled to minimize waiting times for concrete trucks.
- F. **Placement:** Preparations shall be made to place and consolidate the concrete at the fastest possible rate. Maintain a continuous flow of concrete to the job site to avoid development of cold joints, during placement of slabs, apply fog spray to prevent moisture loss without causing surplus water to stand on concrete surface.

- G. Finishing: Finish concrete as fast as practical. Continue fogging concrete during finishing. Where fogging is not possible, apply sprayable moisture-retaining film between finishing passes.
- H. Curing: Formed concrete shall be covered with a waterproof material to retain moisture. Flat work shall be moisture cured as described in this specification. Moist curing shall continue for at least 7 days.

3.14 FIELD QUALITY ASSURANCE

- A. Independent Testing Agency and [Special] Inspector shall each perform their prescribed inspection, sampling, and testing services as described in Part 1 of this specification section.
- B. In cases where samples have not been taken or tests conducted as specified or strength of laboratory test cylinders for a particular portion of the structure fails to meet requirements of ACI 301, for evaluation of concrete strength, Structural Engineer shall have the right to order compressive or flexural test specimens or both be taken from the hardened concrete according to ASTM C42, load tests according to ACI 318, or such other tests as may be necessary to clearly establish the strength of the in situ concrete, and such tests shall be paid for by the Contractor. Where cores have been cut from the Work, Contractor shall fill voids with dry-pack and patch the finish to match the adjacent existing surfaces.

3.15 REPAIR OF DEFECTIVE AREAS

- A. All repair of defective areas shall be made, with prior approval of Architect and Structural Engineer as to method and procedure, in accordance with Section 5 of ACI 301, except specified bonding compound must be used. Cosmetic repairs of minor defects in exposed concrete surfaces shall be in a manner acceptable to the Architect. Defective areas shall be deemed when:
 - 1. Tests on core or prism specimens fail to show specified strengths.
 - 2. Not formed as indicated or detailed.
 - 3. Not plumb or level where so indicated or required to receive subsequent work.
 - 4. Not true to intended grades and levels.
 - 5. Cut, filled, or resurfaced, unless under direction of the Structural Engineer.
 - 6. Debris is embedded therein.
 - 7. Not fully in conformance with provisions of the drawings.
 - 8. Damaged by hot or cold weather conditions.
 - 9. Mixing time exceeds 90 minutes from ready-mix plant to the time of deposit.
- B. Patch form tie holes at the following locations:
 - 1. Unfinished exposed concrete (not scheduled for painting, plus at board formed concrete finish).
 - 2. All other areas: Prime voids with bonding compound and fill with patching mortar. Strike flush without overlap, float to uniform texture to match adjacent surfaces.
 - 3. Exposed areas scheduled for spray texture:
 - a. Remove projections and protrusions: 1/16" or larger.
 - b. Remove continuous ridges 1/32" or larger.
 - c. Fill voids and pin holes.
 - 4. Exposed areas scheduled for paint or epoxy:
 - a. Remove projections, ridges, and other protrusions 1/32" or larger.
 - b. Fill voids and pin holes 1/16" or larger.
 - 5. Exposed areas not scheduled for paint or other finishes:
 - a. Remove projections, ridges and other protrusions not conforming to requirements specified under Section 03 10 00.
 - b. Fill voids and pin holes not conforming to requirements specified under Section 03 10 00.
- C. All structural repairs shall be made, with prior approval of the Architect/Engineer, as to method and procedure, using the specified epoxy adhesive and/or epoxy mortar.

- D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- E. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

3.16 CEMENT GROUT AND DRY-PACK

- A. Dry-Pack: Thoroughly blend dry ingredients prior to mixing with water. Forcibly pack mixture to completely fill voids and spaces.

3.17 CLEANING

- A. Clean exposed concrete to remove laitance, efflorescence and stains.

END OF SECTION

**SECTION 03 35 11
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.
- B. Clear coatings.
- C. Polished concrete.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.
- B. Section 09 67 00 - Fluid-Applied Flooring.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Product Data: Manufacturer's published data and installation instructions for concrete polishing system and finishing products, including manufacturer's installation instructions, information on compatibility of different products, and limitations.
- D. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- E. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Specimen Warranty: Manufacturer warranty.

1.05 QUALITY ASSURANCE

- A. For slabs indicated to receive concrete polishing system, do not proceed with concrete polishing unless manufacturer's representative and specialized equipment is present for every day of placement.

1.06 MOCK-UP

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.08 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F minimum.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

- B. Correct defective work within a five-year period commencing on the Date of Substantial Completion.
- C. Manufacturer Warranty: Provide five-year manufacturer warranty for failure of the finish in any way commencing on the Date of Substantial Completion.
- D. Installer Warranty: Provide five-year manufacturer warranty for failure of the finish in any way commencing on the Date of Substantial Completion.
- E. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

- A. Surface Treatments (Integral Concrete Cure & Profile System):
 - 1. Integral cure and profile system, consisting of a surface applied curing agent applied during concrete placement with power troweling, followed by a hydrophobic fixative applied after power trowel finishing is complete.
 - 2. Use at following locations:
 - a. All interior concrete floor slabs including but not limited to:
 - 1) Office and interior finished spaces.
 - 2) Vehicle parking and shop areas.
 - 3) Interior sidewalks.
 - 4) Exterior sidewalks.
 - 5) Interior equipment concrete housekeeping pads.
 - 6) Exterior equipment concrete housekeeping pads.
 - 7) Exterior concrete stoops.
- B. Clear Coatings:
 - 1. Use at following locations:
 - a. All interior areas noted to have "Sealed Concrete" or "S.C." that will not have another floor finish.
 - b. All interior finishes that will have "Polished Concrete" or "P.C." finish.
- C. Polished Finishes:
 - 1. Use at following locations:
 - a. All interior areas noted to have "Polished Concrete" or "P.C." that will not have another floor finish.

2.02 SURFACE TREATMENTS

- A. Troweling Aid, Densifier and Curing Agent: Liquid reactive colloidal silica-based topical treatment, spray-applied to wet concrete and floated or troweled into the surface.
 - 1. Product:
 - a. Green Umbrella Architectural Concrete Systems; GreenIce Cure & Profile System: www.greenumbrellasystems.com/#sle.
 - b. Forta Corporation; EXTEND-PRO: www.forta-ferro.com/#sle.
 - c. Penetron; Peneseal FH-PS: www.penetron.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 COATINGS

- A. High Gloss Clear Coating: Transparent, nonyellowing, acrylic polymer-based coating.
 - 1. Products:
 - a. Euclid Chemical Company; ULTRAGUARD: www.euclidchemical.com/#sle.
 - b. Green Umbrella Architectural Concrete Systems; Shield&Enhance: www.greenumbrellasystems.com/#sle.
 - c. Kaufman Products Inc; Krystal ReFresh: www.kaufmanproducts.net/#sle.
 - d. Nox-Crete Inc; Sparkl-Seal: www.nox-crete.com/#sle.
 - e. PROSOCO, Inc; LSGuard: www.prosoco.com/consolideck/#sle.
 - f. SpecChem, LLC; Aqua Shine: www.specchemllc.com/#sle.

- g. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 POLISHED CONCRETE SYSTEM

- A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
 - 1. Acceptable Systems:
 - a. Ameripolish, Inc; Ameripolish Polished Concrete System: www.ameripolish.com/#sle.
 - b. Curecrete Distribution, Inc; RetroPlate: www.curecrete.com/#sle.
 - c. Euclid Chemical Company; DOUBLE DIAMOND POLISHED CONCRETE FLOOR SYSTEMS: www.euclidchemical.com/#sle.
 - d. Floor Seal Technology, Inc; MirrorCrete System with MirrorCure: www.floorseal.com/#sle.
 - e. Green Umbrella Architectural Concrete Systems; Green Umbrella Concrete Polishing: www.greenumbrellasystems.com/#sle.
 - f. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; FGS Permashine Concrete Polishing System: www.lmcc.com/#sle.
 - g. PROSOCO, Inc; Consolideck Polished Concrete System: www.prosoco.com/consolideck/#sle.
 - h. Rust-Oleum Corporation; Citadel Polishing System with TDS: www.rustoleum.com/#sle.
 - i. W. R. Meadows, Inc; Induroshine and Bellatrix Concrete Enhancer: www.wrmeadows.com/#sle.
 - j. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

3.04 CONCRETE POLISHING

- A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
 - 1. Final Polished Sheen: High-gloss finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.
 - 2. High Gloss Finish: Finish that looks wet and shows mirror-like reflections of side and overhead images.
 - 3. Exposed Aggregate: Medium aggregate exposed to view.

- B. Protect finished surface as required and as recommended by manufacturer of polishing system.

END OF SECTION

**SECTION 03 54 00
CAST UNDERLAYMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid-applied self-leveling floor underlayment.
 - 1. Use cementitious type at all locations.

1.02 RELATED REQUIREMENTS

- A. Section 09 67 00 - Fluid-Applied Flooring.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- C. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Instructions.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.07 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cementitious Underlayment:
 - 1. ARDEX Engineered Cements; ARDEX V 1200 with ARDEX P51 Primer: www.ardexamericas.com/#sle.
 - 2. Custom Building Products; CL-150 Self-Leveling Underlayment: www.custombuildingproducts.com/#sle.
 - 3. Hacker Industries, Inc; True-Screed: www.hackerindustries.com/#sle.
 - 4. H.B. Fuller Construction Products, Inc; TEC Level Set 200 Self-Leveling Underlayment with TEC Multipurpose Primer: www.tecspecialty.com/#sle.
 - 5. Kaufman Products Inc; SureFlow 040: www.kaufmanproducts.net/#sle.

6. LATICRETE International, Inc; LATICRETE NXT Level Plus with NXT Primer: www.laticrete.com/#sle.
7. Mapei Corporation; PlaniLevel 450: www.mapei.com/#sle.
8. W. R. Meadows, Inc; Floor-Top STG: www.wrmeadows.com/#sle.
9. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Cast Underlayments, General:
 1. Comply with applicable code for combustibility or flame spread requirements.
- B. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 1. Compressive Strength: Minimum 4,500 pounds per square inch after 28 days, tested per ASTM C109/C109M.
 2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
 3. Density: 125 pounds per cubic foot, nominal.
 4. Final Set Time: 1-1/2 to 2 hours, maximum.
 5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- C. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- E. Primer: Manufacturer's recommended type.
- F. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
- B. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- C. Vacuum clean surfaces.
- D. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- E. Close floor openings.

3.03 APPLICATION

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.
- C. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin

application of the subsequent layer within 24 hours.

- D. Place before partition installation.
- E. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.
- F. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.

3.05 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field inspection and testing, as specified in Section 01 40 00 - Quality Requirements.
- B. Placed Material: Agency will inspect and test for compliance with specification requirements.

3.06 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

**SECTION 04 05 11
MASONRY MORTARING AND GROUTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 43 13 - Stone Masonry Veneer: Installation of mortar.

1.03 REFERENCE STANDARDS

- A. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- B. ASTM C476 - Standard Specification for Grout for Masonry 2022.
- C. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2020.
- D. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry 2020.
- E. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry 2019a.
- F. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- D. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- E. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.06 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.08 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
- B. Mortar Color: Natural gray unless otherwise indicated.
- C. Mortar Mix Designs: ASTM C270, Property Specification.
 - 1. Exterior Masonry Veneer: Type N.

2.02 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Color: Standard gray.
- B. Water: Clean and potable.
- C. Accelerating Admixture: Nonchloride type for use in cold weather.
- D. Bonding Agent: Latex type.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.

3.02 INSTALLATION

- A. Install mortar to requirements of section(s) in which masonry is specified.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Test and evaluate mortar in accordance with ASTM C780 procedures.

3.04 SCHEDULES

- A. Exterior Stone Veneer Wall: Type N mortar.

END OF SECTION

**SECTION 04 43 13
STONE MASONRY VENEER**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered cut stone veneer at exterior walls.
- B. Metal anchors and accessories for anchored veneer.
- C. Accessories for adhered veneer.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 11 - Masonry Mortaring and Grouting: Setting and pointing mortar.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashings.
- C. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 REFERENCE STANDARDS

- A. ASTM C119 - Standard Terminology Relating to Dimension Stone 2020.
- B. ASTM C568/C568M - Standard Specification for Limestone Dimension Stone 2022.
- C. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster 2022c.
- D. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering 2006 (Reapproved 2019).
- E. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster 2022a.
- F. ASTM C1242 - Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems 2022a.
- G. ASTM C1515 - Standard Guide for Cleaning of Exterior Dimension Stone, Vertical And Horizontal Surfaces, New or Existing 2020.
- H. ASTM C1528/C1528M - Standard Guide for Selection of Dimension Stone 2020.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- J. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on stone units, mortar, and reinforcement.
- C. Samples: Submit two stone samples illustrating minimum and maximum stone sizes, color range, texture, and markings.
- D. Stone Fabricator's Qualification Statement.
- E. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Stone Fabricator Qualifications: Company specializing in fabricating cut stone with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type required by this section, with minimum five years of documented experience.

1.07 MOCK-UP

- A. Construct stone wall mock-up, 4 feet long by 4 feet wide; include stone anchor accessories, sill and head flashings, window frame, corner condition, and typical control joint in mock-up.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect stone from discoloration during storage on site.
- B. Provide ventilation to prevent condensation from forming on stone.

1.09 FIELD CONDITIONS

- A. Cold Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 STONE

- A. Oolitic Limestone: Indiana Oolitic Limestone; complying with ASTM C568/C568M Classification II - Medium Density.
 - 1. Color: Buffs, tans, mochas, yellows and grays.
 - 2. Type: Thin Veneer.
 - 3. Sizes:
 - a. Length: 6" to 24".
 - b. Height: Variety at 2-1/4" (20%), 5" (40%), 7-3/4" (30%) and 10-1/2" (10%).
 - c. Width: 3/4" to 1-1/4".
 - d. Corner returns: 3" to 5".
 - 4. Surface Finish: Honed; as described in ASTM C119 and ASTM C1528/C1528M.
 - 5. Basis of Design:
 - a. Buechel Stone Corp; "Aged Parchment Tailored Blend": www.beuchelstone.com.
 - 6. Other Acceptable Producers (providing they meet the appearance and characteristics of the Basis of Design product):
 - a. Alabama Stone Co: www.alabamastone.com/#sle.
 - b. Indiana Limestone Company: www.indianalimestonecompany.com/#sle.
 - c. Mezger Enterprises Ltd: www.mezger.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES - ADHERED VENEER

- A. Lath: Stone manufacturer's standard lath.
- B. Water-Resistive Barrier: Stone manufacturer's standard water-resistive barrier, flashing and accessories.
- C. Weep System: Provide complete weep system to separate stone veneer from structural backup wall and provide means to remove water entering the cavity. Provide manufacturer's standard weep system.
- D. Bonding Compound: Provide type recommended for bonding scratch coat to solid surfaces, complying with ASTM C932.
- E. Rainscreen Drainage Material:
 - 1. Rainscreen Drainage Mat: Polyester or polypropylene mesh.
 - a. Thickness: 1/8 inch.
 - b. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.

2.03 STONE FABRICATION - ADHERED VENEER

- A. Comply with ASTM C1242 requirements for adhered stone system without mechanical anchors for maximum stone weight and maximum individual stone panel size.
- B. Comply with TMS 402/602 size requirements for adhered stone veneer units for maximum thickness, maximum face dimension, maximum face area and maximum weight per square foot.
- C. Nominal Thickness: 3/4 inch to 1-1/4 inches.
- D. Height: 2 inches to 8 inches.
- E. Length: 6 inches to 14 inches.
- F. Style: Dimensional - square and rectangle.
- G. Fabricate for 3/8 inch beds and joints.
- H. Backs: Sawn.
- I. Form stone corners to irregular joint profile. Clean jagged corners from stone in preparation for setting.
- J. Slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.
- K. Provide special shapes as indicated on the drawings and as follows: Trimstones.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that support work and site conditions are ready to receive work of this section.
 - 1. Per ASTM C1242, exterior walls to receive thin natural stone veneers should be designed with a stiffness ratio of L/1000 minimum.
- B. Verify that substrates to receive mortar scratch coat or setting bed comply with stone veneer manufacturer's instructions.
 - 1. Concrete Masonry: Verify joints are cut flush and surface is ready to receive mortar setting bed. Verify no bituminous or water repellent coatings exist on masonry surface.
 - 2. Concrete: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive mortar setting bed. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to mortar setting bed.
 - 3. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.
- C. Verify that items built-in under other sections are properly located and sized.

3.02 PREPARATION - ADHERED VENEER

- A. Dampen masonry surfaces to reduce excessive suction.
- B. Clean concrete surfaces of foreign matter using approved acid solutions, solvents, or detergents, and then rinse surfaces thoroughly with clean water.
- C. Roughen smooth concrete surfaces and apply bonding compound in accordance with manufacturer's written installation instructions.
- D. Apply dash bond coat to solid bases and moist cure for at least 24 hours before applying setting bed.
- E. Install stone, scratch coat, metal lath, drainage plan and other accessories per manufacturer's standard details.

3.03 INSTALLATION - WATER-RESISTIVE BARRIER

- A. Where required by thin stone veneer fabricator's instructions or by local codes, install two layers of water-resistive barrier in accordance with water-resistive barrier manufacturer's instructions. Integrate water-resistive barrier with all flashing accessories, adjacent water-resistive barriers, doors, windows, penetrations, and cladding transitions.

- B. Apply water-resistive barrier horizontally with upper layer lapped over lower layer minimum 2 inches.
- C. Lap water-resistive barrier minimum 6 inches at vertical joints.
- D. Lap water-resistive barrier minimum 16 inches past the corner in both directions at inside and outside corners.
- E. In two layer applications, start with two horizontal layers at bottom of exterior wall or structure.

3.04 INSTALLATION - RAINSCREEN DRAINAGE MATERIAL

- A. Install rainscreen drainage material and metal lath with accessories over sheathing material and water-resistive barrier with fastening system in accordance with ASTM C1063 into wood or metal studs. Install drainage material with filter fabric mortar screen to exterior.

3.05 INSTALLATION - SCRATCH COAT

- A. Apply mortar scratch coat of 1/2 inch nominal to cover metal lath in accordance with ASTM C926. Scratch surface when somewhat firm. If scratch coat dries before applying setting bed mortar and thin stone veneer, moisten scratch coat by misting it with water.

3.06 INSTALLATION - ADHERED VENEER

- A. Install thin stone veneer with a cementitious mortar setting bed to a scratch coat backing surface, in accordance with stone fabricator's instructions and applicable sections of the ICC (IBC), TMS 402/602 and ASTM C1242 that apply to adhered masonry veneer.
- B. Mortar Joints: Concave.
 - 1. Style: Tight fit joints.
- C. Pattern Bond:
 - 1. Lay out work in advance and distribute color range of stone uniformly over total work area.
 - 2. Lay stone with face exposed.
 - 3. Take care to avoid concentration of any one color to any one wall surface.
 - 4. Maintain approximate 3/8 inch joint, as stone allows.
 - 5. Do not use stacked vertical joints.
- D. Windows, Doors and Wall Openings: Extend field stone units to edges of wall openings.
- E. Sills: Install sills where located on drawings.
- F. Caps: Install capstones where located on drawings.
- G. Seal all joints at wall openings and penetrations with sealant approved for use with adhered stone veneer.
- H. Weep Screed and Stone Clearances for Exterior Stud Wall Installations:
 - 1. Above Finished Grade: Terminate a minimum of 4 inches or as per local code and building practices.
 - 2. Above Paved Surfaces: Terminate a minimum of 2 inches or as per local code.
 - 3. Above Paved Walking Surface Supported by Same Foundation Supporting the Wall: Terminate a minimum of 1/2 inch or as per local code.

3.07 INSTALLATION - MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. Extend metal flashings through exterior face of stone and terminate in an angled drip with hemmed edge.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.08 CONTROL AND EXPANSION JOINTS

- A. Form joints as detailed on drawings.
- B. Discontinue lath, scratch coat, and setting bed at movement joints in adhered veneer.

3.09 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.10 CLEANING

- A. Remove excess mortar as work progresses, and upon completion of work.
- B. Replace defective mortar. Match adjacent work.
- C. Clean exterior stone per ASTM C1515.
- D. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

- A. During temporary storage on site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

END OF SECTION

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Downspout boots.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 09 91 13 - Exterior Painting: Paint finish.
- C. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- I. AWS D1.2/D1.2M - Structural Welding Code - Aluminum 2014, with Errata (2020).
- J. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.
- K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- L. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

- A. Design all structural items under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of

scheduled welding work.

- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- B. Plates: ASTM A283/A283M.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.

2.04 DOWNSPOUT BOOTS

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and on-body cleanout and cover with neoprene gaskets.
 - 1. Configuration: Offset.
 - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 - 3. Finish: Manufacturer's standard factory applied powder coat finish.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.
 - 6. Manufacturers:
 - a. Downspoutboots.com, a division of J. R. Hoe & Sons: www.downspoutboots.com/#sle.
 - b. J.R. Smith Mfg. Co.: www.jrsmith.com..
 - c. Zurn: www.zurn.com.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.

- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Rough opening framing for doors, windows, and roof openings.
- C. Sheathing.
- D. Roofing nailers.
- E. Preservative treated wood materials.
- F. Miscellaneous framing and sheathing.
- G. Communications and electrical room mounting boards.
- H. Concealed wood blocking, nailers, and supports.
- I. Wall sheathing with factory applied water-resistive and air barrier sheet.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
- C. Section 03 54 00 - Cast Underlayment.
- D. Section 05 50 00 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- E. Section 06 12 19 - Structural Insulated Panels.
- F. Section 06 18 00 - Glued-Laminated Construction.
- G. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).
- D. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies 2018.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.
- G. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2018, with Errata (2019).
- H. AWPA U1 - Use Category System: User Specification for Treated Wood 2022.
- I. ICC-ES AC310 - Acceptance Criteria for Water-resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-Resistive Barriers 2008, with Editorial Revision (2015).
- J. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).
- K. PS 1 - Structural Plywood 2019.
- L. PS 2 - Performance Standard for Wood Structural Panels 2018.

M. PS 20 - American Softwood Lumber Standard 2021.

N. SPIB (GR) - Standard Grading Rules 2021.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials, application instructions, and wall sheathing.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a two-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: As indicated on drawings for various locations.
 - 2. Grade: No. 2.
- E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Machine stress-rated (MSR) as follows:
 - a. Fb-single; minimum extreme fiber stress in bending: 1350 psi.
 - b. E; minimum modulus of elasticity: 1,300,000 psi.
 - 2. Species and Grades: As indicated on drawings for various locations.
- F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.

2. Boards: Standard or No. 3.

2.03 EXPOSED DIMENSION LUMBER

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- C. Sizes: Nominal sizes as indicated on drawings.
- D. Surfacing: S4S.
- E. Moisture Content: S-dry or MC19.
- F. Stud Framing (2 by 2 through 2 by 6):
 1. Species: Douglas Fir.
 2. Grade: Clear.
- G. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 1. Species: Southern Pine.
 2. Grade: Select Heart.

2.04 EXPOSED TIMBERS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (20 percent maximum).
- C. Surfacing: S4S.
- D. Species: Douglas Fir.
- E. Grade: Clear Structural.

2.05 ENGINEERED LUMBER

- A. Provide engineered lumber capable of supporting required loads and meeting or exceeding the bending stresses and modulus of elasticity as indicated on the Drawings.
- B. Manufacturers: Provide any manufacturer's product that is capable of complying with the design requirements and material properties as indicated on the Drawings.

2.06 STRUCTURAL COMPOSITE LUMBER

- A. At Construction Manager's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.
- B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
 1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.
 2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.
 3. Headers Not Longer Than 48 inches: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.
 4. Products:
 - a. Boise Cascade Company; Versa-Lam LVL: www.bc.com/#sle.
 - b. RedBuilt LLC; Redbuilt Laminated Veneer Lumber: www.redbuilt.com//#sle.
 - c. Roseburg Forest Products; RigidLam LVL: www.roseburg.com/#sle.
 - d. Weyerhaeuser Company; Microllam LVL: www.weyerhaeuser.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 EXPOSED BOARDS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (15 percent maximum).

- C. Surfacing: S4S.
- D. Species: Douglas Fir.
- E. Grade: No. 2, 2 Common, or Construction.

2.08 CONSTRUCTION PANELS

- A. Wall Sheathing: Oriented strand board structural wood panel with factory laminated water-resistive barrier layer.
 - 1. Sheathing Panel: PS 2, Exposure 1.
 - a. Size: 4 feet wide by 8 feet long.
 - b. Grade: Sheathing.
 - c. Performance Category: 7/16 PERF CAT.
 - d. Span Rating: 24/16.
 - e. Edge Profile: Square edge.
 - 2. Integral Water-Resistive Barrier: Sheet material qualifying as a Grade D water-resistive barrier; complying with ICC-ES AC310.
 - 3. Water Vapor Permeance of Water-Resistive Barrier: 12 to 16 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure B.
 - 4. Maximum Allowable Air Leakage of Assembly: Comply with ASTM E2357.
 - a. Infiltration: 0.0072 cfm/sq ft, maximum, at a pressure differential of 1.57 psf.
 - b. Exfiltration: 0.0023 cfm/sq ft, maximum, at a pressure differential of 1.57 psf.
 - 5. Provide fastening guide on top panel surface with separate markings indicating fastener spacing for 16 inches and 24 inches on center, respectively.
 - 6. Seam Tape: Manufacturer's standard pressure-sensitive, self-adhering, cold-applied, seam tape.
 - 7. Warranty: Manufacturer's standard 30 year limited system warranty.
 - a. Performance: Panel and tape resistance to water penetration; tape adhesion.
 - b. Material: Free from manufacturing defects and panel delamination.
 - 8. Manufacturers:
 - a. Georgia-Pacific LLC; ForceField Air and Water Barrier System: www.buildgp.com/#sle.
 - b. Huber Engineered Woods, LLC; ZIP System Wall Sheathing and ZIP System Seam Tape: www.huberwood.com/#sle.
 - c. Louisiana-Pacific Corporation; WeatherLogic: www.lpcorp.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- C. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.

2.09 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

- C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- D. Termite-Resistant Sill Flashing: Self-adhesive membrane; polyethylene film bonded to sealant.
 - 1. Thickness: 40 mil, 0.040 inch.
 - 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
- E. Sill Flashing: See Section 07 62 00.
- F. General Purpose Construction Adhesives: Comply with ASTM C557.

2.10 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 - e. Treat lumber less than 18 inches above grade.
 - f. Treat lumber in other locations as indicated.
 - 2. Preservative Pressure Treatment of Plywood Above Grade: AWWA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with roofing, flashing, or waterproofing.
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood less than 18 inches above grade.
 - e. Treat plywood in other locations as indicated.
 - 3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWWA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
 - a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 - b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- D. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.06 INSTALLATION OF CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
- B. Wall Sheathing and Roof Sheathing with Laminated Water-Resistive Barrier and Air Barrier: Secure to studs in accordance with manufacturer's installation instructions.

1. Install with laminated water-resistive and air barrier on exterior side of sheathing.
2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
3. Use only mechanically attached and drainable EIFS and exterior insulation with wall sheathing with laminated water-resistive and air barrier.
4. Apply manufacturer's standard seam tape to joints between sheathing panels; use tape gun or hard rubber roller in accordance with manufacturer's installation instructions.

3.07 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.09 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.10 CLEANING

- A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
 1. Comply with applicable regulations.
 2. Do not burn scrap on project site.
 3. Do not burn scraps that have been pressure treated.
 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 12 19
STRUCTURAL INSULATED PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural insulated panels for walls and roofs.
- B. Fasteners and adhesives.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Bearing support, stud framing, field-fabricated panel connections, miscellaneous blocking and nailers.
- B. Section 07 41 13 - Metal Roof Panels: Metal roof panels over structural insulated roof panels.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.
- C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- D. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).
- E. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021.
- F. PS 2 - Performance Standard for Wood Structural Panels 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide structural insulated panel manufacturer's product literature including structural properties, design load capacities and installation instructions.
- C. Shop Drawings: Fully dimensioned fabrication and installation details for structural insulated panels. Indicate dimensions, materials, connections and arrangement of joints. Include anchorage, size and type of fasteners, and accessories.
 - 1. Include calculations that indicate compliance with the applicable building code and the structural insulated panel manufacturer's requirements.
 - 2. Include seal of Professional Engineer registered in the State of Illinois on drawings and calculations.
 - 3. Include selections from prescriptive design tables that indicate compliance with the applicable building code and the structural insulated panel manufacturer's requirements.
 - 4. Clearly indicate the load and capacity assumptions selected. Include copies of any calculations.
- D. Design Data: As required by authorities having jurisdiction.
- E. Designer's Qualification Statement.
- F. Manufacturer's Qualification Statement.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State of Illinois.

- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
 - 1. Member of Structural Insulated Panel Association (SIPA).
 - 2. Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural insulated panels in manufacturer's packaging, if any, and with manufacturer labels and markings intact.
- B. Cover structural insulated panels with waterproof covering during transportation and storage. Keep dry.
- C. Protect edges of wood construction panels and foam cores.
- D. Fully support structural insulated panels off the ground.
- E. Do not lift structural insulated panels by wood construction panel layer.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide twenty year manufacturer warranty on structural insulated panel material and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Structural Insulated Panels:
 - 1. Insulspan; INSULSPAN SIPs: www.insulspan.com
 - 2. Premier Building Systems; Premier SIPs: www.premierbuildingsystems.com/#sle.
 - 3. Raycore; RAY-CORE SIPs: www.raycore.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STRUCTURAL INSULATED PANELS

- A. Structural Insulated Panels: Provide structural insulated panels capable of withstanding design loads including dead load, live load, wind load and seismic load.
- B. Structural Insulated Roof Panel: Oriented strand board construction panel laminated to both sides of rigid manufacturer's standard Maximum R-Value Highly Insulating insulation board.
 - 1. Panel Size: 4 feet by 8 feet.
 - 2. Overall Thickness: 6-1/2 inches.
 - 3. Span Rating: 24/16, minimum.
 - 4. Edge Treatment: Square edge.
 - 5. Thermal Resistance: R-value of 42.
 - 6. Provide panels with fastening guide marked on exterior face.
 - 7. R-value must be achieved within the thickness specified of the total panel.

2.03 MATERIALS

- A. Oriented Strand Board: Oriented strand board in compliance with requirements of PS 2.
 - 1. Bond Classification: Exposure 1.
 - 2. Grade: Sheathing.
 - 3. Performance Category: PERF CAT 7/16, Span Rating 24/16.
 - 4. Edges: Square.
- B. Extruded Polystyrene (XPS) Insulation Board: Complies with ASTM C578.
 - 1. Type and Board Density: Type X, 1.30 pcf (21 kg/cu m), minimum.
 - 2. Type and Thermal Resistance, R-value (RSI-value): Type X, 5.0 (0.88) per 1 inch at 75 degrees F mean temperature using ASTM C177 test method.
- C. Laminating Adhesive: Manufacturer's standard; complying with ASTM D2559.

- D. Dimension Lumber:
 - 1. Sizes: Nominal sizes as indicated on drawings, S4S.
 - 2. Moisture Content: S-dry or MC19.
 - 3. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring: S4S, No. 2 or Standard Grade.
- E. Engineered Lumber: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.
- F. Water-Resistive Barrier Joint Tape: Manufacturer's standard; 6 inches wide.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Common Nails: ASTM F1667.
 - 4. Panel Screws: Pancake head; minimum thread diameter 0.255 inch, minimum shank diameter of 0.190 inch and minimum head diameter 0.625 inch.
 - 5. Heavy Duty Metal Screws: 1/8 inch to 1/4 inch diameter.
 - 6. Light Duty Metal Screws: 1/8 inch or less diameter.
- B. Underlayment for Metal Roof Panels: See Section 07 42 13.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine foundations, sills, framing and other surfaces to receive structural insulated panels. Verify conditions suitable for installation. Report unsatisfactory conditions to Architect. Do not proceed with structural insulated panel work until unsatisfactory conditions corrected.

3.02 PREPARATION

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.

3.03 INSTALLATION

- A. Install structural insulated panels in accordance with manufacturer's instructions.
 - 1. Comply with manufacturer's written recommendation for number, size and placement of fasteners.
 - 2. Join structural insulated panel edges according to manufacturer's written recommendation.
- B. Restrictions:
 - 1. Do not over cut oriented strand board or plywood face when field-cutting openings.
 - 2. Do not install electrical chases inside structural insulated panels.
 - 3. Do not install plumbing inside structural insulated panels without consulting manufacturer and obtaining written recommendations.
 - 4. Protect structural insulated panel core from solvents and solvent vapors.
- C. Prevent damage to structural insulated panels.
- D. When structural insulated panels have oriented strand board or plywood on one side only, install panel with wood face on exterior of structure.
- E. Install structural insulated panels plumb, square and true to line.
- F. Seal panel joints with manufacturer's recommended sealant.
- G. Repair or replace damaged panels.

3.04 PROTECTION

- A. Do not leave panels exposed to moisture. Remove wet panels or allow to dry completely before installation of sealants, tape, weather barrier and siding or other veneer.
- B. Protect installed structural insulated panels from subsequent construction operations.
- C. Cover top and edges of unfinished panel work. Protect from weather and prevent accumulation of water in cores.

END OF SECTION

SECTION 06 17 53
METAL PLATE CONNECTED WOOD TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Engineering, fabrication, and erection of metal plate connected wood trusses to withstand the design loads as shown on the drawings and herein specified.
- B. All fastening devices and bridging requirements related to the manufacture or erection of the wood trusses.
- C. Structural notes indicated on the drawings regarding metal-plate-connected wood trusses shall be considered part of this specification.

1.02 RELATED WORK

- A. Pertinent Sections of Division 01.
- B. Section 04 22 00 - Reinforced Unit Masonry.
- C. Section 05 12 23 - Structural Steel.
- D. Section 06 10 00 - Rough Carpentry.

1.03 REFERENCES

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards except where more stringent requirements are shown or specified. Where any provision of other pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
 - 1. AFPA - American Forest & Paper Association.
 - 2. ANSI/TPI 1 - National Design Standard for Metal Plate Connected Wood Truss Construction.
 - 3. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 4. AWC - Manual for Engineered Wood Construction.
 - 5. BCSI - Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.
 - 6. NDS - National Design Specification for Wood Construction with Commentary.
 - 7. NDS Supplement - National Design Specification Values for Wood Construction.
 - 8. SBCA - Structural Building Components Association.
 - 9. TPI - Truss Plate Institute.
 - 10. WTCA - Wood Truss Council of America.
 - 11. WTCA - Metal Plate Connected Wood Truss Handbook.

1.04 QUALITY ASSURANCE

- A. Fabrication and Erection Qualifications:
 - 1. Engage a fabricator who participates in a recognized quality-assurance program that involves inspection by Western Wood Products Association (WWPA), West Coast Lumber Inspection Bureau (WCLIB), or National Lumber Grades Authority (NLGA); Timber Products Inspection, Inc.; Truss Plate Institute (TPI); or other independent inspecting and testing agency acceptable to authorities having jurisdiction.
- B. Design Qualifications:
 - 1. Engage a fabricator who uses a qualified Structural Engineer, licensed in the State where the trusses are to be installed, to prepare calculations, shop drawings and other structural data for metal-plate-connected wood trusses.

1.05 SYSTEM PERFORMANCE REQUIREMENTS

- A. Trusses shall be designed in accordance with NDS, AFPA, TPI, WTCA and the local code of jurisdiction.
- B. Comply with applicable requirements and recommendations of ANSI/TPI 1, "Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses" (BCSI), and "Metal Plate Connected Wood Truss Handbook" (WTCA).

- C. Comply with applicable requirements of the "National Design Specification for Wood Construction" and its "Supplement."
- D. Single-Source Engineering Responsibility:
 - 1. Provide trusses engineered by a metal-plate connector manufacturer to support superimposed dead and live loads indicated, with design approved and certified by a qualified Structural Engineer who is legally authorized to practice in the jurisdiction where the project is located and who is experienced in the design of metal-plate-connected wood trusses.
- E. Structural Performance:
 - 1. Design Loads: As indicated on the drawings.
 - 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: $L/240$ live load deflection and $L/180$ total load deflection.

1.06 SUBMITTALS

- A. Product Data: For metal-plate connectors, metal framing anchors, bolts and fasteners.
- B. Prepare and submit truss shop drawings and structural analysis calculations signed and sealed by the qualified Structural Engineer registered in the State where the project is located. Shop drawings and calculations shall include, but not be limited to, the following:
 - 1. Building code used for design.
 - 2. Plan detailing location.
 - 3. Pitch, span, camber, configuration and spacing of each truss type.
 - 4. Lumber species, sizes, and stress grades.
 - 5. Metal connector plate type, size, and thickness.
 - 6. Number of plies.
 - 7. Required bearing details.
 - 8. Location of all joints, splices, and support locations.
 - 9. Design loads.
 - 10. Adjustments to wood member or metal connector plate design values.
 - 11. Maximum reactions and direction, including uplift reactions.
 - 12. Truss-to-truss connections or truss field assembly requirements.
 - 13. Deflection ratio.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. All metal-plate-connected wood trusses shall be stored clear of the ground to prevent deterioration or damage due to moisture, temperature changes, contaminants, and corrosion.
- B. All items shall be transported, stored, and erected in a manner that will avoid any further damage or deformation. Bent or deformed items will be rejected and shall be replaced or repaired at the expense of the responsible party.
- C. Handling during erection shall be in accordance with recommended practices set forth in BCSI's "Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses."

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber Standards:
 - 1. Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee (ALSC) Board of Review.
- B. Grade and Species:
 - 1. Provide dimensional lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to NDS' "National Design Specifications for Wood Construction" and its "Supplement."
- C. Metal Connector Plates:
 - 1. Fabricate connector plates from structural-quality steel sheet, zinc coated by hot-dip process complying with TPI 1 and ASTM A653, G60 coating designation; Designation SS Grade 33 and not less than 0.036-inch coated thickness.

2.02 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified below for material and manufacture. Where truss members are exposed to weather or to high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A153 or of stainless steel, Type 304 or 316.
 - 1. Nails, Wire, Brads, and Staples: FS FF-N-105.
 - 2. Wood Screws: ASME B18.6.1.

2.03 METAL FRAMING ANCHORS

- A. Provide metal framing anchors with allowable design loads, as published by manufacturer, that meet or exceed those indicated, of the following metal and finish:
 - 1. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

2.04 MISCELLANEOUS MATERIAL

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

2.05 FABRICATION

- A. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with the requirements of NDS and TPI.
- B. Fabricate wood trusses in compliance with the requirements in NDS and TPI.
- C. Connect truss members by metal connector plates located and securely embedded simultaneously by air or hydraulic press into both sides of wood members.
- D. Trusses shall be fabricated in a properly equipped manufacturing facility of a permanent nature. Trusses shall be manufactured by experienced workmen, using precision cutting, jigging, and pressing equipment under the requirements of NDS and TPI.
- E. Fabricate metal connector plates in sizes, configurations, thicknesses, and anchorage details as required to withstand design loads for types of joint designs indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and brace trusses according to recommendations of TPI. Space trusses as indicated; install plumb, square, and true to line; and securely fasten to supporting construction.
- B. Anchor trusses securely at all bearing points using metal framing anchors and fasten according to metal framing anchor manufacturer's fastening schedules and written instructions.
- C. Securely connect each truss ply required for forming built-up girder trusses. Anchor trusses to girder trusses as indicated.
- D. Install and fasten temporary and/or permanent bracing during truss erection and before construction loads are applied to prevent toppling. Anchor ends of permanent bracing where terminating at walls or beams.
- E. Install wood trusses within installation tolerances required by TPI 1.
- F. Cutting, removal, or altering of trusses is not permitted without written authorization from the Structural Engineer.
- G. Return wood trusses that are damaged or do not meet requirements to fabricator and replace with trusses that do meet requirements.

3.02 REPAIR

- A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

END OF SECTION

SECTION 06 18 00
GLUED-LAMINATED CONSTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Design and construction using structural glued-laminated timber. Work shall include, but not be limited to the following items:
 - 1. Framing members.
 - 2. Anchoring and fastening devices.
 - 3. Wood treatment.
- B. Dimensional lumber items associated with glued-laminated timber framing is specified in Division 06.
- C. Structural notes indicated on the drawings regarding glued-laminated construction shall be considered a part of this specification.

1.02 RELATED WORK

- A. Pertinent Sections of Division 01.
- B. Section 06 10 00 - Rough Carpentry.
- C. Section 06 13 00 - Heavy Timber Construction.
- D. Section 06 15 00 - Wood Decking.

1.03 REFERENCES

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified. Where any provision of other pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
 - 1. AITC 108 - Standard for Heavy Timber Construction.
 - 2. AITC 109 - Standard for Preservative Treatment of Structural Glued Laminated Timber.
 - 3. AITC 110 - Standard Appearance Grades for Structural Glued Laminated Timber.
 - 4. AITC 111 - Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection.
 - 5. AITC 117 - Standard Specification for Structural Glued Laminated Timber of Softwood Species.
 - 6. AITC - Timber Construction Manual.
 - 7. ANSI A190.1 - Standard for Wood Products - Structural Glued Laminated Timber.
 - 8. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 9. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 10. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 11. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 12. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 13. ASTM A575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - 14. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 15. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - 16. ASTM D245 - Standard Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber.
 - 17. ASTM D3737 - Standard Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam).

18. ASTM D5664 - Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
19. ASTM D5933 - Standard Specification for 2 5/8-in. and 4-in. Diameter Metal Shear Plates for Use in Wood Construction.
20. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
21. AWP A M4 - Standard for the Care of Preservative-Treated Wood Products.
22. AWP A P5 - Standard for Waterborne Preservatives.
23. AWP A P17 - Fire-Retardant Formulations.
24. AWP A T1 - Use Category System: Processing and Treatment Standard.
25. AWP A U1 -Use Category System: User Specification for Treated Wood.
26. NDS - National Design Specification for Wood Construction with Commentary.
27. NDS Supplement - National Design Specification Values for Wood Construction.
28. NIST PS 20 - Voluntary Product Standard - American Softwood Lumber Standard.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. The glued-laminated timber manufacturer shall be an AITC or APA-EWS licensed firm complying with AITC A190.1.
 2. Shall have not less than five (5) years of continuous experience in manufacturing glued-laminated structural units.
 3. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that will not be exposed in the final installed condition.
- B. Design Qualifications:
 1. Structural Performance: Structural glued-laminated timber and connectors shall withstand the effects of structural loads without exceeding allowable design working stresses determined according to ASTM D3737 and acceptable to the Authorities Having Jurisdiction.
- C. Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated.
 1. Include data on lumber, adhesives, fabrication and protection.
 2. Include connector installation instructions.
 3. Wood treatment data as follows, including chemical treatment manufacturer's warranty and instructions for handling, storing, installing, and finishing treated materials:
 - a. 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 standard.
 - b. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to the project site.
- B. Shop drawings:
 1. Show layout of structural glued-laminated timber system and full dimensions of each member.
 - a. Indicate species and laminating combination, adhesive type, and other variables in required work.
 - b. Include large scale details of connections.
 - c. Structural analysis calculations.
- C. Samples: Provide full width and depth, 24 inches long, showing the range of variation to be expected in appearance of structural glued-laminated timber, including variations due to specified treatment.
- D. Samples: Apply specified factory finish to three sides of half-length of each sample.

- E. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating structural glued-laminated timber complies with requirements in AITC A190.1.
- F. Material Certificates: For preservative-treated wood products, from manufacturer. Indicate type of preservatives used and net amount of preservative retained.
- G. Research / Evaluation Reports: For structural glued-laminated timber, from ICC-ES.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with provisions of AITC 111.
- B. All members shall be delivered, piled, and handled so as to protect them from warping due to excessive moisture or damage. Members shall be stored off the ground and individually wrapped using a plastic-coated paper covering with water-resistant seams.
- C. All installed exposed members shall be protected from moisture until covered with subsequent roofing materials or flashings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers offering products that may be incorporated into the work, but are not limited to, the following:
 - 1. American Laminators, Oregon.
 - 2. Boise Cascade, LLC, Idaho.
 - 3. Calvert Co., Inc., Washington.
 - 4. Laminated Timbers, Inc., Kentucky.
 - 5. Sentinel Structures, Inc., Wisconsin.
 - 6. Timber Technologies, Wisconsin.

2.02 STRUCTURAL GLUED-LAMINATED TIMBER

- A. General: Provide structural glued-laminated timber that complies with AITC A190.1 and AITC 117 or research / evaluation reports acceptable to authorities having jurisdiction.
 - 1. Provide structural glued-laminated timber made from single species.
 - 2. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
 - 3. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.
- B. Species and Grades for Structural Glued-Laminated Timber: Provide grades needed to comply with "System Performance Requirements" Article section 1.5.
 - 1. Alaska cedar
 - 2. Douglas fir-larch
 - 3. Southern pine
 - 4. Any species
- C. Species and Grades for Structural Glued-Laminated Timber: Provide grades needed to comply with structural properties, combination symbols and beam stress classifications indicated on drawings.
- D. Appearance Grade: Architectural complying with AITC 110.
 - 1. For Premium and Architectural appearance grades, fill voids as required by AITC 110.
 - 2. For Premium appearance grade, use clear wood inserts, of matching grain and color, for filling voids and knot holes more than 1/4 inch wide.
- E. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
- F. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer compatible with indicated finish.
- G. Preservative Treatment: Glued-laminated timber shall comply with AWP A U1.
 - 1. Use preservative solution without substances that may interfere with application of indicated finishes.

2. Do not incise structural glued-laminated timber or wood used to produce structural glued-laminated timber.

2.03 TIMBER CONNECTORS

- A. Provide connectors as detailed on the drawings. Basis of design for metal framing anchor products is Simpson Strong-Tie Co. Inc.
- B. Materials: Fabricate from the following:
 1. Structural steel shapes, plates, and flat bars complying with ASTM A36.
 2. Round steel bars complying with ASTM A575, Grade M1020.
 3. Connection material shall comply with "System Performance Requirements" Article section 1.5 and as noted on the drawings.
- C. Bolts: Provide 3/4-inch diameter bolts complying with ASTM A307, Grade A; nuts complying with ASTM A563; and, where indicated, flat washers.
- D. Shear Plates: Comply with ASTM D5933. Provide [2-5/8 inch][4-inch]<Insert> diameter.
- E. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.
- F. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A123 or ASTM A153.
- G. Unless noted otherwise, all timber connections are to be concealed with all holes plugged.

2.04 FABRICATION

- A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.
 1. Dress exposed surfaces as needed to remove planing and surfacing marks.
- B. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.
- C. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with AWPA M4.
 1. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
 2. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
- D. End-Cut Sealing: Immediately after end cutting each member to final length [and, after preservative treatment], apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.
- E. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit, [except for preservative-treated wood where treatment included a water repellent].

2.05 FACTORY FINISH

- A. Wiped Stain Finish: Manufacturer's standard, dry-appearance, penetrating acrylic stain and sealer; oven dried and resistant to mildew and fungus.
 1. Color: As selected by Architect/Engineer from manufacturer's full range.
- B. Clear Finish: Manufacturer's standard, two-coat, clear varnish finish; resistant to mildew and fungus.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates in areas to receive structural glued-laminated timber, with installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
 - 1. Install structural glued-laminated timber to comply with the shop drawings.
 - 2. Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with indicated finish.
 - 3. Lift with padded slings and protect corners with wood blocking.
- B. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.
- C. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing and finishing.
 - 1. Predrill for fasteners using timber connectors as templates.
 - 2. Finish exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
 - 3. Coat cross cuts with end sealer.
 - 4. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPAC M4.
 - a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
 - b. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
- D. Install timber connectors as indicated.
 - 1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
 - 2. Install bolts with orientation as indicated or, if not indicated, as directed by the Architect/Engineer.
- E. Where beams penetrate through exterior walls, apply waterproof sealer as recommended by the manufacturer.

3.03 ADJUSTING

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by the Architect/Engineer.

3.04 TOLERANCES

- A. Framing Members: 1/2 inch maximum from true position.

3.05 PROTECTION

- A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.
 - 1. Coordinate wrapping removal with finishing work. Retain wrapping where it can serve as a painting shield.
- B. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION

**SECTION 06 20 00
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 08 52 00 - Wood Windows.
- D. Section 08 80 00 - Glazing: Glass and glazing of wood partitions and screens.
- E. Section 09 91 13 - Exterior Painting: Painting of finish carpentry items.
- F. Section 09 91 23 - Interior Painting: Painting of finish carpentry items.
- G. Section 09 93 00 - Staining and Transparent Finishing: Staining and transparent finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - Basic Hardboard 2012 (Reaffirmed 2020).
- B. AWI (QCP) - Quality Certification Program Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- D. AWMAC (GIS) - Guarantee and Inspection Services Program Current Edition.
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- F. PS 1 - Structural Plywood 2019.
- G. WI (CCP) - Certified Compliance Program (CCP) Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 3. Include certification program label.
- D. Samples: Submit two samples of finish plywood, 8 x 12 inch in size illustrating wood grain and specified finish.
- E. Samples: Submit two samples of wood trim 12 inch long.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 2. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Comply with AWMAC (GIS) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
 - 3. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section www.woodworkinstitute.com/#sle.
 - 4. Provide labels or certificates indicating that work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 5. Provide designated labels on shop drawings as required by certification program.
 - 6. Provide designated labels on installed products as required by certification program.
 - 7. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.07 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- B. Protect from moisture damage.
- C. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- C. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim Pieces: Clear white pine/spruce/fir with eased edges; prepare for transparent finish.
 - a. Sizes and Locations:
 - 1) All windows to be completely cased in 1 x 4 wood trim.
 - 2) All door frames to be completely case in 1 x 4 wood trim.
 - 3) All baseboard trim at rooms with plywood paneling to have 1 x 6 wood base.
 - 4) All ceiling trim at rooms with plywood paneling to have 1 x 4 ceiling cove trim at juncture between wall panels and ceiling panels.
 - 5) All interior corner trim at rooms with plywood paneling to have 1 x 1 wood trim.
 - 6) All exterior corner trim at rooms with plywood paneling to have 2 x 2 wood trim.
 - 2. Window Sills: Clear white pine/spruce/fir with eased edges; prepare for transparent finish.
 - a. Sizes: As shown on the Drawings.
 - 3. Interior Wood Paneling: 1/2" thick x 4' wide x 8' high clear sanded white pine/spruce/fir plywood, prepare for transparent finish.

- a. Locations: All walls and ceilings in the building called out with "Plywood" on the interior elevations, room finish schedule or reflected ceiling plans on the Drawings.
- 4. Wood Battens: 3/4" thick x 1-1/5" wide clear white pine/spruce/fir, with eased edges; prepare for transparent finish.
 - a. Locations: All walls and ceilings in the building called out with "Plywood" on the interior elevations, room finish schedule or reflected ceiling plans on the Drawings.

2.02 SUSTAINABILITY CHARACTERISTICS

- A. Provide sustainably harvested wood, certified or labeled; see Section 01 60 00.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: Pine species, standard band sawn, maximum moisture content of 6 percent, of quality suitable for transparent finish.
 - 1. Quality Level: Mid-grade, with tight small knots being permissible.

2.04 SHEET MATERIALS

- A. Softwood Plywood, Exposed to View: Face species of pine, plain sawn, multi-ply core; PS 1 Grade A-B, glue type as recommended for application.

2.05 PANEL CORE MATERIALS

- A. Basic Hardboard: Panel manufactured from inter-felted lignocellulosic fibers consolidated under heat and pressure; comply with ANSI A135.4.

2.06 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Fasteners: Of size and type to suit application; bright finish in concealed locations and stainless steel finish in exposed locations.
- C. Fasteners for Exterior Applications: Stainless steel; length required to penetrate wood substrate 1-1/2 inch minimum.
- D. Concealed Joint Fasteners: Threaded steel.

2.07 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Lumber for Shimming and Blocking: Softwood lumber of any species.
- C. Primer: Alkyd primer sealer.
- D. Wood Filler: Solvent base, tinted to match surface finish color.

2.08 HARDWARE

- A. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
 - 1. Material: Steel; T-shape cross-section.
 - a. Finish: Manufacturer's standard, factory-applied, textured powder coat.
 - b. Color: Black.
 - c. Height: 15 inches.
 - d. Support Length: 21 inches.
 - e. Width: 1 inch.

2.09 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.10 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.

- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 4, Latex Acrylic, Water-based.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- C. See Section 06 10 00 for installation of recessed wood blocking.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install components with nails at 8 inch on center.
- E. Install prefinished paneling with full bed contact adhesive applied to substrate.
- F. Lay out plywood paneling symmetrical on all walls or ceilings, or as shown on the Drawings. Adjust layout as needed around door, window and other openings.
- G. Install batten strips at all joints in plywood panels.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 91 13 and 09 91 23.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

**SECTION 06 64 00
PLASTIC PANELING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic liner panel assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs 2022.
- C. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate liner panel installation requirements with layout of stud framing and furring supporting members.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: For each panel and trim type.
- C. Shop Drawings:
 - 1. For each wall paneling layout, indicate:
 - a. Elevations: Dimensioned locations of panels and penetrations. Include field measurements indicating extents of paneling.
 - b. Drawing Scale: 1/4 inch to 1 foot, minimum.
 - 2. Details: Include panel-to-trim connections.
 - a. Drawing Scale: 1-1/2 inches to 1 foot, minimum.
- D. Samples: For each wall and ceiling panel type, two samples, 6 inches by 6 inches in size, indicating specified color and texture.
- E. Samples: For each trim type, two samples, 4 inches in length, indicating specified color and texture.
- F. Manufacturer's Instructions: For each panel type and associated trim, provide installation instructions.
- G. Installer's qualification statement.
- H. Maintenance Data: Panel maintenance and cleaning recommendations.
- I. Executed warranty.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
 - 1. See Section 01 60 00 - Product Requirements for additional provisions.
 - 2. Extra Stock Materials: Two of each type of liner panel.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Construct wall paneling mock-up, 10 feet long by 10 feet wide of each type, indicating panels, trim, and joints.

- C. Locate where directed.
- D. Mock-up may remain as part of work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver products to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.
- C. Store products in clean, dry, interior areas in accordance with manufacturer's instructions.
- D. Store plastic panels and trim flat.

1.09 FIELD CONDITIONS

- A. Ambient Field-Cutting Conditions: Before field-cutting panels in temperatures below 40 degrees F, warm space to 60 degrees F minimum. Maintain temperature for 24 hours before, during, and after field-cutting.
- B. Ambient Conditions for Installation: When ambient temperatures are below 40 degrees F, warm space to 60 degrees F minimum. Maintain temperature for 24 hours before, during, and after installation.
- C. Ambient Conditions for Installation: When ambient temperatures are above 70 degrees F, cool space to 60 degrees F. Maintain temperature for 24 hours before, during, and after installation.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Paneling:
 - 1. Extrutech Plastics, Inc: www.epiplastics.com/#sle.
 - 2. Palram Americas Ltd: www.palram.com/#sle.
 - 3. Trusscore: www.trusscore.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PLASTIC PANELING

- A. Material: 100 percent virgin PVC (polyvinyl chloride), exterior grade.
- B. Surface Burning Requirements, Interior Use: Flame spread index of 25 or less and smoke-development index of 450 or less; Class A classification when tested in accordance with ASTM E84.
- C. Fungi Resistance: No visible growth, when tested in accordance with ASTM G21.

2.03 PLASTIC LINER PANEL ASSEMBLIES

- A. Description: Double-wall, hollow, rib-reinforced plastic liner panels; with nailing fins for hidden fastener attachment to furring members; interlocking panels.
 - 1. Applications: Walls.
 - 2. Panel Material: Extruded PVC.
 - 3. Panel Width, Wall Assemblies: 16 inches.
 - 4. Panel Length: As indicated on drawings.
 - 5. Panel Thickness: 1/2 inch.
 - 6. Panel Color: White.
 - 7. Trim: Extruded PVC, same color as liner panels, sized to fit liner panel thickness; types:
 - a. J-shape perimeter wall trim.
 - b. Inside corner trim.
 - c. Outside corner trim.
 - d. Floor cove.
 - e. Drip cap.

- f. Two-part H-bar.

2.04 ACCESSORIES

- A. Plastic Spacers: Rigid nylon spacers, same thickness as panel.
- B. Threaded Fasteners: Type and size as recommended by paneling manufacturer for substrate, application, and corrosion risk.
 - 1. High Corrosion Risk: Stainless steel ASTM F593 Type 316.
- C. Adhesives: Type recommended by panel manufacturer for application; not containing formaldehyde or volatile organic compounds.
- D. Joint Sealants: Type recommended by paneling manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements are as indicated on shop drawings.
- B. Verify substrates are prepared to receive plastic paneling.
- C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Verify mechanical, electrical, and other building components affecting work of this section are placed and ready to receive work of this section.

3.02 PREPARATION

- A. Surface Preparation: Clean substrate surfaces prior to installing paneling.

3.03 INSTALLATION - PLASTIC WALL LINER PANELS

- A. Install panels and trim in accordance with manufacturer's written instructions and approved shop drawings.
- B. Vertically Installed Liner Panel: Install panels plumb within specified tolerances.
- C. Install threaded fasteners into nailing fins with gaps between fasteners and nailing fins and without overtightening in accordance with manufacturer recommendations.
- D. Apply sealant between panels and trim in accordance with panel manufacturer's written instructions.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/4 inch in 10 feet.
- C. Maximum Variation from Level: 1/4 inch in 10 feet.

3.05 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean exposed surfaces of panels and trim in accordance with manufacturer's instructions.

3.06 PROTECTION

- A. Protect installed plastic paneling from subsequent construction operations.

END OF SECTION

**SECTION 07 21 00
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall.
- B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- D. Acoustic insulation.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete foundation walls.
- B. Section 07 21 19 - Foamed-in-Place Insulation. Foamed-in-place wall insulation at exterior walls and other locations.

1.03 DEFINITIONS

- A. Mineral Fiber Material Composition: Insulation referred to as mineral fiber block, board, and blanket insulation is composed of fibers from mineral based substances such as rock, slag, or glass and processed from the molten state into fibrous form.
 - 1. Based on type of insulation substance, the material will be referred to as a mineral fiber when having a rock or slag base, and glass fiber with a glass or silica sand base, also considered a mineral.
 - 2. Insulation blankets are flexible units consisting of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces referred to as batts; rolls are simply longer versions of batts.
 - 3. For additional information about mineral fiber and the various classification types, refer to the following reference standards; ASTM C553, ASTM C612, ASTM C665, and ASTM C726.

1.04 REFERENCE STANDARDS

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- E. ASTM C726 - Standard Specification for Mineral Wool Roof Insulation Board 2017.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

1.06 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.07 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- B. Acoustic insulation in framed walls: Mineral fiber batts.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
 - 5. Board Edges: Square.
 - 6. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
 - 7. Products:
 - a. DuPont de Nemours, Inc; Styrofoam Brand Cavitymate Ultra: building.dupont.com/#sle.
 - b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.
 - c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness [3-1/2] inch.

2.04 ACCESSORIES

- A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 - 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 - 2. Width: As required for application.
 - 3. Temperature Resistance: Range of minus 40 to 212 degrees F.
- B. Flashing Tape: Special reinforced film with high performance adhesive.
 - 1. Application: Window and door opening flashing tape.
 - 2. Width: As required for application.
 - 3. Primer: Tape manufacturer's recommended product.
- C. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- D. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- E. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- F. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- G. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Adhere a 6 inches wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
 - 1. Tape seal joints.
 - 2. Extend sheet full height of joint.
- B. Apply adhesive to back of boards:
 - 1. Full bed 1/8 inch thick.
- C. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- D. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.05 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

**SECTION 07 21 19
FOAMED-IN-PLACE INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation.
 - 1. In exterior framed walls.
 - 2. In exterior wall crevices.
 - 3. At junctions of dissimilar wall and roof materials.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.
- E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- F. FM 4880 - Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials 2017.
- G. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers 2022.
- H. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth 2019.
- I. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction Current Edition, Including All Revisions.
- J. UL 1715 - Standard for Safety Fire Test of Interior Finish Material Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.
- E. Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.

1.05 FIELD CONDITIONS

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

- B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Foamed-In-Place Insulation:
 - 1. BASF Corporation: www.spf.basf.com/#sle.
 - 2. Carlisle Spray Foam Insulation: www.carlislesfi.com/#sle.
 - 3. Gaco Western: www.gaco.com/#sle.
 - 4. Johns Manville: www.jm.com/#sle.
 - 5. Rhino Linings Corporation: www.rhinolining.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 - 1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
 - a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
 - 2. Thermal Resistance: R-value of 5.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
 - 3. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
 - 4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
 - 5. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
 - 6. Closed Cell Content: At least 90 percent.
 - 7. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

2.03 ACCESSORIES

- A. Primer: As required by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete before insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to a uniform monolithic density without voids.
- C. Apply to achieve a thermal resistance R-value of 35.
- D. Patch damaged areas.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Field inspections and tests will be performed by an independent testing agency.
- C. Inspection will include verification of insulation thickness and density.

3.05 PROTECTION

- A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

**SECTION 07 41 13
METAL ROOF PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed aluminum panels.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Roof sheathing.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference 2005 (Reapproved 2017).
- G. ASTM E1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems 2016 (Reapproved 2022).
- H. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments 2012, with Editorial Revision (2015).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Summary of test results, indicating compliance with specified requirements.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
 - 2. Include structural analysis signed and sealed by qualified structural engineer, indicating compliance of roofing system to specified loading conditions.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
 - 1. Include typical panel joint in sample.
 - 2. Include typical fastening detail.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Test Reports: Indicate compliance of metal roofing system to specified requirements.

- I. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of thirty years from Date of Substantial Completion.
- C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of twenty years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Architectural Metal Roof Panels: Tite-Loc Plus manufactured by Pac-Clad: www.pac-clad.com.
- B. Other Acceptable Manufacturers; Architectural Metal Roof Panels:
 - 1. ATAS International, Inc: www.atas.com/#sle.
 - 2. Berridge Manufacturing Company: www.berridge.com/#sle.
 - 3. Fabral: www.fabral.com/#sle.
 - 4. Metal Roofing Systems, Inc: www.metalroofingsystems.biz/#sle.
 - 5. Substitutions: Not permitted.

2.02 PERFORMANCE REQUIREMENTS

- A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
 - 1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
 - a. Dead Loads: Weight of roofing system.
 - b. Live Loads: As required by ASCE 7.
 - 2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
 - 3. Wind Uplift: Refer to Structural Drawings for performance requirements.
 - 4. Air Infiltration: Maximum 0.06 cfm/sq ft at air pressure differential of 6.24 lbf/sq ft, when tested according to ASTM E1680.
 - 5. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

2.03 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Architectural Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Aluminum Panels:
 - a. Alloy and Temper: Aluminum complying with ASTM B209 (ASTM B209M); temper as required for forming.
 - b. Thickness: Minimum 20 gauge, 0.032 inch.
 - 2. Profile: Standing seam, with minimum 2.0 inch seam height; concealed fastener system for field seaming with special tool.
 - 3. Texture: Smooth.
 - 4. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so that each sheet spans over three or more supports.
 - 5. Width: Maximum panel coverage of 18 inches.

2.04 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FABRICATION

- A. Panels: Provide factory fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.06 FINISHES

- A. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat aluminum coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss to match sample.

2.07 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of closed-cell synthetic rubber, neoprene, or PVC.
- C. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
 - 3. Seam Sealant: Factory-applied, non-skinning, non-drying type.
- D. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 - 2. Sheet Thickness: 40 mil, 0.040 inch minimum total thickness.
 - 3. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.

5. Manufacturers:
 - a. GCP Applied Technologies; Grade Ice and Water Shield: www.gcpat.com.
 - b. Henry Company; Blueskin PE200HT: www.henry.com/#sle.
 - c. Polyglass USA, Inc; Polystick MTS Self-Adhered High Temperature Roof Underlayment: www.polyglass.us/#sle.
 - d. Substitutions: Not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- B. Coordinate installation of waterproof membrane over roof sheathing; see Section 06 10 00.
- C. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.
- D. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- E. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
- C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
 1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.
 2. Provide sealant tape or other approved joint sealer at lapped panel joints.
 3. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

3.04 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

END OF SECTION

**SECTION 07 46 43
COMPOSITE SIDING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior composite siding.
- B. Exterior composite accessories and trim.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood stud wall framing, and sheathing.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashing and sheet metal components.

1.03 REFERENCE STANDARDS

- A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- B. ASTM D5206 - Standard Test Method for Windload Resistance of Rigid Plastic Siding 2019.
- C. ASTM D7031 - Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products 2011 (Reapproved 2019).
- D. ASTM D7032 - Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails 2021.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.
- C. Samples: For each finish product specified, provide two complete sets of color samples representing manufacturer's full range of available colors and patterns, including the following:
 - 1. Siding: Two of each type; full panel width by 12 inches long.
 - 2. Trim: Two of each type; full panel width by 12 inches long.
 - 3. Fasteners and Accessories: Two of each type; full size, and indicate use.
- D. Test Report: Showing compliance with specified performance requirements.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.
- H. Executed warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum three years of experience.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

- B. Construct mock-up on project site incorporating required materials and workmanship, with minimum size of 8 feet long by 4 feet wide.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver materials in manufacturer's original packaging and clearly identified.
- C. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- D. Protect materials from harmful environmental elements, construction dust, and other potentially detrimental conditions.

1.08 FIELD CONDITIONS

- A. Do not install siding when air temperature or relative humidity are outside manufacturer's limits.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer's Warranty: Provide manufacturer's standard substrate warranty of 50 years from Date of Substantial Completion.
- C. Manufacturer's Warranty: Provide manufacturer's standard finish warranty of 15 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. LP Smartside: www.lpcorp.com.
- B. Other Acceptable Manufacturers:
 - 1. Alside, Inc: www.ascendcompositecladding.com/#sle.
 - 2. Chelsea Building Products; Everlast Siding: www.everlastsiding.com.
 - 3. Fiberon: www.fiberondecking.com.
 - 4. NewTechWood: www.newtechwood.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPOSITION SIDING

- A. Composition Siding: Coextruded boards with recycled wood and plastic core, polyethylene-based capping; stain-resistant, fade-resistant, and scratch-resistant.
 - 1. Application: Horizontal board orientation, as indicated on drawings.
 - 2. Surface Texture: Embossed grain.
 - 3. Length: 12 feet, nominal.
 - 4. Width: 5-3/8 inches, nominal.
 - 5. Thickness: 15/16 inch, nominal.
 - 6. Color: As selected by Architect from manufacturers full range of available colors.
- B. Trim Boards:
 - 1. Application: Used as soffit, trim, and fascia board.
 - 2. Length: 12 feet, nominal.
 - 3. Width: 7-5/16 inches, nominal.
 - 4. Width: As shown on the Drawings.
 - 5. Thickness: 13/16 inch, nominal.
 - 6. Surface Texture: Match siding.
 - 7. Color: As selected by Architect from manufacturers full range.

2.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Comply with local building code in accordance with authorities having jurisdiction (AHJ) for wind load resistance requirements of project location.
- B. Wind Load Resistance: At least 53 psf sustained static test pressure in accordance with ASTM D5206; nails at 16 inches on center with 1-1/4 inch penetration.
- C. Comply with ASTM D7031 and following requirements:
 - 1. Surface Burning Characteristics: Flame spread index (FSI) of 200 or less, Class C, and smoke development index (SDI) of 350 or less in accordance with ASTM E84 and UL 723.
 - 2. Maximum Load Deflection: Less than 1/8 inch, nominal; ASTM D7032.

2.04 ACCESSORIES

- A. Fasteners, Polymer-Coated: Polymer-coated #9 composite decking screws complying with ASTM B117 for corrosion-resistance; length as required to penetrate wall sheathing at least 1/4 inch.
- B. Clips and Anchors: Provide as indicated in accordance with siding manufacturer; conceal unless otherwise indicated.
- C. Flashing: See Section 07 62 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Inspect products prior to installation; do not install products that may have been damaged in shipment or appear to have a damaged or irregular finish.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Protect surrounding areas and adjacent surfaces during execution of this work.
- B. Install Sheet Metal Flashing: Secure using concealed fastening method in accordance with siding manufacturer's instructions.
 - 1. Above door and window trim and casings.
 - 2. Above horizontal trim in field of siding.
 - 3. Above fascia board locations at roof edge.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
 - 1. Use trim details as indicated on drawings.
 - 2. Touch-up field cut edges before installing.
 - 3. Pre-drill screw holes if necessary to prevent breakage.
- B. Securely attach siding boards to furring, using fastener size, number, spacing, and minimum dimensions from board edges and ends in accordance with manufacturer's recommendations.
 - 1. Cut and route siding boards using carbide-tipped blades to prevent frayed edge cuts.
 - 2. Pre-drill holes located less than 1-1/2 inches from ends of boards, 1 inch from board edges, and in siding boards 3 inches wide or less.
 - 3. Install fasteners perpendicular to siding substrates and flush with surface of board.
- C. Horizontal Board Orientation:
 - 1. Begin siding installation at lowest established level.
 - 2. Center butt joints over vertical furring, and as siding courses are added, stagger butt joints in a consistent stair-step manner.
 - 3. Install lengths of siding to span at least three furring members.

- 4. Provide width of siding open joint at boards abutting ends in accordance with manufacturer's instructions, as spacing dimensions are temperature dependent.
- 5. Provide width of open joints and locations as indicated, and in accordance with manufacturer's instructions.
- D. Allow space for thermal movement between both ends of siding boards that butt against each other and trim.
- E. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.

3.04 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean siding boards in accordance with manufacturer's maintenance instructions, using cleaning materials and methods acceptable to siding manufacturer.

3.05 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Repair damage to adjacent substrates and surfaces.
- C. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 07 62 00
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Lumber and wood framing for anchorage of items within this section.
- B. Section 06 12 19 - Structural Insulated Panels: Roof panels for anchorage of items within this section.
- C. Section 07 41 13 - Metal Roof Panels: Roof panels to be installed over items within this section.
- D. Section 07 46 43 - Composite Siding and Trim: Fascia and trim to be installed in conjunction with items within this section.
- E. Section 07 71 23 - Manufactured Gutters and Downspouts.

1.03 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- E. CDA A4050 - Copper in Architecture - Handbook current edition.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sheet Metal Flashing and Trim:
 - 1. ALUCOBOND USA: www.alucobondusa.com/#sle.
 - 2. Fairview Architectural LLC: www.fairview-na.com/#sle.
 - 3. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
 - 4. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 20 gauge, 0.032 inch thick; plain finish shop pre-coated with fluoropolymer coating.
 - 1. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's standard colors.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.04 GUTTERS AND DOWNSPOUTS

- A. See Section 07 71 23 for manufactured gutters and downspouts.

2.05 EXTERIOR PENETRATION FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.06 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Concealed Sealants: Non-curing butyl sealant.
- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- F. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Exterior Flashing Receivers: Install in accordance with manufacturer's recommendations, and in proper relationship with adjacent construction, and as follows:
 - 1. Secure receiver at perimeter of wall opening with adhesives or fasteners.
 - 2. Place flashing into receiver channel.
 - 3. Secure flashing with receiver clip.
- E. Seal metal joints watertight.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

**SECTION 07 71 00
ROOF SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rain chains.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Aluminum gutters and downspouts.

1.03 REFERENCE STANDARDS

- A. NRCA (RM) - The NRCA Roofing Manual 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Samples: Submit two appropriately sized samples of rain chain and cup.
- D. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Rain Chain and Cups:
 - 1. Expressions Ltd.; "Rain Chain Copper Arts and Crafts Square Cups": www.expressions-ltd.com.
 - 2. Gutter Supply; "Arts & Crafts Square Cups - Medium - Copper Rain Chains": www.guttersupply.com.
 - 3. Rain Chains; "Arts & Crafts Square Cups - Pre-Aged Copper": www.rainchains.com.
 - 4. Rain Chains in a Nutshell; "Arts & Crafts Square Cups - Pre-Aged Copper": www.rainchainsinanutshell.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. Rain Chains:
 - 1. Style: Chain with Arts & Crafts style cups.
 - 2. Cup Sizes:
 - a. Top: 3-1/2".
 - b. Bottom: 1-1/2".
 - c. Height: 4-1/8".
 - d. Cups on Average 8.5' chain: 17 cups.
 - 3. Total Length:
 - a. One (1) at 8'-0".
 - b. One (1) at 12'-0" long.
 - 4. Material: Raw copper.

2.03 FINISHES

- A. Raw natural copper.

2.04 ACCESSORIES

- A. Rain chain gutter installation kit for attachment to gutters: Compatible with rain chain.
- B. Rain chain debris blocker: Manufacturer's standard.
- C. Hammered shallow basin dish: Manufacturer's compatible in same material as rain chain.
- D. Sealant between gutter installation kit and rain chain: As recommended by component manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION

**SECTION 07 72 00
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Snow guards.

1.02 RELATED REQUIREMENTS

- A. Section 07 71 00 - Roof Specialties: Other manufactured roof specialty items.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for failure of any type including detachment from the roofing surface. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 SNOW GUARDS

- A. Unit Snow Guards: Individual projecting metal shapes, attached to standing seams of roof panel, and adhered to roof deck.
 - 1. Projecting Metal Shapes: Aluminum, semi-circular flat design.
 - 2. Placement: As indicated on drawings.
 - a. Three (3) rows at roof edge in a staggered layout.
 - b. 6'-0" to 8'-0" space between first grouping and second grouping.
 - c. Three (3) rows at roof higher up slope from roof edge grouping.
 - d. 30" maximum spacing between snow guards.
 - 3. Products:
 - a. Alpine SnowGuards; Snow Bird Hybrid Pad-Style Snow Guard: www.alpinesnowguards.com/#sle.
 - b. Berger Building Products; Pad-Style Snow Guard: www.bergerbp.com/#sle.

- c. Rocky Mountain Snow Guards, Inc; SnowTrapper Snow Guard:
www.rockymountainsnowguards.com/#sle.
- d. TRA Snow and Sun; Pad-Style Snow Guard: www.trasnowandsun.com/#sle.
- e. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 07 92 00
JOINT SEALANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.
- D. Owner-provided field quality control.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
- B. Section 07 41 13 - Metal Roof Panels: Sealant for roofing system.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Sealant for flashing and trim.
- D. Section 07 72 00 - Roof Accessories: Sealant for roof accessories.
- E. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- F. Section 08 80 00 - Glazing: Glazing sealants and accessories.
- G. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants 2018 (Reapproved 2022).
- C. ASTM C834 - Standard Specification for Latex Sealants 2017.
- D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- H. ASTM C1311 - Standard Specification for Solvent Release Sealants 2022.
- I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
- J. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).
- K. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.

6. Substrates for which laboratory adhesion and/or compatibility testing is required.
 7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 8. Sample product warranty.
 9. Certification by manufacturer indicating that product complies with specification requirements.
 10. SWRI Validation: Provide currently available sealant product validations as listed by SWRI (VAL) for specified sealants.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
 - D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
 - E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
 - F. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 01 61 16.
 - G. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
 - H. Installation Plan: Submit at least four weeks prior to start of installation.
 - I. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
 - J. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
 - K. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
 - L. Installation Log: Submit filled out log for each length or instance of sealant installed.
 - M. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
 - N. Manufacturer's Qualification Statement.
 - O. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 1. Adhesion Testing: In accordance with ASTM C794.
 2. Compatibility Testing: In accordance with ASTM C1087.
 3. Allow sufficient time for testing to avoid delaying the work.
 4. Deliver to manufacturer sufficient samples for testing.
 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- D. Installation Plan: Include schedule of sealed joints, including the following.
 1. Joint width indicated in Contract Documents.

2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
4. Approximate date of installation, for evaluation of thermal movement influence.
5. Installation Log Form: Include the following data fields, with known information filled out.
 - a. Unique identification of each length or instance of sealant installed.
 - b. Location on project.
 - c. Substrates.
 - d. Sealant used.
 - e. Stated movement capability of sealant.
 - f. Primer to be used, or indicate as "No primer" used.
 - g. Size and actual backing material used.
 - h. Date of installation.
 - i. Name of installer.
 - j. Actual joint width; provide space to indicate maximum and minimum width.
 - k. Actual joint depth to face of backing material at centerline of joint.
 - l. Air temperature.
- E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
 1. Identification of testing agency.
 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
 - b. Test date.
 - c. Location on project.
 - d. Sealant used.
 - e. Stated movement capability of sealant.
 - f. Test method used.
 - g. Date of installation of field sample to be tested.
 - h. Date of test.
 - i. Copy of test method documents.
 - j. Age of sealant upon date of testing.
 - k. Test results, modeled after the sample form in the test method document.
 - l. Indicate use of photographic record of test.
- F. Owner will employ an independent testing agency to perform the field quality control inspection and testing as referenced in PART 3 of this section and as follows, to prepare and submit the field quality control plan and log, and to provide recommendations of remedies in the case of failure.
 1. Contractor shall cooperate with testing agency and repair failures discovered and destructive test location damage.
- G. Field Quality Control Plan:
 1. Visual inspection of entire length of sealant joints.
 2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
 - a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
 - b. If any failures occur in the first 10 linear feet, continue testing at 12 inches intervals at no extra cost to Owner.
 3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.

- a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1000 linear feet, and one test per 1000 linear feet thereafter, or once per floor on each elevation.
 - b. If any failures occur in the first 1000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- H. Field Adhesion Test Procedures:
 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 2. Have a copy of the test method document available during tests.
 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- I. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
 1. Record results on Field Quality Control Log.
 2. Repair failed portions of joints.
- J. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
 1. Sample: At least 18 inches long.
 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
 3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.
- K. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 1. Bostik Inc: www.bostik-us.com/#sle.
 2. Hilti, Inc: www.us.hilti.com/#sle.
 3. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us/#sle.
 4. Pecora Corporation: www.pecora.com/#sle.
 5. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 6. Sika Corporation: www.usa-sika.com/#sle.
 7. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

8. W.R. Meadows, Inc: www.wrmeadows.com/#sle.
 9. Substitutions: Not permitted.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
1. Same manufacturers as described above for non-sag sealants.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
- a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Joints between door, window, and other frames and adjacent construction.
 - e. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - f. Other joints indicated below.
 - g. Intentional weepholes in masonry.
 - h. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - i. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - j. Joints where installation of sealant is specified in another section.
 - k. Joints between suspended panel ceilings/grid and walls.
2. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
 3. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- B. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
 3. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
 6. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Wet Areas: Bathrooms, restrooms, and kitchens; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.
- D. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".
- E. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

2.03 NONSAG JOINT SEALANTS

1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Service Temperature Range: Minus 20 to 180 degrees F.
- B. Type E-2 - Silicone Sealant: ASTM C920, Grade NS, Use T; single-component, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
1. Movement Capability: Plus 100 percent and minus 50 percent, minimum.

2. Color: To be selected by Architect from manufacturer's standard range.
- C. Type I-1 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 1. Color: White.
- D. Type I-2 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 1. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 2. Color: To be selected by Architect from manufacturer's standard range.
 3. Service Temperature Range: Minus 40 to 180 degrees F.
- E. Type I-3 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 1. Color: To be selected by Architect from manufacturer's standard range.
- F. Type I-4 - Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag; not expected to withstand continuous water immersion or traffic.
 1. Hardness Range: 10 to 30, Shore A, when tested in accordance with ASTM C661.
 2. Color: To be selected by Architect from manufacturer's standard range.
 3. Service Temperature Range: Minus 13 to 180 degrees F.
- G. Type I-5 - Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

2.04 SELF-LEVELING SEALANTS

- A. Type SL-1 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.
 4. Service Temperature Range: Minus 40 to 180 degrees F.
- B. Type SL-2 - Rigid Self-Leveling Polyurethane Joint Filler: Two part, low viscosity, fast setting; intended for cracks and control joints not subject to significant movement.
 1. Hardness Range: Greater than 100, Shore A, and 50 to 80, Shore D, when tested in accordance with ASTM C661.
- C. Type SL-3 - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 1. Composition: Multi-component, 100 percent solids by weight.
 2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
 3. Color: To be selected by Architect from manufacturer's standard colors.
 4. Joint Width, Minimum: 1/8 inch.
 5. Joint Width, Maximum: 1/4 inch.
 6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 3. Open Cell: 40 to 50 percent larger in diameter than joint width.
 4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 - 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
 - 3. Record each test on Preinstallation Adhesion Test Log as indicated.
 - 4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 - 5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Owner will employ an independent testing agency to perform field quality control inspection and testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.
- D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- E. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

**SECTION 08 06 71
DOOR HARDWARE SCHEDULE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule of door hardware sets for swinging and other door types as indicated on drawings.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware: Requirements to comply with in coordination with this section.

1.03 REFERENCE STANDARDS

- A. BHMA A156.3 - American National Standard for Exit Devices 2014.
- B. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks 2014.
- C. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000 2017.
- D. BHMA A156.18 - American National Standard for Materials and Finishes 2016.
- E. DHI (H&S) - Sequence and Format for the Hardware Schedule 1996.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Comply with submittal requirements as indicated in Section 08 71 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Only manufacturers listed in Door Hardware Schedule or Section 08 71 00 are considered acceptable, unless noted otherwise.
- B. Obtain each type of door hardware as indicated from a single manufacturer and single supplier.
- C. Manufacturer's Abbreviations: Coordinate with manufacturers listed in Section 08 71 00.
 - 1. AR - Adams Rite.
 - 2. BAS - Best Access Systems.
 - 3. BOM - Bommer Industries.
 - 4. CR - Corbin Russwin.
 - 5. CUR - Curries.
 - 6. DTX - Detex.
 - 7. DMA - Dorma.
 - 8. FC - Falcon.
 - 9. FOR - Forms+Surfaces.
 - 10. GJ - Glynn Johnson.
 - 11. HGR - Hager.
 - 12. HES - HES.
 - 13. HG - Hettich Grant.
 - 14. HIA - Hiawatha.
 - 15. IVE - Ives.
 - 16. JOH - Johnson Hardware.
 - 17. KNX - Knox Company.
 - 18. LCN - LCN.
 - 19. McK - McKinney.
 - 20. MED - Medeco.
 - 21. MKR - Markar.
 - 22. NGP - National Guard Products.
 - 23. NOR - Norton.
 - 24. PEM - Pemko.

- 25. PH - Precision Hardware.
- 26. RIX - Rixson.
- 27. ROC - Rockwood.
- 28. SA - Sargent.
- 29. SCH - Schlage.
- 30. SEC - Securitron.
- 31. SDC - Stanley Door Closers.
- 32. SH - Stanley Hinges.
- 33. STH - Stanley Commercial Hardware.
- 34. TR - Trimco.
- 35. VON - Von Duprin.
- 36. YA - Yale.
- 37. ZRO - Zero Industries, Inc.

2.02 DESCRIPTION

- A. Door hardware sets provided represent the design intent, they are only a guideline and should not be considered a detailed or complete hardware schedule.
 - 1. Provide door hardware item(s) as required for similar purposes, even when item is not listed for a door in Door Hardware Schedule.
 - 2. Necessary items that are not included in a Hardware Set should be added and have the appropriate additional hardware as required for proper application and functionality.
 - 3. Door hardware supplier is responsible for providing proper size and hand of door for products required in accordance with Door Hardware Schedule and as indicated on drawings.
 - 4. Quantities listed are for each Pair (PR) of doors, or for each Single (SGL) door, as indicated in hardware sets.

2.03 LOCK FUNCTION CODES

- A. Function Codes for Cylindrical Locks: Complying with BHMA A156.5.
 - 1. Code F75; Passage: Latch retracted by knobs/levers at all times.
 - 2. Code F76; Privacy Lock: Outside knob/lever locked by pushbutton on inside knob/lever. Rotating inside knob/lever or closing door releases/unlocks button. Emergency release in outside knob/lever.
 - 3. Code F78; Communicating Lock: Deadlocking latch bolt by knobs. Either knob is locked by turn button in opposite knob.
 - 4. Code F81; Office Lock: Turn button locking. Turning button on inside locks outside knob/lever until unlocked by key or by rotating the inside knob/lever. Inside knob/lever always free. Deadlocking latch bolt.
 - 5. Code F82; Entry Lock: Push button locking. Button on inside locks outside knob/lever until unlocked by key or by rotating the inside knob/lever. Inside knob/lever always free. Deadlocking latch bolt.
 - 6. Code F83; Exit Lock: Deadlocking latch bolt by levers except when outside lever is locked by turn button inside. Turn button must be manually unlocked to operate outside lever. Inside lever always free.
 - 7. Code F84; Classroom Lock: Outside knob/lever locked/unlocked by key in outside knob/lever. Inside knob/lever always free. Deadlocking latchbolt.
 - 8. Code F86; Storeroom Lock: Outside knob/lever always locked/rigid. Latchbolt retracted by key in outside knob/lever or by rotating inside knob/lever. Inside knob/lever always free. Deadlocking latchbolt.
 - 9. Code F88; Entry/Restroom Lock: Deadlocking latch bolt by levers except when outside lever is locked by key inside, then by key outside.
- B. Function Codes for Mortise Locks: Complying with BHMA A156.13.
 - 1. Code F01; Passage/Closet Latchset: Latch bolt by knobs at all times.
 - 2. Code F02; Privacy Lock: Latch bolt by knobs, deadbolt by turn inside or emergency key outside.

3. Code F05; Classroom Lock: Deadlocking latch bolt by knobs. Outside knob locked by key outside. Inside knob always free.
 4. Code F07; Storeroom/Exit Lock: Deadlocking latch bolt by inside knob or key outside. Outside knob rigid.
 5. Code F11; Exit Lock: Latch bolt operated by knob from either side except when outside knob is made inoperative by buttons in lock face. Deadbolt projected by key from either side. Deadbolt retracted by key from outside. Both bolts retracted by inside knob. Deadlocking latch.
- C. Function Codes for Exit Devices: Complying with BHMA A156.3.
1. Code 01; Exit Device: Exit only/no trim.
 2. Code 02; Exit Device: Entrance by pull/trim when actuating bar is locked down (Dogged-Down). Note-Fire Exit devices cannot be locked down.
 3. Code 03; Exit Device: Entrance by trim when latchbolt is retracted by key (pullside). Unit is locked when the key is removed.
 4. Code 04; Exit Device: Entrance by trim when latchbolt is retracted by key (pullside) or set in a retracted position by key.
 5. Code 05; Exit Device: Entrance by thumbpiece. Key (pullside) locks/unlocks thumbpiece.
 6. Code 06; Exit Device: Entrance by thumbpiece only when released by key (pullside). Unit is locked when the key is removed.
 7. Code 07; Exit Device: Entrance by thumbpiece. Inside key (on pushside/on active device case) locks/unlocks thumbpiece. Outside key (pullside) retracts latch.
 8. Code 08; Exit Device: Entrance by knob/lever. Key (pullside) locks/unlocks knob/lever.
 9. Code 09; Exit Device: Entrance by knob/lever with key (pullside) only. Unit is locked when the key is removed.
 10. Code 10; Exit Device: Entrance by knob/lever. Inside key (pushside) locks/unlocks knob/lever. Outside key (pullside) only retracts latch.
 11. Code 11; Exit Device: Entrance by auxiliary control turnpiece. Key (pullside) locks/unlocks auxiliary control.
 12. Code 12 ; Exit Device: Entrance by auxiliary control turnpiece only when released by turning key (pullside). Unit is locked when the key is removed.

2.04 CYLINDERS

- A. Scheduled Manufacturer: Schlage. Field verify prior to bidding or ordering.
- B. Requirements:
1. Provide permanent cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
 2. Provide the following keyway: Field verify prior to bidding or ordering. Match Owner's existing.

2.05 KEYING

- A. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

2.06 FINISHES

- A. Finishes: Complying with BHMA A156.18.
1. Code 626: Satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D).
 2. Code 652: Satin chromium plated over nickel, with steel base material (former US equivalent US26D).

PART 3 EXECUTION**3.01 DOOR HARDWARE SCHEDULE**

- A. Organize listing of door hardware components within each hardware set in compliance with 10-Part scheduling sequence indicated in DHI (H&S), unless otherwise indicated.

3.02 HARDWARE SET # 01: "RESTROOM"

- A. For use on Door Number(s): P103A.
B. Provide for each Single (SGL) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
3 Each		HINGE	5BB1 4.5 X 4.5	652	IVE
1 Each	F76	PRIVACY LOCK	ND40S TLR	626	SCH
1 Each		WALL STOP	WS407CVX	630	IVE
3 Each		SILENCER	SR64	GRY	IVE

3.03 HARDWARE SET # 02: "WASH BAY TO EXTERIOR, VEHICLE STORAGE TO WASH BAY, VEHICLE STORAGE TO EXTERIOR "

- A. For use on Door Number(s): V102C, V101B, V101C, V101G, V101H, V102D.
B. NOTE: VERIFY HARDWARE COMPATIBILITY WITH DOOR/FRAME MANUFACTURER.
C. CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE. ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER: CREDENTIAL READER DEVICE. REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE.
D. Provide for each Single (SGL) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
1		CONTINUOUS HINGE	SL-11HD (PROVIDED BY SPECIAL LITE)	AA	SPE
1	F83	STOREROOM LOCK	ND80PD TLR	626	SCH
1		ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC	630	VON
1		SURFACE CLOSER	4050A SCUSH	689	LCN
1		GASKETING	BY DOOR/FRAME MANUFACTURER		B/O
1		THRESHOLD	BY DOOR/FRAME MANUFACTURER		B/O
1		DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		B/O
1		CREDENTIAL READER	BY DIVISION 28		B/O

3.04 HARDWARE SET # 03: "WATER SHOP AND STREETS SHOP TO VEHICLE STORAGE"

- A. For use on Door Number(s): P105A, P107A.

- B. CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE. ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER: CREDENTIAL READER DEVICE. REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE.

- C. Provide for each Pair (PR) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
8		HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1		POWER TRANSFER	EPT10	689	VON
1		CONST LATCHING BOLT	FB51P 24"	630	IVE
1		DUST PROOF STRIKE	DP2	626	IVE
1	F83	STOREROOM LOCK	ND80PD TLR	626	SCH
1		ELECTRIC STRIKE	6223 FSE 12/16/24/28 VAC/VDC	630	VON
1		COORDINATOR	COR X FL	628	IVE
2		MOUNTING BRACKET	MB	689	IVE
2		SURFACE CLOSER	4050A SCUSH	689	LCN
2		KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2		SILENCER	SR64	GRY	IVE
1		CREDENTIAL READER	BY DIVISION 28		B/O

3.05 HARDWARE SET # 04: "METER STORAGE TO WATER SHOP"

- A. For use on Door Number(s): P108A.

- B. CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE. ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER: CREDENTIAL READER DEVICE. REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE.

- C. Provide for each Single (SGL) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
3 Each		HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1 Each	F83	STOREROOM LOCK	ND80PD TLR	626	SCH
1 Each		ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC	630	VON
1 Each		SURFACE CLOSER	4050A SCUSH	689	LCN

1 Each		KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 Each		WALL STOP	WS406/407CCV	630	IVE
3 Each		SILENCER	SR64	GRY	IVE
1 Each		CREDENTIAL READER	BY DIVISION 28		B/O

3.06 HARDWARE SET # 05: "VARIOUS EXISTING ACCESS CONTROL DOORS"

- A. For use on Door Number(s): PE100A, PE100B, PE101A, PE104A, PE104C, PE110A, PE110C, PE110D, PE110H, PE111A, PE111B, PE105A.
- B. NOTE: BALANCE OF HARDWARE IS EXISTING TO REMAIN.
- C. NOTE: FIELD VERIFY ALL EXISTING OPENINGS TO CONFIRM FUNCTIONALITY OF NEW HARDWARE ITEMS.
- D. CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE. ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER: CREDENTIAL READER DEVICE. REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE.
- E. Provide for each Single (SGL) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
1 Each		ELECTRIC STRIKE	6300/6211 FSE 12/24 VAC/VDC AS REQ.	630	VON
1 Each		CREDENTIAL READER	BY DIVISION 28		B/O

3.07 HARDWARE SET # 06: "CORRIDOR TO EXTERIOR"

- A. For use on Door Number(s): V100A, V100B.
- B. CREDENTIAL READER DEVICE IS TO RETRACT LATCH ALLOWING MANUAL INGRESS. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE. ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER: CREDENTIAL READER DEVICE. REQUIRED WIRING TO THE PS902 POWER SUPPLY (WHICH POWERS THE QEL ELECTRIC LATCH RETRACTION FEATURE INSIDE THE PANIC HARDWARE) AND THE QEL ELECTRIC LATCH RETRACTION FEATURE INSIDE THE PANIC HARDWARE ITSELF.
- C. Provide for each Pair (PR) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
1 Each		CONT. HINGE	112XY	628	IVE
1 Each		CONT. HINGE	112XY EPT	628	IVE
1 Each		POWER TRANSFER	EPT10	689	VON
1 Each	01	PANIC HARDWARE	3547A-EO	626	VON
1 Each	03	ELEC PANIC HARDWARE	QEL-3547A-NL- OP-388 24 VDC	626	VON
1 Each		RIM CYLINDER	20-022	626	SCH
2 Each		DECORATIVE PULL	RM4506 6HD	630	ROC

2 Each		OH STOP	100S	630	GLY
2 Each		SURFACE CLOSER	4050A EDA	689	LCN
2 Each		PA MOUNTING PLATE	4050A-18PA	689	LCN
2 Each		BLADE STOP SPACER	4050A-61	689	LCN
2 Each		ASTRAGAL	8193AA	AA	ZER
1 Each		WEATHER STRIPPING	BY DOOR/FRAME MANUFACTURER		B/O
2 Each		DOOR SWEEP	39A	A	ZER
1 Each		THRESHOLD	625A-V3-223	A	ZER
1 Each		CREDENTIAL READER	BY DIVISION 28		B/O
1 Each		POWER SUPPLY	PS902 900-4R 120/240 VAC	LGR	SCE

3.08 HARDWARE SET # 07: "VEHICLE STORAGE TO CORRIDOR"

- A. For use on Door Number(s): V100C.
- B. CREDENTIAL READER DEVICE IS TO RETRACT LATCH ALLOWING MANUAL INGRESS. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE. ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER: CREDENTIAL READER DEVICE. REQUIRED WIRING TO THE PS902 POWER SUPPLY (WHICH POWERS THE QEL ELECTRIC LATCH RETRACTION FEATURE INSIDE THE PANIC HARDWARE) AND THE QEL ELECTRIC LATCH RETRACTION FEATURE INSIDE THE PANIC HARDWARE ITSELF.
- C. Provide for each Pair (PR) door(s).

UNITS	LOCK	ITEM	DESCRIPTION	FINISH	MFR
1 Each		CONT. HINGE	112XY	628	IVE
1 Each		CONT. HINGE	112XY EPT	628	IVE
1 Each		POWER TRANSFER	EPT10	689	VON
1 Each	01	PANIC HARDWARE	3547A-EO	626	VON
1 Each	03	ELEC PANIC HARDWARE	QEL-3547A-NL-OP-388 24 VDC	626	VON
1 Each		RIM CYLINDER	20-022	626	SCH
2 Each		DECORATIVE PULL	RM4506 6HD	630	ROC
2 Each		OH STOP	100S	630	GLY
2 Each		SURFACE CLOSER	4050A EDA	689	LCN
2 Each		PA MOUNTING PLATE	4050A-18PA	689	LCN

2 Each		BLADE STOP SPACER	4050A-61	689	LCN
1 Each		CREDENTIAL READER	BY DIVISION 28		B/O
1 Each		POWER SUPPLY	PS902 900-4R 120/240 VAC	LGR	SCE

END OF SECTION

**SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.
- B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
- C. Section 08 14 16 - Flush Wood Doors: Wood doors for installation in hollow metal frames.
- D. Section 09 91 23 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. ASCE: American Society of Civil Engineers.
- C. HMMA: Hollow Metal Manufacturers Association.
- D. NAAMM: National Association of Architectural Metal Manufacturers.
- E. NFPA: National Fire Protection Association.
- F. SCIF: Sensitive Compartmented Information Facility.
- G. SDI: Steel Door Institute.
- H. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2022.
- C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames 2020.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- I. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- M. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.

- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- O. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Fleming Door Products, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 4. Krieger Specialty Products: www.kriegerproducts.com/#sle.
 - 5. Mesker, dormakaba Group: www.meskeropeningsgroup.com/#sle.
 - 6. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 7. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 8. Substitutions: Not permitted.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Edge Profile: Manufacturers standard for application indicated.
 - 4. Typical Door Face Sheets: Flush.
 - 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.

6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Interior Doors, Non-Fire-Rated:
 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 3. Door Thickness: 1-3/4 inches, nominal.
 4. Door Finish: Factory primed and field finished.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 1. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
 2. Frame Finish: Factory primed and field finished.
- C. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- D. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- E. Transom Bars: Fixed, of profile same as jamb and head.
- F. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.06 ACCESSORIES

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
 1. Size: As indicated on drawings.
 2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
 3. Glazing: 1/4 inch thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
- B. Glazing: As specified in Section 08 80 00, factory installed.
- C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

- E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 08 71 00.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- D. Comply with glazing installation requirements of Section 08 80 00.
- E. Coordinate installation of electrical connections to electrical hardware items.
- F. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

**SECTION 08 14 16
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Submit two samples of door veneer, 6 by 6 inches in size illustrating wood grain, stain color, and sheen.
- E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- F. Manufacturer's Installation Instructions: Indicate special installation instructions.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.
- I. Specimen warranty.
- J. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.

1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 1. Haley Brothers: www.haleybros.com/#sle.
 2. Krieger Specialty Products: www.kriegerproducts.com/#sle.
 3. Masonite Architectural: www.architectural.masonite.com/#sle.
 4. Oregon Door: www.oregondoor.com/#sle.
 5. VT Industries, Inc: www.vtindustries.com/#sle.
 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS

- A. Doors: See drawings for locations and additional requirements.
 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 1. Provide solid core doors at each location.
 2. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: White pine, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 1. Vertical Edges: Any option allowed by quality standard for grade.
 2. "Running Match" each pair of doors and doors in close proximity to each other.
 3. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
- B. Facing Adhesive: Type I - waterproof.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
 2. Provide solid blocking for other throughbolted hardware.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 1. Transparent:
 - a. System - 4, Latex Acrylic, Water-based.
 - b. Sheen: Satin.

- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 08 11 13.
- B. Glazed Openings:
 - 1. Glazing: Single vision units, 3/8 inch thick glass.
 - 2. Tint: Clear.
- C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
- D. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

**SECTION 08 16 13
FIBERGLASS DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass doors.
- B. Fiberglass door frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA 1304 - Voluntary Specification for Determining Forced Entry Resistance of Side-Hinged Door Systems 2018.
- B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2022.
- D. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010 (Reapproved 2018).
- E. ASTM D570 - Standard Test Method for Water Absorption of Plastics 2022.
- F. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.
- G. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2022.
- H. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials 2017.
- I. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor 2013a.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- K. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- L. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- M. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- N. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2023).
- O. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes 2020.
- P. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights 2019c.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
- C. Shop Drawings: Indicate layout and profiles; include assembly methods.
 - 1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
 - 2. Indicate wall conditions, door and frame elevations, sections, materials, gauges, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.
- D. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
- E. Verification Samples: Submit door surface samples for each finish specified, 10 inches by 10 inches in size, illustrating finishes, colors, and textures.
- F. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Maintenance Data: Include instructions for repair of minor scratches and damage.
- J. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer; include detailed terms of warranty.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Mark doors with location of installation, door type, color, and weight.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Deliver pre-assembled doors and frames with braces, spreaders, and packaging as required to prevent damage.
- D. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.
 - 1. Store at temperature and humidity conditions recommended by manufacturer.
 - 2. Do not use non-vented plastic or canvas shelters.
 - 3. Immediately remove wet wrappers.
- E. Store in position recommended by manufacturer, elevated minimum 4 inches above grade, with minimum 1/4 inch space between doors.

1.08 FIELD CONDITIONS

- A. Do not install doors until structure is enclosed.
- B. Maintain temperature and humidity at manufacturer's recommended levels during and after installation of doors.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year manufacturer warranty covering materials and workmanship , including degradation or failure due to chemical contact.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Pultruded Fiberglass Reinforced Plastic (FRP) Doors:
 - 1. Basis of Design:
 - a. Special-Lite, Inc; AF-100 Series: www.special-lite.com/#sle.
 - 2. Other Acceptable Manufacturers:
 - a. Corrim Company; FRP doors and frames: www.corrimcpr.com.
 - b. Oshkosh Door Company; CorGuard FRP doors and frames: www.oshkoshdoor.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOOR AND FRAME ASSEMBLIES

- A. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.
 - 1. Physical Endurance: Swinging door cycle test to ANSI/SDI A250.4, Level A (1,000,000 cycles) minimum; tested with hardware and fasteners intended for use on project.
 - 2. Screw-Holding Capacity: Tested to 890 pounds, minimum.
 - 3. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
 - 4. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
 - 5. Chemical Resistance: Resist degradation due to exposure to tap water and distilled water.
 - 6. Sizes: As indicated on drawings.
 - 7. Clearance Between Door and Frame: 1/8 inch, maximum.
 - 8. Clearance Between Bottom of Door and Finished Floor: 3/4 inch, maximum; not less than 1/4 inch clearance to threshold.
 - 9. Provide frame anchors that allow for variation in rough opening size; field cutting of doors or frames to fit is not permitted.

2.03 COMPONENTS

- A. Doors: Fiberglass construction with reinforced core.
 - 1. Type: As indicated on drawings, including swinging doors.
 - 2. Thickness: 1-3/4 inch, nominal.
 - 3. Core Material: Manufacturer's standard core material for application indicated.
 - 4. Construction:
 - a. Molded fiberglass shells with color gel coating, bonded into seamless unit; manufacturer's standard subframe and hardware reinforcements.
 - 1) Fill door panel with foam insulation.
 - 5. Face Sheet Texture: Smooth.
 - 6. Door Panel Configuration: As indicated on drawings.
 - 7. Subframe and Reinforcements: Manufacturer's standard materials.
 - 8. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
 - 9. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.
- B. Door Frames: Provide type in compliance with performance requirements specified for doors.
 - 1. Type: Factory assembled with chemically welded joints.
 - 2. Profiles: 5-3/4 inches deep, 2 inches wide at jambs, and 2 inches wide at headers.
 - 3. Non-Fire-Rated:
 - a. Fiberglass pultrusions with gel-coating matching doors.
 - 4. Mullions: Fixed, fiberglass centerpost; 2 inches wide by 2-3/4 inches deep, nominal.
 - 5. Corner Joints: Mitered with concealed corner blocks or angles of same material as frame; fiberglass and aluminum joined with screws; steel and stainless steel spot welded; sealed

- 6. Hardware Cut-outs: Provide continuous backing or mortar guards of same material as frame, with watertight seal.
- 7. Frame Anchors: Stainless steel, Type 304; provide three anchors in each jamb for heights up to 84 inches with one additional anchor for each additional 24 inches in height.
- 8. Reinforcing: Provide manufacturer's standard reinforcing at hinge, strike, and closer locations.

2.04 PERFORMANCE REQUIREMENTS

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.
- B. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 and Wind Zone 4 - Additional Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
- C. Forced Entry Resistance: Pass in accordance with AAMA 1304 test method.
- D. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf.
- E. Air Leakage: Maximum of 0.1 cfm per square foot at 6.27 psf differential pressure, when tested in accordance with ASTM E283.
- F. Structural Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
- G. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of 0.35, maximum, measured on exterior door in size required for this project.
- H. Acoustical Performance: Sound Transmission Class (STC) of 25, minimum, when tested in accordance with ASTM E90.
- I. Fiberglass Reinforced Plastic (FRP) Face Sheet Properties:
 - 1. Izod Impact Resistance: ASTM D256, 7 foot-pound force per inch of width, minimum, with notched izod.
 - 2. Tensile Strength at Break: ASTM D638, 13,250 psi, minimum.
 - 3. Water Absorption: ASTM D570, 0.16 percent, maximum, after 24 hours at 74 degrees F.
 - 4. Flexural Strength: ASTM D790, 27,000 psi, minimum.
 - 5. Barcol Hardness: ASTM D2583, minimum of 40 units.

2.05 FINISHES

- A. Gel Coating: Ultraviolet (UV) stabilized polyester finish.
 - 1. Thickness: Minimum 15 mils, 0.015 inch wet thickness, plus/minus 3 mils, 0.003 inch.
 - 2. Color: As selected by Architect from manufacturer's standard line of colors.

2.06 HARDWARE

- A. Door Hardware: See Section 08 71 00.

2.07 ACCESSORIES

- A. Stops for Glazing: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.
 - 1. Exterior Doors: Provide non-removable stops on exterior side with continuous compression gasket weatherseal.
 - 2. Glazed Openings: Provide removable stops on interior side.
 - 3. Opening Sizes and Shapes: As indicated on drawings.
- B. Glazing: See Section 08 80 00.
- C. Door Vision Lite Frames: Frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.
- B. Do not begin installation until substrates have been properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Clean and prepare substrate in accordance with manufacturer's directions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.
- B. Install exterior doors in accordance with ASTM E2112.
- C. Install door hardware as specified in Section 08 71 00.
- D. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.
- E. Set thresholds in continuous bed of sealant.
- F. In masonry walls, install frames prior to laying masonry; anchor frames into masonry mortar joints; fill jambs with grout as walls are laid up.
- G. In stud walls, install frames prior to building walls; anchor frames to studs using concealed anchors.
- H. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
- I. Repair or replace damaged installed products.

3.04 ADJUSTING

- A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.
- B. Adjust hardware for smooth and quiet operation.
- C. Adjust doors to fit snugly and close without sticking or binding.

3.05 CLEANING

- A. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 36 13
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Rough wood framing for door opening.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 26 05 33.13 - Conduit for Electrical Systems: Conduit from electric circuit to operator and from operator to control station.
- D. Section 26 05 83 - Wiring Connections.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- B. ASTM C1036 - Standard Specification for Flat Glass 2021.
- C. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- D. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- E. DASMA 102 - American National Standard Specifications for Sectional Doors 2018.
- F. ITS (DIR) - Directory of Listed Products Current Edition.
- G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- H. NEMA MG 1 - Motors and Generators 2021.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL (DIR) - Online Certifications Directory Current Edition.
- L. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Operation Data: Include normal operation, troubleshooting, and adjusting.

- H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Comply with applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for electric motor and transmission.
- D. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: 2042 Extra Heavy Duty manufactured by Amarr.
- B. Other Acceptable Manufacturers - Sectional Doors:
 - 1. Amarr: www.amarr.com/commercial/#sle.
 - 2. bp Glass Garage Doors & Entry Systems: www.glassgaragedoors.com/#sle.
 - 3. C.H.I. Overhead Doors: www.chiohd.com/#sle.
 - 4. Clopay Building Products: www.clopaydoor.com/#sle.
 - 5. Fimbel Architectural Door Specialties: www.fimbelads.com/#sle.
 - 6. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.
 - 7. Substitutions: Not permitted.

2.02 STEEL DOORS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches thick.
 - 3. R-Value: 19.4.
 - 4. Air Leakage Rate: Less than 0.40 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
 - 5. Exterior Finish: Factory finished with acrylic baked enamel; "Sandstone" color.
 - 6. Interior Finish: Factory finished with acrylic baked enamel; "Sandstone" color.
 - 7. Glazed Lights: Full panel width, double row; set in place with resilient glazing channel.
 - 8. Electric Operation: Electric control station.
- B. Door Panels: Steel construction; outer steel sheet of 20 gauge, 0.0359 inch minimum thickness, flush profile; inner steel sheet of 20 gauge, 0.0359 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
- C. Window Frame: Manufacturers standard, clear anodized aluminum frame.
- D. Glazing: Annealed float glass; single pane; clear; 1 inch overall thickness.

2.03 COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Float Glass: Provide float glass glazing, unless noted otherwise.
 - 1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
- C. Insulation: Foamed-in-place polyurethane, bonded to facing.
 - 1. R-value of 19.4.
 - 2. Same thickness as core framing members.
- D. Metal Primer Paint: Zinc molybdate type.

2.05 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
 - 1. Provide interlock switches on motor operated units.
 - 2. Provide tamperproof operation cycle counter.
- B. Electric Operators:
 - 1. Mounting: Side mounted on cross head shaft.
 - 2. Motor Enclosure:
 - a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.
 - 3. Motor Rating: 1/3 hp; continuous duty.
 - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 6. Controller Enclosure: NEMA 250, Type 1.
 - 7. Opening Speed: 12 inches per second.
 - 8. Brake: Adjustable friction clutch type, activated by motor controller.
 - 9. Manual override in case of power failure.
 - 10. Refer to Section 26 05 83 for electrical connections.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.

3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- E. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
- F. Provide interconnection to security system.
- G. Hand Held Transmitter: Digital control, and resettable.
- H. Provide number of transmitters as required for up to twenty (20) vehicles to control all doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 52 01
WOOD AND ALUMINUM COMPOSITE WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory-fabricated wood and aluminum composite windows.
- B. Factory-fabricated wood patio door assemblies, including frames and hardware.
- C. Factory fabricated wood and aluminum entry doors assemblies, including frames.
- D. Factory fabricated and field installed wood and aluminum composite curtain wall system.
- E. Glazing.
- F. Operating hardware.
- G. Insect screens.
- H. Wood trim for exterior finishing.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Rough opening framing.
- B. Section 07 25 00 - Weather Barriers: Sealing frames to water-resistive barrier installed on adjacent construction.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- D. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2017.
- B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products 2021.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- F. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors 2002 (Reapproved 2018).
- G. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference 2015 (Reapproved 2023).
- H. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation 2022.
- I. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes 2020.
- J. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact 2017.
- K. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- L. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Show component dimensions, anchorage and fasteners, glass, and internal drainage details.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, and installation requirements.
- D. Operating Hardware: Two samples of each type of operating hardware.
- E. Manufacturer's Certificate: Certify that products furnished meet or exceed specified requirements.
- F. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification; label or other documentation.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- G. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- H. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- I. Manufacturer's qualification statement.
- J. Installer's qualification statement.
- K. Specimen warranty.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of sealants.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a ten year period after Date of Substantial Completion.
- C. Manufacturer Warranty: Provide 10 year manufacturer warranty for insulated glass units against seal failure, interpane dusting or misting, and replacement of same. Complete forms in Owner's name and register with manufacturer.
- D. Manufacturer Warranty: Provide 10 year manufacturer warranty against defects listed. Complete forms in Owner's name and register with manufacturer or warrantor.
 - 1. Degradation of color finish.
 - 2. Delamination or separation of finish cladding from window member.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design - Wood Windows, Entry Doors and Curtain Wall:
 - 1. H Window Company: www.hwindow.com.
- B. Other Acceptable Manufacturers (provided they meet the design intent of this section):
 - 1. Andersen Windows, Inc: www.andersenwindows.com/#sle.
 - 2. Marvin: www.marvin.com/#sle.
 - 3. Pella Corporation: www.pellacommercial.com/#sle.
 - 4. Substitutions: Not permitted.

2.02 WOOD AND ALUMINUM COMPOSITE WINDOWS

- A. Wood and Aluminum Composite Windows: Wood frame and sash, factory fabricated and assembled.
 - 1. Exterior Finish: Metal clad, painted.
 - 2. Interior Finish: Factory transparent finish.
 - 3. Color: As selected by Architect from manufacturer's standard range.
 - 4. Configuration: As indicated on drawings.
 - 5. Window Product Types: AP - Awning, hopper, projected window and FW - Fixed window, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 6. Factory glazed; dry glazing method.
 - 7. Wood Species: Clear pine, preservative treated using treatment type suitable for required finish.
 - 8. Frame and Sash Members: Mortise and tenon joints. Glue and steel pin joints to hairline fit, weather tight.
 - 9. Metal Cladding: Formed aluminum, factory finished, factory fit to profile of wood members.
 - 10. Transparent Finish: Scarf joints permitted if wood matches in color and grain texture.
 - 11. Weather Stop Flange: Continuous at perimeter of unit.
 - 12. Clearances and Shim Spacing: Minimum required for installation and dynamic movement of perimeter seal.
 - 13. Fasteners: Concealed from view.
 - 14. Internal Drainage of Glazing Spaces to Exterior: Weep holes.
 - 15. Insect Screen: Locate on inside of windows.
 - 16. Operable Units: Double weatherstripped.

2.03 MATCHING WOOD AND ALUMINUM COMPOSITE ENTRY DOORS

- A. Entry Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard; Grade: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 - 2. Configuration: As indicated on drawings.
 - 3. Door Product Type: SHD - Side hinged door, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 4. Factory glazed; dry glazing method.
 - 5. Door Style: As indicated on drawings.
 - 6. Thickness: 1-3/4 inches, unless otherwise indicated.
 - 7. Frame Depth: 4-9/16 inch, minimum.
 - 8. Exterior Metal Cladding: Formed aluminum, factory finished, factory fit to profile of wood members.
 - a. Color: To match the windows.
 - 9. Door Stops: Clear preservative treated wood, finished to match frame.
 - 10. Door Sill: Extruded 6063-T5 aluminum, 1/2 inch low profile threshold with compressible bulb weatherstripping and attached to frame jambs.
 - a. Color: Mill finish.
 - 11. Hinges: Heavy duty ball bearing type, 4-1/2 inch, with non-removable pin and set screw.

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- a. Finish: Satin stainless steel.
- 12. Door Hardware: See Section 08 71 00.

2.04 COMPONENTS

- A. Glazing: Double glazed, clear, Low-E coated, argon filled, with glass thicknesses as recommended by manufacturer for specified wind conditions.
- B. Window Frames: Manufacturer's standard profile; flush solid wood glass stops of screw fastened type, sloped for positive drainage.
- C. Curtain Wall Frames: Manufacturer's standard profile, depth as required to meet performance requirements; flush solid wood glass stops of screw fastened type, sloped for positive drainage.
- D. Entry Door Frames: Manufacturer's standard profile; flush solid wood glass stops of screw fastened type, sloped for positive drainage.
- E. Sills: Extruded aluminum, with 0.080 inch nominal thickness; sloped for positive drainage; fits under sash and projects at least 1/2 inch beyond exterior face of wall; single piece full width of opening.
- F. Interior Extension Jambs: Wood to match window frame, depth as required for wall construction.
- G. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable supports allowing screen removal without use of tools.
 - 1. Supports: Spring-loaded steel pins; four per screen unit.
 - 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 - 3. Frame Finish: Baked enamel, color to match window interior color.
- H. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to effect weather seal.
- I. Fasteners: Stainless steel.
- J. Sealant and Backing Materials: See Section 07 92 00 of types as indicated.
 - 1. Perimeter Sealant: Appropriate for application.
 - 2. Sealant Used Within System (Not Used for Glazing): Appropriate for application.
- K. Flashing: Provide related flashings, with necessary anchors and attachment devices.
- L. Sealant for Setting Sills, Stools, Aprons, and Sill Flashing: Non-curing butyl type.

2.05 PERFORMANCE REQUIREMENTS

- A. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 requirements for the specific window type in accordance with the following:
 - 1. Performance Class (PC): R.
- B. Design Pressure (DP): In accordance with Structural Drawings.
- C. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 for Wind Zone 4 - Additional Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
- D. Fenestration Assembly Thermal transmittance (U-value): Comply with ASHRAE Std 90.1 I-P for building envelope requirements for applicable climate zone.
- E. Forced Entry Resistance: Tested to comply with ASTM F588 requirements for performance level of Grade 10 for specific window style required.
- F. Acoustic Performance: Minimum outdoor-indoor transmission class (OITC) rating of 34, when tested in accordance with ASTM E90 and ASTM E1332.

2.06 HARDWARE

- A. Operator: Manufacturer's standard push-pull handle fitted to projecting sash arms with limit stops; baked enamel finish.

- B. Projecting Sash Arms: Cadmium plated steel, friction pivot joints with nylon bearings, removable pivot clips for cleaning.

2.07 ALUMINUM FINISHES

- A. High Performance Organic Coatings: AAMA 2604, multiple coats, thermally cured fluoropolymer system.
- B. Color: To be selected by Architect from manufacturer's standard range.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify wall openings and adjoining water-resistive barrier materials are ready to receive wood windows. Refer to Section 06 10 00.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Set sill members and sill flashing in continuous bead of sealant.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install operating hardware.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inch per 3 ft non-cumulative or 1/8 inch per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

- A. Provide services of wood window manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 01 40 00 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- C. Provide field testing of installed wood windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
 - 1. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf.
 - 2. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.27 psf.
 - a. Maximum allowable rate of air leakage is 1.5 times specified rate of 0.10 cfm/sq ft as indicated in AAMA/WDMA/CSA 101/I.S.2/A440.
- D. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

- A. Refer to Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
- B. Remove protective material from factory finished surfaces.

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- C. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

**SECTION 08 71 00
DOOR HARDWARE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for aluminum, hollow metal, and fiberglass doors.
- B. Electrically operated and controlled hardware.
- C. Lock cylinders for doors that hardware is specified in other sections.
- D. Thresholds.
- E. Weatherstripping and gasketing.
- F. Hardware sets.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealants for setting exterior door thresholds.
- B. Section 08 06 71 - Door Hardware Schedule: Schedule of door hardware sets.
- C. Section 08 11 16 - Aluminum Doors and Frames.
- D. Section 08 14 16 - Flush Wood Doors.
- E. Section 08 16 13 - Fiberglass Doors.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. BHMA (CPD) - Certified Products Directory Current Edition.
- C. BHMA A156.1 - Standard for Butts and Hinges 2021.
- D. BHMA A156.2 - Bored and Preamsembled Locks and Latches 2017.
- E. BHMA A156.3 - Exit Devices 2020.
- F. BHMA A156.4 - Door Controls - Closers 2019.
- G. BHMA A156.5 - Cylinders and Input Devices for Locks 2020.
- H. BHMA A156.6 - Standard for Architectural Door Trim 2021.
- I. BHMA A156.7 - Template Hinge Dimensions 2016.
- J. BHMA A156.13 - Mortise Locks & Latches Series 1000 2017.
- K. BHMA A156.16 - Auxiliary Hardware 2018.
- L. BHMA A156.17 - Self Closing Hinges & Pivots 2019.
- M. BHMA A156.20 - Standard for Strap and Tee Hinges, and Hasps 2021.
- N. BHMA A156.21 - Thresholds 2019.
- O. BHMA A156.22 - Standard for Gasketing 2021.
- P. BHMA A156.26 - Standard for Continuous Hinges 2021.
- Q. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems 2018.
- R. BHMA A156.30 - High Security Cylinders 2020.
- S. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- T. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.
- U. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.
- V. DHI (KSN) - Keying Systems and Nomenclature 2019.
- W. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.

- X. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors 1993; also in WDHS-1/WDHS-5 Series, 1996.
- Y. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- Z. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- AA. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- BB. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- CC. UL (DIR) - Online Certifications Directory Current Edition.
- DD. UL 437 - Standard for Key Locks Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:
 - 1. Architect.
 - 2. Installer's Architectural Hardware Consultant (AHC).
 - 3. Hardware Installer.
 - 4. Owner's Security Consultant.
- D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- E. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Construction Manager occupancy.
 - 2. Attendance Required:
 - a. Construction Manager.
 - b. Owner.
 - c. Architect.
 - d. Installer's Architectural Hardware Consultant (AHC).
 - e. Hardware Installer.
 - 3. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
 - c. Verify that keying and programming complies with project requirements.
 - d. Establish keying submittal schedule and update requirements.
 - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Access control requirements.
 - b. Key control system requirements.
 - c. Schematic diagram of preliminary key system.
 - d. Flow of traffic and extent of security required.
 - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
 - 6. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
 - 3. List groups and suffixes in proper sequence.
 - 4. Provide complete description for each door listed.
 - 5. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 - 6. Include account of abbreviations and symbols used in schedule.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
 - 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 - 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Samples for Verification:
 - 1. Submit minimum size of 2 by 4 inch for sheet samples, and minimum length of 4 inch for other products.
 - 2. Submit one (1) sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
 - 3. Return full-size samples to Contractor.
 - 4. Submit product description with samples.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
 - 1. Submit manufacturer's parts lists and templates.
 - 2. Bitting List: List of combinations as furnished.
- H. Keying Schedule:
 - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- I. Manufacturer's qualification statement.
- J. Installer's qualification statement.
- K. Supplier's qualification statement.
- L. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- M. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- N. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Lock Cylinders: Ten for each master keyed group.
 - 3. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Construction Manager.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.
 - 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Applicable provisions of NFPA 101.
 - 4. Listed and certified compliant with specified standards by BHMA (CPD).
 - 5. Auxiliary Hardware: BHMA A156.16.
 - 6. Straps and Tee Hinges: BHMA A156.20.
 - 7. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 - 8. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
 - 9. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
- D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
 - 1. See Section 28 10 00 for additional access control system requirements.
- E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. See Door Hardware Schedule.
- F. Fasteners:
 - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.

2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
 - a. Self-drilling (Tek) type screws are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
6. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
7. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.02 HINGES

- A. Manufacturers:
 1. Basis of Design: Ives.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Ives: www.iveshinges.com.
 4. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 5. Substitutions: Not permitted.
- B. Hinges: Comply with BHMA A156.1, Grade 1.
 1. Self Closing Hinges: Comply with BHMA A156.17.
 2. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
 - a. Provide hinge width required to clear surrounding trim.
 3. Continuous Hinges: Comply with BHMA A156.26.
 4. Provide hinges on every swinging door.
 5. Provide ball-bearing hinges at each door with closer.
 6. Provide non-removable pins on exterior outswinging doors.
 7. Provide power transfer hinges where electrified hardware is mounted in door leaf.
 8. Provide following quantity of butt hinges for each door:
 - a. Doors up to 60 inches High: Two hinges.
 - b. Doors From 60 inches High up to 90 inches High: Three hinges.
 - c. Doors 90 inches High up to 120 inches High: Four hinges.
 - d. Doors over 120 inches High: One additional hinge per each additional 30 inches in height.

2.03 FLUSH BOLTS

- A. Manufacturers:
 1. Basis of Design: Ives.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 4. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 5. Substitutions: Not permitted.
- B. Flush Bolts: Comply with BHMA A156.16, Grade 1.
 1. Flush Bolt Throw: 3/4 inch, minimum.
 2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
 - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
 3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
 4. Manual Flush Bolts: Provide lever extensions for top bolt at over-sized doors.
 5. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.

2.04 EXIT DEVICES

- A. Manufacturers:
 - 1. Basis of Design: Von Duprin.
 - 2. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - 4. Von Duprin, an Allegion brand: www.allegion.com/us/#sle.
 - 5. Substitutions: Not permitted.
- B. Exit Devices: Comply with BHMA A156.3, Grade 1.
 - 1. Lever design to match lockset trim.
 - 2. Provide cylinder with cylinder dogging or locking trim.
 - 3. Provide exit devices properly sized for door width and height.
 - 4. Provide strike as recommended by manufacturer for application indicated.
 - 5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

2.05 LOCK CYLINDERS

- A. Manufacturers:
 - 1. Basis of Design: Schlage: www.allegion.com/us/#sle.
 - 2. Substitutions: Not permitted.
- B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 - 1. Provide standard, electronic, conventional, full size interchangeable core (FSIC), and small format interchangeable core (SFIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
 - 2. Provide high security mechanical type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.30 or UL 437 at locations indicated.
 - 3. Provide cylinders from same manufacturer as locking device.
 - 4. Provide cams and/or tailpieces as required for locking devices.
 - 5. Within specific Door Sections, when provisions for lock cylinder are being referenced to this Section, provide specified lock cylinder and keyed to building keying system, unless otherwise indicated.

2.06 CYLINDRICAL LOCKS

- A. Manufacturers:
 - 1. Basis of Design: Schlage: www.allegion.com/us/#sle.
 - 2. Substitutions: Not permitted.
- B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
 - 1. Bored Hole: 2-1/8 inch diameter.
 - 2. Latchbolt Throw: 1/2 inch, minimum.
 - 3. Backset: 2-3/4 inch unless otherwise indicated.
 - 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.
 - b. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
 - c. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
 - d. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
 - e. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
 - 5. Provide a lock for each door, unless otherwise indicated that lock is not required.
 - 6. Provide an office lockset for swinging door where hardware set is not indicated.
 - 7. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

2.07 MORTISE LOCKS

- A. Manufacturers:
 - 1. Basis of Design: Schlage: www.allegion.com/us/#sle.
 - 2. Substitutions: Not permitted.
- B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.
 - 1. Latchbolt Throw: 3/4 inch, minimum.
 - 2. Deadbolt Throw: 1 inch, minimum.
 - 3. Backset: 2-3/4 inch unless otherwise indicated.
 - 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
 - b. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
 - c. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
 - d. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
 - e. Finish: To match lock or latch.

2.08 DOOR PULLS AND PUSH PLATES

- A. Manufacturers:
 - 1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Hager Companies: www.hagerco.com/#sle.
 - 3. Hiawatha, Inc, division of Activar Construction Products Group, Inc: www.activarcpg.com/hiawatha/#sle.
 - 4. Substitutions: Not permitted.
- B. Door Pulls and Push Plates: Comply with BHMA A156.6.
 - 1. Pull Type: Straight, unless otherwise indicated.
 - 2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
 - a. Edges: Beveled, unless otherwise indicated.
 - 3. Material: Aluminum, unless otherwise indicated.
 - 4. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
 - 5. On solid doors, provide matching door pull and push plate on opposite faces.
 - 6. On glazed storefront doors, provide matching door pulls/push plates on both faces unless otherwise indicated.

2.09 CLOSERS

- A. Manufacturers; Surface Mounted:
 - 1. Basis of Design: LCN.
 - 2. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Hager Companies: www.hagerco.com/#sle.
 - 4. LCN, an Allegion brand: www.allegion.com/us/#sle.
- B. Closers: Comply with BHMA A156.4, Grade 1.
 - 1. Type: Surface mounted to door.
 - 2. Provide door closer on each exterior door.

2.10 KICK PLATES

- A. Manufacturers:
 - 1. Basis of Design: Ives.
 - 2. Hiawatha, Inc, an Activar Construction Products Group company: www.activarcpg.com/hiawatha/#sle.
 - 3. Ives, an Allegion brand: www.allegion.com/us/#sle.

4. Standard Metal Hardware Manufacturing Ltd; Door Plates: www.smhardware.com/#sle.
 5. Substitutions: Not permitted.
- B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.

2.11 WALL STOPS

- A. Manufacturers:
1. Basis of Design: Ives.
 2. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 3. Hager Companies: www.hagerco.com/#sle.
 4. Hiawatha, Inc, division of Activar Construction Products Group, Inc; []: www.activarcpg.com/hiawatha/#sle.
 5. Ives: www.allegion.com/us/#sle.
 6. Substitutions: Not permitted.
- B. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
1. Provide wall stops to prevent damage to wall surface upon opening door.
 2. Type: Bumper, concave, wall stop.
 3. Material: Aluminum housing with rubber insert.

2.12 THRESHOLDS

- A. Manufacturers:
1. Basis of Design: Zero.
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 3. National Guard Products, Inc: www.ngpinc.com/#sle.
 4. Zero International, Inc: www.zerointernational.com/#sle.
 5. Substitutions: Not permitted.
- B. Thresholds: Comply with BHMA A156.21.
1. Provide threshold at interior doors for transition between two different floor types, and over building expansion joints, unless otherwise indicated.
 2. Provide threshold at each exterior door, unless otherwise indicated.
 3. Type: Flat surface.
 4. Material: Aluminum.
 5. Threshold Surface: Fluted horizontal grooves across full width.
 6. Field cut threshold to profile of frame and width of door sill for tight fit.
 7. Provide non-corroding fasteners at exterior locations.

2.13 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
1. Basis of Design: Zero.
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 3. National Guard Products, Inc: www.ngpinc.com/#sle.
 4. Zero International, Inc: www.zerointernational.com/#sle.
 5. Substitutions: Not permitted.
- B. Weatherstripping and Gasketing: Comply with BHMA A156.22.
1. Head and Jamb Type: Adjustable.
 2. Door Sweep Type: Encased in retainer.
 3. Material: Aluminum, with brush weatherstripping.
 4. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
 5. Provide door bottom sweep on each exterior door, unless otherwise indicated.

2.14 SILENCERS

- A. Manufacturers:

1. Basis of Design: Ives.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 4. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 5. Substitutions: Not permitted.
- B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
1. Single Door: Provide three on strike jamb of frame.
 2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 3. Material: Rubber, gray color.

2.15 KEY CONTROL SYSTEMS

- A. Manufacturers:
1. Basis of Design: Schlage: www.allegion.com/us/#sle.
 2. Substitutions: Not permitted.
- B. Key Control Systems: Comply with guidelines of BHMA A156.28.
1. Provide keying information in compliance with DHI (KSN) standards.
 2. Keying: Grand master keyed.
 3. Include construction keying and control keying with removable core cylinders.
 4. Key to existing keying system.
 5. Supply keys in following quantities:
 - a. 4 each Master keys.
 - b. 1 each Grand Master keys.
 - c. 1 each Great Grand Master keys.
 - d. 6 each Construction Master keys.
 - e. 15 each Construction keys.
 - f. 2 each Construction Control keys.
 - g. 2 each Control keys if new system.
 - h. 2 each Extra Cylinder cores.
 - i. 2 each Change keys for each keyed core.
 6. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.
 7. Security Key Tags: For each keyed lock on project, provide one set of matching key tags for permanent attachment to one key of each set.
 8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
 9. Deliver keys with identifying tags to Owner by security shipment direct from hardware supplier.
 10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
 11. Owner or Owner's agent install permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

2.16 KEY CABINET

- A. Manufacturers:
1. Basis of Design: Lund.
 2. Knox Company: www.knoxbox.com/#sle.
 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Key Cabinet: Sheet steel construction, piano hinged door with key lock; BHMA A156.28.
1. Mounting: Wall-mounted.
 2. Capacity: Actual quantity of keys, plus 25 percent additional capacity.
 3. Horizontal metal hook strips with replaceable labels covered with clear plastic.
 4. Size key hooks to hold 6 keys each.

5. Finish: Baked enamel, manufacturer's standard color.
6. Key cabinet lock to building keying system.

2.17 FIRE DEPARTMENT LOCK BOX

- A. Manufacturers:
 1. Knox Company; Knox-Box Rapid Entry System: www.knoxbox.com/#sle.
 2. Substitutions: Not permitted.
- B. Fire Department Lock Box:
 1. Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
 2. Capacity: Holds 10 keys.
 3. Finish: Manufacturer's standard dark bronze.

2.18 FINISHES

- A. Finishes: Identified in Section 08 0671 - Door Hardware Schedule.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Do not install surface mounted items until application of finishes to substrate are fully completed.
- D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
 2. For Aluminum-Framed Storefront Doors and Frames: See Section 08 43 13.
 3. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
 4. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch.
 - b. Push Plates/Pull Bars: 42 inch.
 - c. Deadlocks (Deadbolts): 48 inch.
 - d. Exit Devices: 40-5/16 inch.
- E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
 1. See Section 07 92 00 for additional requirements.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 40 00 - Quality Requirements.
- B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

**SECTION 08 80 00
GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.
- D. Section 08 16 13 - Fiberglass Doors and Frames: Glazed lites in doors.
- E. Section 08 36 13 - Sectional Doors: Glazed lites in doors.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- F. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021a.
- G. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- H. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2019.
- I. GANA (SM) - GANA Sealant Manual 2008.
- J. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2020.
- K. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2020.
- L. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch in size of glass units.

- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.
 - 1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.
 - a. North American Contractor Certification (NACC) for glazing contractors.
 - b. Equivalent independent third-party ANSI accredited certification.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.07 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.
- B. Provide on-site glazing mock-up with the specified glazing components.
- C. Locate where directed.
- D. Mock-ups may remain as part of the Work.

1.08 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
 - 1. AGC Glass North America, Inc: www.agcglass.com/#sle.
 - 2. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
 - 3. Guardian Glass, LLC: www.guardianglass.com/#sle.
 - 4. Pilkington North America Inc: www.pilkington.com/na/#sle.
 - 5. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
 - 6. Substitutions: Not permitted.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
 - 2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

2.04 INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Glass: Any of the manufacturers specified for float glass.
 - 2. Goldray Industries, Inc: www.goldrayglass.com/#sle.
 - 3. Viracon, Apogee Enterprises, Inc: www.viracon.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
- C. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Metal Edge Spacers: Aluminum, bent and soldered corners.
 - 4. Spacer Color: Black.
 - 5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - b. Color: Black.
 - 6. Purge interpane space with dry air, hermetically sealed.
- D. Type G-1 - Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 4. Metal edge spacer.
 - 5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.

6. Total Thickness: 1 inch.
 7. Thermal Transmittance (U-Value), Summer - Center of Glass: 29, nominal.
 8. Visible Light Transmittance (VLT): 68 percent, nominal.
 9. Shading Coefficient: 0.43, nominal.
 10. Solar Heat Gain Coefficient (SHGC): 0.38, nominal.
 11. Visible Light Reflectance, Outside: 11 percent, nominal.
 12. Glazing Method: Dry glazing method, gasket glazing.
- E. Type G2 - Insulating Glass Units: Vision glass, double glazed.
1. Applications: Exterior glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 4. Metal edge spacer.
 5. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 6. Total Thickness: 1 inch.
 7. Thermal Transmittance (U-Value), Summer - Center of Glass: 29, nominal.
 8. Visible Light Transmittance (VLT): 68 percent, nominal.
 9. Shading Coefficient: 0.43, nominal.
 10. Solar Heat Gain Coefficient (SHGC): 0.38, nominal.
 11. Visible Light Reflectance, Outside: 11 percent, nominal.
 12. Glazing Method: Dry glazing method, gasket glazing.

2.05 GLAZING UNITS

- A. Type G3 - Monolithic Interior Vision Glazing:
1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
 5. Glazing Method: Dry glazing method, gasket glazing.

2.06 GLAZING COMPOUNDS

- A. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- B. Polysulfide Sealant: Two component; chemical curing, nonsagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- C. Polyurethane Sealant: Single component, chemical curing, nonstaining, nonbleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.
- D. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; black color.
- E. Manufacturers:
1. BASF Corporation: www.basf.com/#sle.
 2. Bostik Inc: www.bostik-us.com/#sle.
 3. Dow Corning Corporation: www.dowcorning.com/construction/#sle. Dow Corning Corporation: www.dowcorning.com/construction/#sle.
 4. Momentive Performance Materials, Inc: www.momentive.com/#sle.
 5. Pecora Corporation: www.pecora.com/#sle.
 6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.07 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- E. Glazing Clips: Manufacturer's standard type.

2.08 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Provide shop inspection and testing for each type of glass.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- C. Monitor and report installation procedures and unacceptable conditions.

3.06 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove nonpermanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

**SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Carpet tile.
 - 2. Fluid-applied flooring.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Flooring contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Flooring contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- E. Patching compound.
- F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- B. Section 01 74 19 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.
- C. Section 03 30 00 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.
- D. Section 03 54 00 - Cast Underlayment: Self-leveling underlayment applied as remediation treatment.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.
- F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings 2011.

1.04 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- B. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.

2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
 3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 4. Manufacturer's installation instructions.
 5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.
- C. Testing Agency's Report:
1. Description of areas tested; include floor plans and photographs if helpful.
 2. Summary of conditions encountered.
 3. Moisture and alkalinity (pH) test reports.
 4. Copies of specified test methods.
 5. Recommendations for remediation of unsatisfactory surfaces.
 6. Product data for recommended remedial coating.
 7. Include certification of accuracy by authorized official of testing agency.
 8. Submit report directly to Owner.
 9. Submit report not more than two business days after conclusion of testing.
- D. Adhesive Bond and Compatibility Test Report.
- E. Floor Moisture Testing Technician Certificate: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician- Grade I certificate.
- F. Copy of RFCI (RWP).

1.05 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing will be performed by an independent testing agency employed and paid by Owner.
- B. Construction Manager may perform adhesive and bond test with Construction Manager's own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- D. Construction Manager's Responsibility Relating to Independent Agency Testing:
1. Provide access for and cooperate with testing agency.
 2. Confirm date of start of testing at least 10 days prior to actual start.
 3. Allow at least 4 business days on site for testing agency activities.
 4. Achieve and maintain specified ambient conditions.
 5. Notify Owner when specified ambient conditions have been achieved and when testing will start.
- E. Floor Moisture Testing Technician Qualifications: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician Certification- Grade I.
- F. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
 - 3. Products:
 - a. ARDEX Engineered Cements; ARDEX Feather Finish: www.ardexamericas.com/#sle.
 - b. H.B. Fuller Construction Products, Inc; TEC Feather Edge Skim Coat: www.tecspecialty.com/#sle.
 - c. USG Corporation; Durock Brand Advanced Skim Coat Floor Patch: www.usg.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 - 2. Products:
 - a. Allied Construction Technologies, Inc; AC Tech 2170: www.actechperforms.com/#sle.
 - b. ARDEX Engineered Cements; ARDEX MC RAPID: www.ardexamericas.com/#sle.
 - c. GCP Applied Technologies; Kovara AB 300: www.gcpat.com/#sle.
 - d. H.B. Fuller Construction Products, Inc; TEC LiquidDam with TEC Level Set 200 SLU: www.tecspecialty.com/#sle.
 - e. LATICRETE International, Inc; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus: www.laticrete.com/#sle.
 - f. Rust-Oleum Corporation; TVB - Topside Vapor Barrier 100% Solids: www.rustoleum.com/#sle.
 - g. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com/#sle.
 - h. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com/#sle.
 - i. USG Corporation; Durock Brand CST Moisture Vapor Reducer: www.usg.com/#sle.
 - j. Substitutions: Not permitted.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Existing concrete slabs with coatings or penetrating sealers/hardeners/dustproofers:
 - a. Do not attempt to remove coating or penetrating material.
 - b. Do not abrade surface.
 - 3. Preliminary cleaning.
 - 4. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
 - 5. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 6. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 7. Specified remediation, if required.
 - 8. Patching, smoothing, and leveling, as required.
 - 9. Other preparation specified.
 - 10. Adhesive bond and compatibility test.
 - 11. Protection.
- C. Remediations:
 - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 - 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
 - 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Construction Manager's convenience.
 - 1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
 - 2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
 - 3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.10 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

**SECTION 09 68 13
TILE CARPETING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- D. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2023.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Sustainable Design Submittal: Submit VOC content documentation for adhesives.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile Carpeting:
 - 1. Interface, Inc; Step Repeat collection: www.interface.com/#sle.
 - 2. Milliken & Company; Entrance flooring: www.milliken.com/#sle.
 - 3. Mohawk Group; Tuff Stuff II: www.mohawkgroup.com/#sle.
 - 4. Shaw Contract; Steppin Out collection: www.shawcontract.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Tile Carpeting, Type 1: Needlebond rib, manufactured in one color dye lot.
 - 1. Tile Size: 24 x 24 inch, nominal.
 - 2. Color: To be selected by Architect from manufacturer's full line.
 - 3. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 4. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 - 5. VOC Content: Comply with Section 01 61 16.
 - 6. Maximum Electrostatic Charge: 3 Kv. at 20 percent relative humidity.
 - 7. Total Weight: 50 oz/sq yd.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum, color as selected by Architect.
- C. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 61 16.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with Section 09 05 61.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Adhere carpet tile to substrate along centerline of rooms, at perimeter of rooms, where tiles are cut, and at 15 foot intervals throughout rooms. Lay remainder of tile dry over substrate.
- I. Adhere carpet tile as base finish up vertical surfaces to form base. Terminate top of base with cap strip.
- J. Trim carpet tile neatly at walls and around interruptions.
- K. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

**SECTION 09 91 13
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Non-metallic roofing and flashing.
 - 6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
 - 7. Floors, unless specifically indicated.
 - 8. Glass.
 - 9. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 09 91 23 - Interior Painting.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- D. SSPC-SP 2 - Hand Tool Cleaning 2018.
- E. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- F. SSPC-SP 13 - Surface Preparation of Concrete 2018.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, submit each color in each sheen available.
 - 3. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 3 feet long by 3 feet wide, illustrating paint color, texture, and finish.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

- B. Paints:
 - 1. Benjamin Moore: www.benjaminmoore.com.
 - 2. Behr Process Corporation: www.behr.com/#sle.
 - 3. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 - 4. PPG Paints: www.ppgpaints.com/#sle.
 - 5. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: Not permitted.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide 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.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated in Color Schedule.
 - 1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
 - 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete and primed metal.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
 - 3. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.
 - 3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- I. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- J. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

- B. Owner will provide field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 09 91 23
INTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. Paint interior surfaces of air ducts and convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, and convactor and baseboard cabinets to match face panels.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
 - 6. Floors, unless specifically indicated.
 - 7. Glass.
 - 8. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 09 91 13 - Exterior Painting.
- D. Section 09 93 00 - Staining and Transparent Finishing: Wood substrates.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. MPI product number (e.g., MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, submit each color in each sheen available.
 - 3. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Samples: Submit two paper chip samples, 4 x 6 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.
- E. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures.
- G. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 8 feet long by 8 feet wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by Architect.
- E. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Benjamin Moore: www.benjaminmoore.com.
 - 2. Behr Process Corporation: www.behr.com/#sle.
 - 3. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 - 4. PPG Paints: www.ppgpaints.com/#sle.
 - 5. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: Not permitted.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide 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.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.
 - 2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
 - 3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 - 4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.
 - 5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including uncoated steel, shop primed steel, and galvanized steel.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 - 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
 - b. Eggshell: MPI gloss level 3; use this sheen at all wall locations.
 - c. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
 - 1. Medium duty applications include doors and door frames.
 - 2. Two top coats and one coat primer.
 - 3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
 - 4. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.
- C. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
 - 1. One coat of latex primer.
 - 2. Semi-gloss: Two coats of latex enamel.
- D. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with latex primer.
 - 2. Semi-gloss: Two coats of latex enamel.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

- G. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- H. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- I. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- J. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.
- B. Owner will provide field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Field application of stains.
- B. Field application of transparent finishes.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 91 13 - Exterior Painting: Stains and transparent finishes for concrete substrates.
- C. Section 09 91 23 - Interior Painting: Stains and transparent finishes for concrete substrates.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and catalog number, and general product category.
 - 2. Manufacturer's installation instructions.
- C. Samples: Two samples on actual wood substrate to be finished, 6 by 8 inch in size, indicating selected colors and sheens for each system, with specified coats cascaded.
- D. Certification: By manufacturer that stains and transparent finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Manufacturer's Qualification Statement.
- G. Applicator's Qualification Statement.
- H. Maintenance Data: Submit data including finish schedule showing where each product, color, and finish was used, product technical data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements for additional provisions.
 - 2. Extra Stock Materials: Stain and transparent finish materials, 1 gal of each color and type; store where directed.
 - 3. Label each container with color and type in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with at least three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

Staining and Transparent Finishing

- B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperature: 50 degrees F unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide finishes used in any individual system from the same manufacturer; no exceptions.
- B. Transparent Finishes:
 - 1. Behr Process Corporation: www.behr.com/#sle.
 - 2. Benjamin Moore & Co.: www.benjaminmoore.com.
 - 3. General Finishes Arm-R-Seal: www.generalfinishes.com.
 - 4. Minwax: www.minwax.com.
 - 5. PPG Paints: www.ppgpaints.com/#sle.
 - 6. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 - 7. Watco: www.rustoleum.com.
 - 8. Varathane: www.varathanemasters.com.
 - 9. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Stains:
 - 1. Behr Process Corporation: www.behr.com/#sle.
 - 2. Benjamin Moore & Co.: www.benjaminmoore.com/
 - 3. Cabot Stain: www.cabotstain.com.
 - 4. General Finishes Dye Stain: www.generalfinishes.com.
 - 5. Minwax: www.minwax.com.
 - 6. PPG Paints: www.ppgpaints.com/#sle.
 - 7. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 - 8. Varathane: varathanemasters.com.
 - 9. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STAINS AND TRANSPARENT FINISHES - GENERAL

- A. Finishes:
 - 1. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. Supply each finish material in quantity required to complete entire project's work from a single production run.

4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: See Section 01 61 16.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: To be selected from manufacturer's full range of available colors.
 1. Selection to be made by Architect after award of contract.
 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

- A. Finish on Wood:
 1. 1-coat stain.
 2. 3-coat polyurethane.
 3. Stain: Semi-transparent stain for wood, solvent based.
 4. Top Coat: Polyurethane varnish, oil modified.
 5. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of stains and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

Staining and Transparent Finishing

- D. Sand wood surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Reinstall items removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for general requirements for field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 10 14 00
SIGNAGE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Emergency evacuation maps.
- C. Plaque.

1.02 RELATED REQUIREMENTS

- A. Section 26 51 00 - Interior Lighting: Exit signs required by code.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- H. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs:
 - 1. Best Sign Systems, Inc: www.bestsigns.com/#sle.
 - 2. Cosco Industries (ADA signs): www.coscoarchitecturalsigns.com/#sle.
 - 3. FASTSIGNS: www.fastsigns.com/#sle.
 - 4. Inpro: www.inprocorp.com/#sle.
 - 5. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.
 - 6. Seton Identification Products: www.seton.com/aec/#sle.
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Plaques:
 - 1. Bronze Memorials: www.bronzememorials.com.
 - 2. Cosco Industries: www.coscoarchitecturalsigns.com/#sle.
 - 3. FASTSIGNS: www.fastsigns.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Character Height: 1 inch.
 - 4. Sign Height: 2 inches, unless otherwise indicated.
 - 5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
 - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
 - 7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
 - 8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
- C. Emergency Evacuation Maps:
 - 1. Allow for a total of four (4) maps to be located by the Owner.
 - 2. Maps to be 8-1/2" x 11" or as recommended by the sign manufacturer to include all necessary content.
 - 3. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-mounted.
- D. Building Plaque: Cast bronze plaque to be located within the main corridor of the building.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Square.
 - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: As selected from manufacturer's full line.

4. Character Color: Contrasting color.
5. Logo: Village's official logo in official colors.

2.04 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 1. Total Thickness: 1/16 inch.

2.05 PLAQUES

- A. Metal Plaques:
 1. Metal: Bronze casting.
 2. Metal Thickness: 1/8 inch, minimum.
 3. Size: 24 inches wide by 30" high.
 4. Text and Typeface:
 - a. Character Font: Helvetica, Arial, or other sans serif font.
 - b. Character Case: Upper and lower case (title case).
 - c. Character Color: Contrast with background color.
 5. Border Style: Double line.
 6. Surface Finish: Brushed, satin.
 7. Painted Background Color: Dark oxide stain.
 8. Protective Coating: Manufacturer's standard clear coating.
 9. Mounting: Rosettes and toggle bolts.
 - a. Rosette Style: Star.
 - b. Rosette Diameter: 3/8 inch.
 10. Information on plaque:
 - a. Forest Preserve District name.
 - b. Project name.
 - c. Elected officials' names and titles.
 - d. Architect's name and city.
 - e. Construction Manager's name and City.
 - f. Year occupied.

2.06 DIMENSIONAL LETTERS

2.07 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Exposed Screws: Chrome plated.
- C. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

**SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Under-lavatory pipe supply covers.
- D. Electric hand/hair dryers.
- E. Utility room accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Concealed supports for accessories, including in wall framing and plates.
- B. Section 22 40 00 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.03 ABBREVIATIONS AND ACRONYMS

- A. PPE: Personal Protective Equipment.

1.04 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2022.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings 2022.
- F. ASTM C1036 - Standard Specification for Flat Glass 2021.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror 2018.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Bobrick Washroom Equipment, Inc.: www.bobrick.com.
- B. Other Acceptable Manufacturers:
 - 1. AJW Architectural Products: www.ajw.com/#sle.
 - 2. American Specialties, Inc: www.americanspecialties.com/#sle.

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3. Bradley Corporation: www.bradleycorp.com/#sle.
4. Georgia-Pacific Professional: www.blue-connect.com/#sle.
5. Substitutions: Not permitted.

C. Provide products of each category type by single manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 1. Grind welded joints smooth.
 2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.
- B. Keys: Provide 3 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Zinc Alloy: Die cast, ASTM B86.
- G. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- H. Adhesive: Two component epoxy type, waterproof.
- I. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.
- C. Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.
- D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- E. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface-mounted, stainless steel unit with pivot hinge, tumbler lock.
 1. Products:
 - a. Bobrick B-4288.
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- B. Soap Dispenser: Liquid soap dispenser, deck-mounted on vanity, with polyethylene container concealed below deck; piston and 4 inch spout of stainless steel with bright polished finish; chrome-plated deck escutcheon.
 1. Minimum Capacity: 34 ounces.
 2. Products:
 - a. Bobrick B-8236..
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- C. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
 1. Size: As shown on Drawings.
 2. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.

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Accessories

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4. Fixed Tilt Mirrors: Minimum 3 inches tilt from top to bottom.
5. Products:
 - a. Bobrick B-1658.
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- D. Grab Bars: Stainless steel, peened surface.
 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/2 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Finish: Satin.
 - d. Length and Configuration: As indicated on drawings.
 - e. Products:
 - 1) Bobrick B-6806 series.
 - 2) Substitutions: Section 01 60 00 - Product Requirements.
- E. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
 1. Products:
 - a. Bobrick B-270.
 - b. Substitutions: Section 01 60 00 - Product Requirements.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

- A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
 1. Products:
 - a. Bobrick B-207.
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- B. Shower Curtain:
 1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
 2. Size: 42 x 72 inches, hemmed edges.
 3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
 4. Color: White.
 5. Products:
 - a. Bobrick B-204-2.
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- C. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
 1. Products:
 - a. Bobrick B-76717.
 - b. Substitutions: Section 01 60 00 - Product Requirements.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Specified in 22 40 00 - Plumbing Fixtures.

2.07 ELECTRIC HAND/HAIR DRYERS

- A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
 1. Operation: Automatic, sensor-operated on and off.
 2. Mounting: Surface mounted.
 3. Cover: Stainless steel with brushed finish.
 - a. Tamper-resistant screw attachment of cover to mounting plate.
 4. Air Velocity: 15,000 linear feet per minute, minimum.
 5. Fan Control: Field adjustable down to approximately half-speed.
 6. Total Wattage: 500 W, maximum; no heater.

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7. Runtime: Field adjustable or automatic, up to 35 seconds.
8. Electric Hand Dryer Products:
 - a. Excel Dryer Inc; ThinAir Hand Dryer: www.exceldryer.com/#sle.
 - b. Mitsubishi Electric Trane HVAC US LLC; Jet Towel, Slim Type: www.mitsubishielectric.com/#sle.
 - c. World Dryer Corporation; VERDEdri: www.worlddryer.com/#sle.
 - d. Substitutions: Section 01 60 00 - Product Requirements.

2.08 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
 1. Drying rod: Stainless steel, 1/4 inch diameter.
 2. Hooks: Three, 0.06 inch stainless steel rag hooks at shelf front.
 3. Mop/broom holders: Four spring-loaded rubber cam holders at shelf front.
 4. Length: Manufacturer's standard length for number of holders/hooks.
 5. Products:
 - a. Bobrick B-224.
 - b. Substitutions: 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. See Section 06 10 00 for installation of blocking, reinforcing plates, and concealed anchors in walls.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 1. Grab Bars: As indicated on drawings.
 2. Mirrors: 40 inch, measured from floor to bottom of mirrored surface.
 3. Other Accessories: As indicated on drawings.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

**SECTION 10 44 00
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide Current Edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2022.
- C. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpbg.com/#sle.
 - 2. Ansul, a Tyco Business: www.ansul.com/#sle.
 - 3. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
 - 4. Oval Brand Fire Products: www.ovalfireproducts.com/#sle.
 - 5. Potter-Roemer: www.potterroemer.com/#sle.
 - 6. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
 - 7. Substitutions: Not permitted.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpbg.com/#sle.
 - 2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
 - 3. Nystrom, Inc: www.nystrom.com/#sle.
 - 4. Oval Brand Fire Products: www.ovalfireproducts.com/#sle.
 - 5. Potter-Roemer: www.potterroemer.com/#sle.
 - 6. Substitutions: Not permitted.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.

1. Stored Pressure Operated: Deep Drawn.
2. Class: A:B:C type.
3. Size: 20 pound.
4. Finish: Polished chrome.
5. Temperature range: Minus 65 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

- A. Cabinet Construction: Non-fire rated.
 1. Formed primed steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration: Recessed type.
 1. Size to accommodate accessories.
 2. Trim: Flat square edge, with 1-1/2 inch wide face.
 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.
- D. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- F. Fabrication: Weld, fill, and grind components smooth.
- G. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
- H. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.
- D. Position cabinet signage at all locations.

3.03 MAINTENANCE

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

SECTION 10 51 13 METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal lockers.
- B. Locker benches.
- C. Sloped tops.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking and nailers.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's published data on locker construction, sizes, and accessories.
- C. Shop Drawings: Indicate locker plan layout, numbering plan.
- D. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Spacesaver; Rival Lockers: www.spacesaver.com.
- B. Other Acceptable Metal Lockers:
 - 1. Penco Products, Inc: www.pencoproducts.com/#sle.
 - 2. Republic Storage Systems Co: www.republicstorage.com/#sle.
 - 3. Substitutions: Not permitted.

2.02 LOCKER APPLICATIONS

- A. Wardrobe Lockers: Metal lockers, free-standing wardrobe unit with drawer base.
 - 1. Wardrobe Unit:
 - a. Width: 24 inches.
 - b. Depth: 24 inches.
 - c. Height: 78 inches.
 - 2. Configuration: Single tier.
 - 3. Drawer Base:
 - a. Width: 24 inches.
 - b. Depth: 34 inches.
 - c. Height: 17 inches.
 - 4. Fittings: Size and configuration as indicated on drawings.
 - a. Upper shelf.
 - b. Hooks: Manufacturer's standard hanger bracket style.
 - 5. Ventilation: Perforated side panels, doors, and back panels.
 - 6. Door Configuration: Single.
 - 7. Latching: Single-point, with recessed handle.
 - 8. Locking: Padlock hasps, for padlocks provided by Owner.

- a. Locking Action: Positive, automatic type, whereby locker may be locked when open, then closed without unlocking.
- 9. Provide sloped top.
- 10. Color: To be selected from manufacturer's full range by Architect.

2.03 METAL LOCKERS

- A. Accessibility: Design units indicated on drawings as 'accessible' to comply with ICC A117.1 and ADA Standards.
- B. Locker Case Construction:
 - 1. Heavy-Duty, Welded Construction: Made of formed and welded together sheet steel; metal edges finished smooth without burrs; baked enamel or powder coat finished inside and out.
 - a. Assembly: Do not use bolts, screws, or rivets to assemble locker bodies.
 - b. Locker Body Components: Formed and flanged from steel sheet of the following type and minimum thicknesses:
 - 1) Unperforated Steel Sheet: Commercial Steel (CS), Type B, supplied for exposed applications and complying with ASTM A1008/A1008M and the following:
 - (a) Uncoated.
 - 2) Body and Shelves: 18 gauge, 0.0478 inch.
 - 3) Backs: 18 gauge, 0.0478 inch.
 - 4) Base: 18 gauge, 0.0478 inch.
 - (a) Height: 4 inches.
 - c. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
 - 1) Door Frame: 18 gauge, 0.0478 inch, minimum.
 - d. Where ends or sides are exposed, provide flush panel closures.
 - e. Provide filler strips where indicated or required, securely attached to lockers.
- C. Drawer Base with Bench:
 - 1. Top, Bottom, Sides, Back, and Drawer: 18 gauge, 0.0478 inch sheet steel.
 - 2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.
 - 3. Integral self latching mechanism triggered by operation of wardrobe door.
 - 4. Bench: Mixed hardwood.
- D. Doors: Channel edge; welded construction, manufacturer's standard stiffeners, grind and finish edges smooth.
 - 1. Door Thickness: 18 gauge, 0.0478 inch, minimum.
 - 2. Form recess for operating handle and locking device.
- E. Latches and Door Handles: Manufacturer's standard.
 - 1. Latching: Manufacturer's standard for locking arrangement selected.
- F. Hinges: Continuous piano hinge with powder coat finish to match locker color.
- G. Trim: 20 gauge, 0.0359 inch.
- H. Coat Hooks: Stainless steel or zinc-plated steel.
- I. Number Plates: Provide rectangular shaped aluminum plates. Form numbers 3/4 inch high of block font style with ADA designation, in contrasting color.
- J. Locks: Locker manufacturer's standard type indicated in Applications article above.

2.04 LOCKER BENCHES

- A. Locker Benches: Stationary type; bench top of laminated birch; painted steel pedestals.
 - 1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 2. Height: 18 inch.
 - 3. Length: 48 inch.
 - 4. Depth: 24 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Place and secure on prepared base.
- C. Install lockers plumb and square.
- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, and sloped tops.
- G. Install fittings if not factory installed.
- H. Replace components that do not operate smoothly.

3.03 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION

**SECTION 12 32 00
MANUFACTURED WOOD CASEWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured standard and custom casework, with cabinet hardware.
- B. Special purpose units.

1.02 RELATED REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements for sustainably harvested wood.
- B. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: VOC limitations for adhesives and sealants.
- C. Section 06 10 00 - Rough Carpentry: Blocking and nailers for anchoring casework.
- D. Section 07 92 00 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.
- E. Section 12 36 00 - Countertops and Solid Surface Fabrications: Additional requirements for countertops.
- F. Section 22 40 00 - Plumbing Fixtures: Sinks and fittings installed in casework.

1.03 DEFINITIONS

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

1.04 REFERENCE STANDARDS

- A. ANSI A135.4 - Basic Hardboard 2012 (Reaffirmed 2020).
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- D. BHMA A156.9 - Cabinet Hardware 2020.
- E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- F. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Keying Conference: Conduct conference prior to ordering keys. Incorporate conference decisions into keying submittal.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
- C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, and keying information.

- D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
 - 1. Plastic laminate samples, for color, texture, and finish selection.
- E. Manufacturer's Installation Instructions.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- I. Finish touch-up kit for each type and color of materials provided.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
- B. Acceptance at Site:
 - 1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
- C. Storage:
 - 1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
 - 1. Ruptured, cracked, or stained finish coating.
 - 2. Discoloration or lack of finish integrity.
 - 3. Cracking or peeling of finish.
 - 4. Delamination of components.
 - 5. Failure of adhesives.
 - 6. Failure of hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Laminate Casework:
 - 1. Case Systems: www.casesystems.com/#sle.
 - 2. Diversified Fixture: www.diversifiedfixture.com/#sle.
 - 3. Labscape LLC: www.labscape.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 CASEWORK, GENERAL

- A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom Grade.

2.03 FABRICATION

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
- B. Construction: As required for selected grade.
- C. Structural Performance: Safely support the following minimum loads:
 - 1. Base Units: 500 pounds per linear foot across the cabinet ends.
 - 2. Suspended Units: 300 pounds static load.
 - 3. Drawers: 125 pounds, minimum.
 - 4. Hanging Wall Cases: 300 pounds.
 - 5. Shelves: 100 pounds, minimum.
- D. Fittings and Fixture Locations: Cut and drill components for fittings and fixtures.
- E. Hardware Application: Factory-machine casework members for hardware that is not surface applied.
- F. Removable back panels on all base cabinets. Provide partial height back panels at sink cabinets.
- G. Fixed panels at backs of open spaces between base cabinets.
 - 1. Provide cutouts for power receptacles where indicated on drawings.
- H. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- I. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.
- J. Countertop Panel-Type Supports: Materials similar to adjacent casework, 1-1/2 inch in width, with front-to-back and toe space dimensions matching base cabinet. Designed to be secured in a concealed fashion to countertop material. Include two leveling devices per support panel.

2.04 PLASTIC-LAMINATE-CLAD CASEWORK

- A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
 - 1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
 - 2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
 - a. Base Cabinets: 22 inches.
 - b. Tall Cabinets: 22 inches.
 - c. Wall Cabinets: 16 inches.
 - 3. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.
 - b. Surface Color and Pattern: As selected by Architect from manufacturer's full line.
 - c. Exposed Interior Surfaces: Thermally fused laminate.
 - 1) Color: White.
 - d. Cap exposed plastic laminate finish edges with material of same finish and pattern.

2.05 COUNTERTOPS

- A. Countertops: See Section 12 36 00.

2.06 CABINET HARDWARE

- A. Comply with BHMA A156.9 requirements.
 - 1. Acceptable base materials for plated finishes include brass, bronze, and steel.
- B. Shelves in Cabinets:

1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.
- C. Swinging Doors: Hinges, pulls, and catches.
 1. Hinges: Concealed, number as required by referenced standards for width, height, and weight of door.
 - a. Concealed Hinges: Installed in cabinet edge, and on door back, bright chromium plated over nickel on base material.
 - 1) European-Style Hinges for Overlay Doors: 110 degree opening angle.
 2. Pulls: Chrome wire pulls, 4 inches wide.
 - a. Pull design to comply with project's referenced accessibility requirements.
 3. Catches: Mechanical catch.
- D. Drawers: Pulls and slides.
 1. Pulls: Chrome wire pulls, 4 inches wide.
 - a. Pull design to comply with project's referenced accessibility requirements.
 2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.07 MATERIALS

- A. Adhesives Used for Assembly: Comply with VOC requirements for adhesives and sealants; see Section 01 61 16.
- B. Wood-Based Materials:
 1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
 2. Composite Wood Panels: Containing no urea-formaldehyde resin binders.
- C. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.
- D. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.
- E. Hardboard: ANSI A135.4, Class 1, tempered.
- F. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.
- G. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

2.08 ACCESSORIES

- A. Concealed Joint Fasteners: Corrosion-resistant, standard with manufacturer.
- B. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.
- C. Sealant for Use in Casework Installation:
 1. Manufacturer's recommended type.

PART 3 EXECUTION

3.01 PREPARATION

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

3.02 EXAMINATION

- A. Site Verification of Environmental Conditions:
 1. Do not deliver casework until the following conditions have been met:
 - a. Building has been enclosed (windows and doors sealed and weather-tight).
 - b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
 - c. Ceiling, overhead ductwork, piping, and lighting have been installed.

- d. Installation areas do not require further “wet work” construction.
- B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
- C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
 - 1. Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 ft and 1/2 inch in 20 ft or more, and/or maximum variation from plumb exceeds 1/4 inch per story.
 - 2. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.
- D. Verify adequacy of support framing and anchors.
- E. Verify that service connections are correctly located and of proper characteristics.

3.03 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
 - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
 - 2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
 - 3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
 - 4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- F. Secure wall and floor cabinets to concealed reinforcement at gypsum board assemblies.
- G. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
 - 1. Where base cabinets are installed away from walls or service space framing, anchor to floor at toe space at not more than 24 inches on center, and at sides of cabinets with not less than two fasteners per side.
- H. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches on center.
- I. Install hardware uniformly and precisely.
- J. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.
- K. Replace units that are damaged, including those that have damaged finishes.

3.04 ADJUSTING

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.05 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
- B. Clean casework and other installed surfaces thoroughly.

3.06 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.

- B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.
- C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

**SECTION 12 36 00
COUNTERTOPS AND SOLID SURFACE FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Wall and ceiling panels for shower stalls.

1.02 RELATED REQUIREMENTS

- A. Section 123200 - Manufactured Wood Casework.
- B. Section 22 40 00 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- B. AWI (QCP) - Quality Certification Program Current Edition.
- C. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- D. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- E. PS 1 - Structural Plywood 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- G. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- H. Installation Instructions: Manufacturer's installation instructions and recommendations.
- I. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Natural Stone Institute (NSI) Accredited Natural Stone Fabricator; www.naturalstoneinstitute.org/#sle.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- C. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Provide designated labels on shop drawings as required by certification program.
 - 3. Provide designated labels on installed products as required by certification program.
 - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Avonite Surfaces: www.avonitesurfaces.com/#sle.
 - 2) Dupont: www.corian.com/#sle.
 - 3) Formica Corporation: www.formica.com/#sle.
 - 4) LG Hausys America, Inc; HI-MACS 12mm: www.lghausysusa.com/#sle.
 - 5) Wilsonart: www.wilsonart.com/#sle.
 - 6) Substitutions: Not permitted.
 - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - d. Color and Pattern: As selected by Architect from manufacturer's full line.
 - 3. Other Components Thickness: 1/2 inch, minimum.
 - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
 - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 - 6. Fabricate in accordance with manufacturer's standard requirements.
- C. Solid Surfacing Wall Panels: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/4 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Same as manufacturers listed above.
 - 3. Fabricate in accordance with manufacturer's standard requirements.

2.02 SHOWER PANELS

- A. Solid Surfacing Wall Panels: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/4 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and

Countertops and Solid Surface

Fabrications

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capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.

- a. Manufacturers:
 - 1) Same as manufacturers listed above.
- b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
- c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
- d. Color and Pattern: As selected by Architect from manufacturer's full line.

2.03 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C. Joint Sealant: Mildew-resistant silicone sealant, white.

2.04 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 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.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Concrete.
- D. Manual gates with related hardware.
- E. Automatic gate operators.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete anchorage for posts.
- B. Section 08 71 00 - Door Hardware: Gate locking device.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- D. ASTM F567 - Standard Practice for Installation of Chain-Link Fence 2014a (Reapproved 2019).
- E. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric 2017 (Reapproved 2022).
- F. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework 2018 (Reapproved 2022).
- G. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures 2018 (Reapproved 2022).
- H. CLFMI CLF-FIG0111 - Field Inspection Guide 2014.
- I. CLFMI CLF-PM0610 - Product Manual 2017.
- J. CLFMI CLF-SFR0111 - Security Fencing Recommendations 2014.
- K. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing 2018.
- L. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric) 1990.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- C. Design Calculations: For high wind load areas, provide calculations for fence fabric and accessory selection as well as line post spacing and foundation details. See CLFMI WLG 2445 for line post and spacing guidance.
- D. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.
- E. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates, and other pertinent information.

- F. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.
- G. Field Inspection Records: Provide installation inspection records that include post settings, framework, fabric, barbed wire, fittings and accessories, gates, and workmanship.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty for all components as well as installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Chain Link Fences and Gates:
 - 1. Hoover Fence Co.: www.hooverfence.com.
 - 2. Master-Halco, Inc: www.masterhalco.com/#sle.
 - 3. Merchants Metals: www.merchantsmetals.com/#sle.
 - 4. Peerless Fence Group: www.peerlessfence.com
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. All dimensions of components are subject to manufacturer's and industry standards. Variations from the described components are acceptable provided they meet manufacturer's standards for the fence type described.
- B. Fence Height: 6'-0".
- C. Line Posts: 2-3/8 inch diameter.
- D. Corner and Terminal Posts: 3.5 inch diameter.
- E. Gate Posts: 6-5/8 inch diameter.
- F. Top and Brace Rail: 1-5/8 inch diameter, plain end, sleeve coupled.
- G. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.
- H. Gate Frame: 2-1/2 inch diameter for welded fabrication for horizontal rails. 2 inch diameter for vertical rails. 1-5/8 inch diameter for diagonal rails.
- I. Fabric: 2 inch diamond mesh interwoven wire, 9 gauge, 0.1483 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.
- J. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.
- K. Tie Wire: Aluminum alloy steel wire.

2.03 MATERIALS

- A. Posts, Rails, and Frames:
 - 1. ASTM A1011/A1011M, Designation SS; hot-rolled steel strip, cold formed to pipe configuration, longitudinally welded construction, minimum yield strength of 50 ksi; zinc coating complying with ASTM F1043 and ASTM F1083.
 - 2. Line Posts: Type I round in accordance with FS RR-F-191/1D.
 - 3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.
- B. Wire Fabric:

1. ASTM F668 polymer-coated steel chain link fabric.
 2. Comply with CLFMI CLF-PM0610.
- C. Concrete:
1. Type specified in Section 03 30 00.

2.04 MANUAL GATES AND RELATED HARDWARE

- A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.
- B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.
- C. Hinges: Finished to match fence components.
1. Brackets: Round.
 2. Mounting: Center.
 3. Closing: Manual.
- D. Latches: Finished to match fence components.
1. Brackets: Round.
 2. Locking: Mechanical.

2.05 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.06 FINISHES

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.
- B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- C. Accessories: Same finish as framing.
- D. Color(s): Black.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.02 PREPARATION

- A. Removal: Obstructions or debris.

3.03 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails.
- C. Set line posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- D. Line Post Footing Depth Below Finish Grade: ASTM F567.
- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- H. Install center brace rail on corner gate leaves.
- I. Do not stretch fabric until concrete foundation has cured 7 days.

- J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- K. Position bottom of fabric 2 inches above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire stretched taut between terminal posts.
- O. Install hardware and gate with fabric to match fence.
- P. Peen all bolts upon installation.
- Q. Perform three random field inspections confirming proper installation.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.
- C. Do not infringe on adjacent property lines.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
 - 1. Hole diameter.
 - 2. Hole depth.
 - 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Gates: Inspect for level, plumb, and alignment.
- F. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.06 CLEANING

- A. Leave immediate work area neat at end of each work day.
- B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- C. Clean fence with mild household detergent and clean water rinse well.
- D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.
- E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.
- F. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Demonstrate proper operation of equipment to Owner's designated representative.
- C. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Conduct walking tour of project.
 - 3. Briefly describe function, operation, and maintenance of each component.
- D. Training: Train Owner's personnel on operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of two hours of training.
3. Instructor: Manufacturer's training personnel.
4. Location: At project site.

END OF SECTION

SECTION 33 11 13

WATER WELLS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work under this section includes:
 - 1. Installation of Water Wells and all other materials necessary to construct the proposed improvements.
- B. Other specification sections which may directly relate to the work in this section include, but are not limited to, include the following:
 - 1. Section 33 14 16 – Water Distribution

1.02 QUALITY ASSURANCE

- A. Contractor Qualifications: The work described in this section requires specialized knowledge, experience, skills and equipment to successfully complete. The Contractor shall possess the full capability to execute the work as specified, including trained, experienced, and skilled personnel and possession or access to the required equipment.
- B. Shop Drawings:
 - 1. Shop Drawings, submittal requirements, procedures and schedules shall meet the requirements contained in Subsection 1.09 of Section 01000, General Project Requirements.
- C. Substitutions and Product Options:
 - 1. These shall meet the requirements in Subsection 1.08.E of Section 01000, General Project Requirements.
 - 2. Provide three (3) locations and contacts for similar work of this nature.
 - 3. All approved equals shall be notified with written statements of their approval. Manufacturers shall not bid on this project without this written notification.

PART 2 PRODUCTS

2.01 WELL CASINGS AND ESTIMATED DEPTH

- A. 6" PVC Casing SDR-21 200 psi at 73 degrees Fahrenheit, ASTM D-2241
- B. Estimated Depth – To be determined by contractor for required design flow and water quality (Approximately 320 ft)

2.02 PIPING, TANK, ELECTRICAL, FITTINGS AND ADAPTERS

- A. PVC Drop Pipe:
 - 1. 1 ¼" diameter PVC Sch 80, 630 psi, PVC 1120 NSF ASTM D1785
- B. Submersible Pump Wire:
 - 1. THW 75 degree Celsius Flat Double Insolated Submersible Water Pump Cable 600V
- D. Parts:
 - 1. Brass adapters with stainless steel clamps, brass nipples and brass elbows
- E. Well Cap:

1. Lunde/Monitor, vented/gasketed well cap according to State and County codes, or approved equal.
- F. Well Pressure Storage Tank:
 1. Amtrol "Well-X-Trol" WX-103, Captive Air Tank, Amtrol Brand NSF/ANSI 61, or approved equal
- G. Water mains (Supply pipe from well to building)
 1. Coil Plastic HDPE 200 PSI SIDR 9 ASTM 2239 SNF-PW U.P. Code AWW-C901 PEPF4710, 1 ¼" to building.
- H. Pitless Adapter(s)
 1. "Baker" Pitless Adapter- M18-09-12001005-001 SPS56PBWEOCO or approved equal
 - a. Pitless well adapters in accordance with section 920.40 Subsection F of the Illinois Water Well and Pump Installation Contractors License Code.
 2. "Campbell" Pitless Adapter - Pitless Adapter Standard PAS-97 Certified to NSF/ANSI 372, or approved equal
 - a. Pitless well adapters in accordance with section 920.40 Subsection F of the Illinois Water Well and Pump Installation Contractors License Code.

2.03 GROUT

- A. WYO-BEN GROUT-WELL DF NSF/ANSI 60 granular, or approved equal

2.04 WATER WELL SCREENS

- A. Approved Manufacturer: Johnson Stainless Steel Slotted, or approved equal
- B. Screen Material: Fabricated of ASTM A 666, Type 304 stainless steel tube; with slotted or perforated surface and designed for well-screen applications.
- B. Screen Couplings: Butt-type, stainless-steel coupling rings.
- C. Screen Fittings: Screen, with necessary fittings, closes bottom and makes tight seal between top of screen and well casing.
- D. Maximum Entering Velocity: 0.1 fps

2.05 PACK MATERIAL – Depends on what slot Screen used.

- A. Coarse, uniformly graded filter sand, maximum 1/8 inch (3 mm) in diameter.
- B. Fine gravel, maximum 1/4 inch (6 mm) in diameter.

2.06 SUBMERSIBLE WELL PUMPS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. "Goulds" Pump Water Technology
 2. "Franklin" Motor classified UL Water Quality
 3. or approved equal
- B. Description: Submersible, well pump complying with HI 2.1-2.2 and HI 2.3; with the following features:
- C. Impeller Material: Plastic

- D. Motor: Capable of continuous operation under water, with protected submersible power cable.
- E. Column Pipe: PVC Sch 80, 630 psi, PVC 1120 NSF ASTM D1785.
- F. Discharge Piping: Coil Plastic HDPE 200 PSI SDR 9 ASTM 2239 SNF-PW U.P. Code AWW-C901 PEPF4710
- G. Capacities and Characteristics:
 - 1. Capacity: 51 gpm minimum.
 - 2. Discharge Head: 65 psi minimum.
 - 3. Discharge Size: 2" or as recommended by the manufacturer.
 - 4. Speed: 3,450 rpm or as recommended by the manufacturer.
 - 5. Motor Horsepower: 3 HP or as recommended by the manufacturer.
 - 6. Power Supply: 208V, 3-Phase

2.07 MOTORS –

- A. General requirements for motors are specified in Division 22 Section "Common Motor Requirements for Plumbing Equipment."
- B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- C. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in other sections of this specification.

2.08 WELL CONTROL PANEL

- A. Digital display on the drive.

2.09 CHLORINATOR

- A. Contractor/Water Treatment Company to shall size chlorinator to provide the proper chlorination in ppm as required by local and state codes.

PART 3 EXECUTION

3.01 PREPARATION

- A. Neighborhood Well Data: Review operating and test analyses.

3.02 INSTALLATION

- A. Construct well using rotary drilling method.
- B. Take samples of substrata formation at 10-foot (3-m) intervals and at changes in formation throughout the entire depth of each water supply well. Carefully preserve samples on-site in glass jars properly labeled for identification.
- C. Excavate for mud pit or provide aboveground structure, acceptable to authorities having jurisdiction, to allow settlement of cuttings and circulation of drill fluids back to well without discharging to on-site waterways. Disposal of slurry in portable pit to be sucked out.
- D. Enlarge pilot hole and install permanent casing, screen, and grout. Install the first section of casing with hardened steel driving shoe of an OD slightly larger than casing couplings if threaded couplings are used.
- E. Set casing and liners round, plumb, and true to line.

F. Join casing pipe as follows:

1. Pre-beveled
2. Solvent weld
3. Mix grout per manufacturers specifications.
4. Place grout continuously, from bottom to top surface, to ensure filling of annular space in one operation. Do not perform other operations in well within 72 hours after grouting of casing. When quick-setting cement is used, this period may be reduced to 24 hours.
5. Provide permanent casing with temporary well cap. Install with top of casing 36 inches (910 mm) above finished grade.
6. Develop wells to maximum yield per foot (meter) of drawdown.
7. Extract maximum practical quantity of sand, drill fluid, and other fine materials from water-bearing formation.
8. Avoid settlement and disturbance of strata above water-bearing formation.
9. Do not disturb sealing around well casings.
10. Continue developing wells until water contains no more than 2 ppm of sand by weight when pumped at maximum testing rate.
11. Install submersible well pumps according to HI 2.1-2.4 and provide access for periodic maintenance. The truck has to back up within 10' for service.
12. Before lowering the permanent pump into well, lower a dummy pump that is slightly longer and wider than permanent pump to determine that permanent pump can be installed. Correct alignment problems.
13. Before lowering the permanent pump into well, start pump to verify correct rotation.
14. Securely tighten discharge piping joints.
15. Connect motor to submersible pump and locate near well bottom.
16. Connect power cable while connection points are dry and undamaged.
17. Do not damage the power cable during installation; use cable clamps that do not have sharp edges.
18. Install water-sealed surface plate that will support pump and piping.(pitless adapter)

3.03 CONNECTIONS

- A. Piping installation requirements are specified elsewhere in other sections of the specifications. Plans indicate general arrangement of piping, fittings, and specialties.
- B. Connect piping between well pump and water piping.
- C. Connect water distribution system in trench to well pipe at pitless unit.
- D. Ground equipment according to National Electrical Code (NEC) requirements.
- E. Connect wiring according to National Electrical Code (NEC) requirements.

3.04 FIELD QUALITY CONTROL

- A. Test Preparation: Clean water supply wells of foreign substances. Swab casings using alkalis, if necessary, to remove foreign substances.
- B. Perform tests and inspections and prepare test reports.

- C. Tests and Inspections:
- D. Plumbness and Alignment Testing: Comply with AWWA A100.

Furnish samples of water-bearing formation to testing laboratory and well-screen manufacturer for mechanical sieve analysis.

Prepare reports on static level of ground water, level of water for various pumping rates, and depth to water-bearing strata.
- E. Performance Test Preparation: Start well pump and adjust controls and pressure setting. Replace damaged and malfunctioning controls and equipment.
- F. Performance Testing: Conduct final pumping tests after wells have been constructed, cleaned, and tested for plumbness and alignment.
- G. Arrange to conduct tests, with seven days' advance notice, after the test pump and auxiliary equipment have been installed. Note water-level elevations referred to for each assigned datum in wells.
- H. Provide discharge piping to conduct water to locations where disposal will not create a nuisance or endanger adjacent property. Comply with requirements of authorities having jurisdiction.
- I. Provide and maintain equipment of adequate size and type for measuring flow of water, such as weir box, orifice, or water meter.
- J. Measure elevation to water level in wells.
- K. Perform two bailer or air-ejection tests to determine expected yield. Test at depths with sufficient quantity of water to satisfy desired yields. Done when well is drilled.
- L. Test Pump: Variable capacity test pump with capacity equal to maximum expected yields at pressure equal to drawdown in wells, plus losses in pump columns and discharge pipes. Done when pump is installed.
- M. Start and adjust test pumps and equipment to required pumping rates.
- N. Record readings of water levels in wells and pumping rates at 30-minute maximum intervals throughout 24-hour minimum period.
- O. Record maximum yields when drawdown is 60 inches (1500 mm) above top of suction screens after designated times.
- P. Operate pumping units continuously for 8 hours after maximum drawdown is reached.
- Q. Record returning water levels in wells and plot curves of well recovery rates.
- R. Remove sand, stones, and other foreign materials that may become deposited in wells after completing final tests.

3.05 WATER ANALYSIS TESTING:

- A. Well drilling contractor to engage an Illinois certified and accredited testing agency to make bacteriological, physical, and chemical analyses of water from each finished well and report the results. Make analyses according to requirements of authorities having jurisdiction.
- B. Analyze water samples from each finished well for bacteriological, physical, and chemical quality and report the results. Make analyses according to requirements of authorities having jurisdiction.

3.06 CLEANING

- A. Disinfect water supply wells according to AWWA A100 and AWWA C654 before testing well pumps. The well is chlorinated after drilling and during installation of pump and tank.
- B. Follow water supply well disinfection procedures required by authorities having jurisdiction before testing well pumps.

3.07 PROTECTION

- A. Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.
- B. Ensure that mud pits will not leak or overflow into streams or wetlands. When well is accepted, remove mud and solids in mud pit from Project site and restore site to finished grade.
- C. Provide casings, seals, sterilizing agents, and other materials to eliminate contamination; shut off contaminated water.
- D. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.
- E. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

END OF SECTION

SECTION 33 14 16
WATER DISTRIBUTION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work under this section includes:
 - 1. Installation of water lines, valves and access boxes.
- B. Other specification sections which may directly relate to the work in this section include, but are not limited to, include the following:
 - 1. Section 33 11 13 – Water Wells

1.02 SUBMITTALS

- A. Shop Drawings and Product Data
 - 1. Submit manufacturer's certification of compliance with referenced standards.

PART 2 PRODUCTS

2.01 WATER LINES

- A. HDPE Potable water line tubing shall meet the requirements of ASTM D2737, AWWA C901 and NSF/ANSI Standards 14 and 61. Pipe dimensions shall meet Copper Tubing Size (CTS) standards. HDPE lines shall be equipped with a tracer wire and tracer wire box in accordance with the construction drawings.

2.02 B-BOX

- A. Curb stops shall be Mueller MARK II ORISEAL Curb Valve H-15154 or approved equal, having inlets and outlets matching the water lines and suitable for connections to either copper or HDPE lines as specified on the construction drawings.
- C. Curb service box shall be Minneapolis Pattern Mueller H-10300 Series or approved equal.
- D. The curb service box shall be installed over the curb stop per the manufacturers specifications and held in a truly vertical position until sufficient backfill has been placed to ensure permanent vertical alignment of the box. The top of the box shall be adjusted and set flush with the established ground surface grade.

PART 3 EXECUTION

3.01 WATER LINES

- A. The construction of all water lines shall be Governed by the following:
 - 1. The "Standard Specifications for Water and Sewer Construction in Illinois", latest revision.
 - 2. The "Illinois Administrative Code, Title 77, Part 890" the "Illinois Plumbing Code", latest revision
 - 3. The "Illinois Administrative Code, Title 35, Subtitle F" "public water supplies", latest revision
- B. Water lines shall be installed as specified on the Plans, having a minimum 5.5-ft depth of cover to the top of pipe.

3.02 B-BOX

- A. All new curb stops and access boxes shall be installed in the location indicated on the Plans.
- B. The curb service box shall be installed over the curb stop per the manufacturers specifications and held in a truly vertical position until sufficient backfill has been placed to ensure permanent vertical alignment of the box.
- C. The top of the box shall be adjusted and set flush with the established ground surface grade.

3.03 DISINFECTION

- A. Water lines shall be disinfected/chlorinated according to state and local requirements.
- B. Documentation of the disinfection/chlorination shall be provided to the Owner.

END OF SECTION