sfL+a
ARCHITECTS
Capital Bank Plaza
333 Fayetteville Street, Suite 225
Raleigh NC 27601

PROJECT MANUAL

VOLUME 1 (of 3)

Divisions 00 thru 08

Architect's Project Number: 02303.000

EB Frink Middle School
405 N. Charles Street
La Grange, NC, 28551
Lenoir County, NC

Lenoir County Public Schools
2017 W. Vernon Avenue
Kinston, North Carolina 28504

February 18, 2025
Construction Documents

ENERGY STAR PARTNER

Set Number: _____

SECTION 00 01 01

PROJECT TITLE PAGE

Date	February 18, 2025 Construction Documents
Project Identification	EB Frink Middle School 405 N. Charles Street La Grange, NC 28551 Lenoir Count, NC Architect Project No.: 02303.000
Owner	Lenoir County Public Schools 2017 W. Vernon Avenue Kinston, North Carolina 28504 Phone: 252-527-1109
Architect	SfL+a Architects, PA 333 Fayetteville Street, Suite 225 Raleigh, NC 27601 Phone: 919-573-6350
Structural Engineer	Bennett and Pless 5430 Wade Park Blvd, Suite 400 Raleigh, NC 27607 Phone: 919-832-5587
Fire Protection Engineer **Plumbing Engineer** **Mechanical Engineer** **Electrical Engineer** **Fire Alarm Engineer**	Optima Engineering, PA Truist Building 434 Fayetteville Street, Suite 2450 Raleigh, NC 27601 Phone: 919-926-2200
Civil Engineer	Timmons Group 5410 Trinity Road, Suite 102 Raleigh, North Carolina 27607 Phone: 919-866-4951

END OF SECTION

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SEALS PAGE

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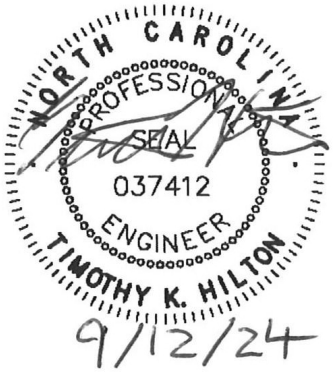
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Eric J. Lindstrom
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Bennett & Pless
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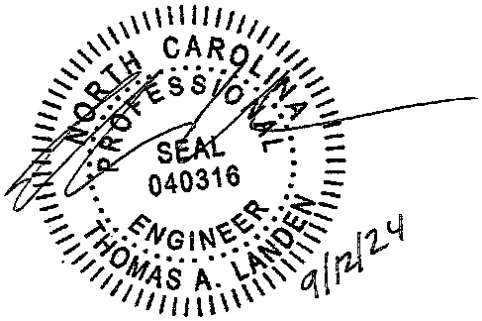
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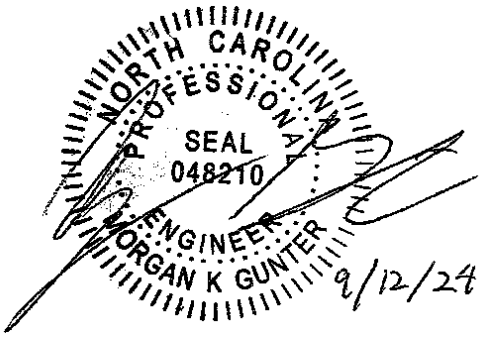
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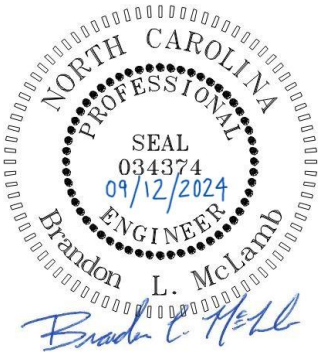
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END OF SECTION

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PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Geotechnical Exploration Information.
   2. Geothermal Conductivity Information.

1.2 GEOTECHNICAL EXPLORATION INFORMATION

A. A copy of the referenced information is included in PART 3 of this Section.
   1. Title: GEOTECHNICAL ENGINEERING REPORT
      EB Frink Middle School - New Build
      N. Charles Street
      La Grange, Lenior County, North Carolina
   2. Prepared For: Mr. Robbie Ferris
      SfL+a Architects
      333 Fayetteville Street, Suite 225
      Raleigh, NC 27601
   3. Prepared By: ECS Southeast, LLC
      Freddie Wescott, Senior Project Manager
      Winslow E. Goins, PE
      6714 Netherlands Drive
      Wilmington, NC 28405
   4. Preparer's Project: No. 22:34599.
   5. Report Date: April 30, 2024.
   6. Total Pages: 85 pages.

B. This information identifies properties of below grade conditions and offers recommendations for design of foundations, prepared primarily for use of the Architect and Engineer.

C. Recommendations described are not requirements of this Contract, unless specifically referenced in Contract Documents.

D. This information, by its nature, cannot reveal all conditions existing on the site. Each bidder is responsible for investigating the site and independently verifying subsurface information and conditions prior to bidding.

E. All bidders are to assume the site is unclassified soil and price accordingly. The contract documents do not include provisions for unit cost or allowances for soil work.

1.3 GEOTHERMAL CONDUCTIVITY INFORMATION

A. A copy of the referenced information is included in PART 3 of this Section.

1.	Title:	FORMATION THERMAL CONDUCTIVITY TEST AND DATA ANALYSIS
2.	Analysis For:	SfL+a Architects Attn: Miyuki Keller, AIA 333 Fayetteville St. Raleigh, NC 27601
3.	Test Location:	EB Frink School 102 MLK, Jr. Drive La Grange, NC 28551
4.	Report Date:	August 13, 2024
5.	Performed By:	Earth Comfort, LLC Charles Davis 311 Highland Lake Dr. Flat Rock, NC 28731 (912) 695-7350
6.	Total Pages:	3 pages.

B. This information identifies properties of below grade conditions as related to geothermal conductivity.

C. Recommendations described are not requirements of this Contract, unless specifically referenced in Contract Documents.

D. This information, by its nature, cannot reveal all conditions existing on the site. Each bidder is responsible for investigating the site and independently verifying subsurface information prior to bidding.

E. All bidders should assume the site is unclassified soil and price accordingly. The contract documents do not include provisions for unit cost or allowances for soil work.

PART 2 (Not Used)

PART 3 INFORMATION AND REPORTS

3.1 INFORMATION AND REPORTS

A. The information and reports referenced in PART 1 of this Section are included after this page, unless indicated otherwise in PART 1.

B. This Section ends after the last referenced and included informational document.





ECS Southeast, LLC

Geotechnical Engineering Report

EB Frink Middle School – New Build

N. Charles Street
La Grange, Lenior County, North Carolina

ECS Project No. 22:34599

April 30, 2024

ECS SOUTHEAST, LLC
NC Engineering License No. F-1519
Geotechnical • Construction Materials • Environmental • Facilities

April 30, 2024

Mr. Robbie Ferris
sfl+a Architects
33 Fayetteville Street
Suite 225
Raleigh, NC 27601

ECS Project No. 22:34599

Reference: Geotechnical Engineering Report
EB Frink Middle School – New Build
N Charles Street
La Grange, Lenoir County, North Carolina

Dear Mr. Ferris:

ECS Southeast, LLC (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration conducted and our design and construction recommendations.

It has been our pleasure to be of service during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify the subsurface conditions encountered in the exploration for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS Southeast, LLC

DocuSigned by:
Winslow Goins
2D745DA276044AF...

Freddie Wescott
Senior Project Manager
FWescott@ecslimited.com

Winslow Goins, PE
Principal Engineer
WGoins@ecslimited.com

DocuSigned by:



4/30/2024

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Appendix B – Field Operations

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- Cone Penetration Test Sounding Logs (S-1 through S-10)
- Reference Notes for Boring Logs
- Hand Auger Boring Logs (K-1 through K-24)
- Kessler DCP Test Results (K-1 through K-24)

Appendix C – Supplemental Report Documents

- GBA Document

EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the executive summary should not be utilized in lieu of reading the entire geotechnical report.

- The geotechnical exploration performed for the site included ten (10) electronic cone penetration test (CPT) soundings drilled to termination or refusal depths ranging from approximately 25 to 40.7 feet. Twenty-four (24) Kessler dynamic cone penetrometer (DCP) tests with hand auger borings were performed in the proposed pavements.

- Provided the subgrades are prepared as recommended in this report and the column and wall loads do not exceed 450 kips and 12 kips per liner foot, respectively, the planned building may be supported by conventional shallow foundations consisting of column or strip footings bearing on compacted structural fill and natural soils using a net allowable soil bearing pressure of 2,000 psf.

- Groundwater was encountered in the soundings at depths ranging from approximately 14.3 to 17.5 feet below existing grades. Groundwater was not encountered in our hand auger borings at the depths explored.

- Due to the near surface loose SANDS (SM, SC, SP) encountered in the soundings and hand auger borings, in-place densification with a vibratory roller may be needed prior to construction of foundations, placement of fill, and construction of pavements.

- Due to the near surface soft soils encountered in the vicinity of hand auger boring K-14, undercutting may be needed prior to construction of pavements.

Please note this Executive Summary is an important part of this report and should be considered a ***"summary"*** only. The subsequent sections of this report constitute our findings, conclusions, and recommendations in their entirety.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of foundations and pavements for the proposed new school located off N Charles Street in La Grange, NC. The recommendations developed for this report are based on project information supplied by Ms. Dottie Sloan of sfl+a Architects.

Our services were provided in accordance with our Proposal No. 22:28450, dated March 28, 2024, as authorized by Mr. Robbie Ferris of sfl+a Architects on April 1, 2024, which includes our Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

- A brief review and description of our field test procedures and the results of testing conducted;
- A review of surface topographical features and site conditions;
- A review of subsurface soil stratigraphy with pertinent available physical properties;
- Foundation recommendations;
  - Allowable bearing pressure;
  - Settlement estimates (total and differential);
- Site development recommendations;
- Suitability of soils for use as fill material;
- Seismic site class and liquefaction recommendations;
- Discussion of groundwater impact;
- Compaction recommendations;
- Site vicinity map;
- Exploration location plan;
- Hand Auger boring logs with Kessler DCP results; and
- CPT sounding logs.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The proposed site is located off N Charles Street in La Grange, Lenoir County, North Carolina. The site is bounded on the south by N Charles Street and on each other side by agrarian land. Figure 2.1.1 below shows an image of where the site is located.

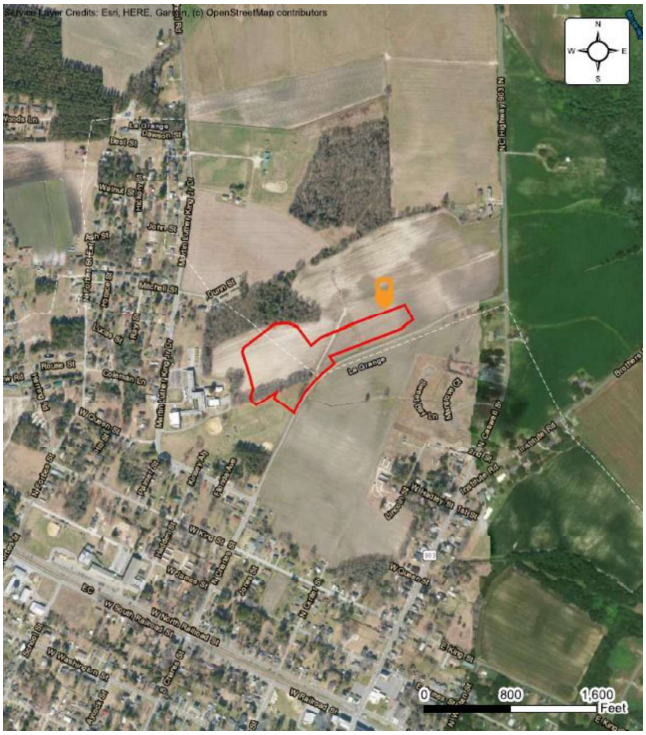


Figure 2.1.1 Site Location

The site currently consists of agrarian land and undeveloped wooded areas. Based on our site visit and approximate elevations from Google Earth, the site is relatively level with typical elevations on site ranging from approximate 98 to 107 feet.

2.2 PROPOSED CONSTRUCTION

The following information explains our understanding of the planned development including proposed building and related infrastructure.

SUBJECT	DESIGN INFORMATION / ESTIMATIONS
Usage	Institutional
Column Loads	Up to 450 kips
Wall Loads	Up to 12 klf

ECS understands the project consists of a new school building with associated parking and drives.

3.0 FIELD EXPLORATION

Our exploration procedures are explained in greater detail in Appendix B including the Reference Notes for Cone Penetration Soundings. Our scope of work included performing ten (10) CPT Soundings and twenty-four (24) hand auger borings with Kessler DCP tests. The approximate sounding and hand auger boring locations are shown on the Boring Location Diagram in Appendix A.

3.1 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil. Please refer to the CPT sounding logs and hand auger boring logs in Appendix B.

The site is located in the Coastal Plain Physiographic Province of North Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the Piedmont and Mountain Physiographic Provinces. In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

Table 3.1.1 Subsurface Stratigraphy

Approximate Depth Range	Stratum	Description	Ranges of N*-Values(1) blows per foot (bpf)
0 to 0.25 (Surface cover)	N/A	Topsoil was encountered on-site with an observed thickness of minimal to approximately 4 inches. Deeper topsoil or organic laden soils are most likely present in wet, poorly drained areas and potentially unexplored areas of the site.	N/A
(0 to 0.25) to 10	I	Very Loose to Very Dense, Silty, Clayey, and Clean SAND (SM, SC, SP), Very Soft to Hard, Sandy and Clayey SILT (ML), Silty and Lean Clay (CL).	1 to 58
10 to 25	II	Loose to Very Dense, Silty, Clayey, and Clean SAND (SM, SC, SP), Soft to Hard, Clayey and Sandy SILT (ML), Silty and Lean CLAY (CL).	3 to 56
25 to 40.7	III	Loose to Very Dense, Silty and Clean SAND (SM, SP) and Stiff to Hard, Clayey and Sandy SILT (ML), Silty and Lean CLAY (CL).	9 to 100

Notes: (1) Equivalent Corrected Standard Penetration Test Resistances

3.2 GROUNDWATER OBSERVATIONS

Water levels were measured in our CPT soundings and are shown in Appendix B. Groundwater depths measured at the time of exploration ranged from approximately 14.3 to 17.5 feet below the ground surface. Groundwater was not encountered in our hand auger borings at the depths explored. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

4.0 DESIGN RECOMMENDATIONS

4.1 FOUNDATIONS

Provided subgrades and structural fills are prepared as recommended in this report, the proposed structures can be supported by shallow foundations including column footings and continuous wall footings. We recommend the foundation design use the following parameters*:*

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure(1)	2,000 psf	2,000 psf
Acceptable Bearing Soil Material	Approved structural fill	Approved structural Fill
Minimum Width	24 inches	12 inches
Minimum Footing Embedment Depth (below slab or finished grade) (2)	12 inches	12 inches
Minimum Exterior Frost Depth (below final exterior grade)	6 inches	6 inches
Estimated Total Settlement (3)	Less than 1- inch	Less than 1- inch
Estimated Differential Settlement (4)	Less than ¾ inches between columns	Less than ¾ inches

Notes:

(1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
(2) For bearing considerations and frost penetration requirements.
(3) Based on estimated structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
(4) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

Potential Undercuts: The soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with approved structural fill up to the original design bottom of footing elevation; the original footing shall be constructed on top of the approved structural fill.

4.2 SLABS ON GRADE

The on-site natural soils are generally considered suitable for support of the lowest floor slabs. Based on the estimation that the finished floor elevation is around the current site elevations, it appears that the slabs for the structure will likely bear on the near surface Stratum I soils SAND (SM, SC, SP) or approved structural fill. The following graphic depicts our soil-supported slab recommendations:

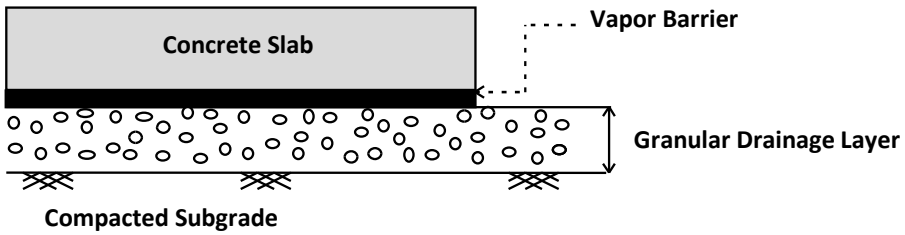


Figure 4.2.1

1. Drainage Layer Thickness: 6 inches
2. Drainage Layer Material: GRAVEL (GP, GW) or SAND containing <5% passing the #200 sieve (SP, SW)
3. Subgrade compacted to 98% maximum dry density per ASTM D698

Subgrade Modulus: Provided the structural fill and granular drainage layer are constructed in accordance with our recommendations, the slab may be designed estimating a modulus of subgrade reaction, k_1 of 150 pci (lbs./cu. inch). The modulus of subgrade reaction value is based on a 1 ft by 1 ft plate load test basis.

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. Surface curing of the slab should be performed in accordance with ACI recommendations to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Slab Isolation: Ground-supported slabs should be isolated from the foundations and foundation-supported elements of the structures so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration (turn down slabs or post tension mats) prevents the use of a free-floating slab, the slab should be designed to avoid overstressing of the slab. Maximum differential settlement of soils supporting interior slabs is anticipated to be less than 0.5 inches in 50 feet.

4.3 SEISMIC DESIGN CONSIDERATIONS

Seismic Site Classification: The ASCE7-16 standard requires site classification for seismic design based on the upper 100 feet of a soil profile. At least two methods are utilized in classifying sites, namely the shear wave velocity (v_s) method and the Standard Penetration Resistance (N-value) method. The first method (shear wave velocity) was used in classifying this site.

Based upon our interpretation of the subsurface conditions, the appropriate Seismic Site Classification is "D."

Liquefaction: When a saturated soil with little to approximately no cohesion liquefies during a major earthquake, it experiences a temporary loss of shear strength as a result of a transient rise in excess pore water pressure generated by strong ground motion. Flow failure, lateral spreading, differential settlement, loss of bearing, ground fissures, and sand boils are evidence of excess pore pressure generation and liquefaction.

The potential for liquefaction at the site is considered low based upon the CPT results and the liquefaction index procedure developed by Iwasaki (1982). Based on our CPT results and our evaluation using a site peak ground acceleration of 0.086 (PGA_m) per ASCE7-16, an earthquake event with a magnitude of 7.3 and procedures developed by Robertson (2009), Moss et al. (2006), and Boulanger & Idriss (2014), the liquefaction induced settlement at the subject site is estimated to be approximately 0.17 inches or less. The max differential settlement is estimated to be 0.16 inches over a distance of 250 feet.

Ground Motion Parameters: In addition to the seismic site classification, ECS has evaluated the design spectral response acceleration parameters following the ASCE7-16 methodology. The Mapped Reponses were estimated from the ATC Hazards by Location Tool available from the USGS website (https://hazards.atcouncil.org). The design responses for the short (0.2 sec, S_{DS}) and 1-second period (S_{D1}) are noted in bold at the far-right end of the following table.

GROUND MOTION PARAMETERS – SITE CLASS D [ASCE7-16 Method]								
Period (sec)	**Mapped Spectral Response Accelerations (g)**		**Values of Site Coefficient for Site Class**		**Maximum Spectral Response Acceleration Adjusted for Site Class (g)**		**Design Spectral Response Acceleration (g)**	
Reference	Figures 1613.3.1 (1) & (2)		Tables 1613.3.3 (1) & (2)		Eqs. 16-37 & 16-38		Eqs. 16-39 & 16-40	
0.2	S_S	0.109	F_a	1.6	$S_{MS}=F_aS_s$	0.175	$S_{DS}=2/3\ S_{MS}$	**0.117**
1.0	S_1	0.054	F_v	2.4	$S_{M1}=F_vS_1$	0.129	$S_{D1}=2/3\ S_{M1}$	**0.086**

The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses.

4.4 PAVEMENTS

Subgrade Characteristics: Based on the results of our soundings and hand auger borings, it appears that the soils that will likely be exposed as pavement subgrades will likely consist of Stratum I soils or approved structural fill. Due to the near surface loose SANDS (SM, SC, SP) encountered in the soundings and hand auger borings, in-place densification may be needed prior to construction of pavements. Due to the near surface soft soils encountered in the vicinity of hand auger boring K-14, undercutting may be needed prior to construction of pavements.

For preliminary design purposes, provided the subgrade preparation recommendations in this report, we recommend estimating a preliminary CBR value of 10.

We were not provided traffic loading information, so we have estimated loadings typical of this type of project. Our recommended pavement sections are based on up to 20,000 ESALs over a 20-year design life for light duty and up to 75,000 ESALs over a 20-year design life for heavy duty.

The preliminary pavement sections below are guidelines that may or may not comply with local jurisdictional minimums.

Table 4.4.1

	FLEXIBLE PAVEMENT		RIGID PAVEMENT	
MATERIAL	**Heavy Duty**	**Light Duty**	**Heavy Duty**	**Light Duty**
Portland Cement Concrete (f'_c = 4,500 psi)	-	-	6 in	6 in
Asphalt Surface Course	2 in	2 in	-	-
Graded Aggregate Base (GAB)	8 in	6 in	6 in	4 in

In general, heavy-duty sections are areas that will likely be subjected to trucks, buses, or other similar vehicles including main drive lanes of the development. Light duty sections are appropriate for vehicular traffic and parking areas.

Large, front loading trash dumpsters frequently impose concentrated front wheel loads on pavements during loading. This type of loading typically results in rutting of asphalt pavement and ultimately pavement failures. For preliminary design purposes, we recommend that the pavement in trash pickup areas consist of a 6-inch thick, 4,500 psi, reinforced concrete slab overlying 6 inches of ABC stone.

Prior to subbase placement and paving, CBR testing of the subgrade soils (both natural and fill soils) should be performed to evaluate the soil engineering properties for final pavement design. A minimum distance of 18 inches should be maintained between the bottom of the aggregate base section and the groundwater table.

The soil subgrade should be smooth-rolled and proofrolled prior to ABC placement. Areas that pump, rut, or are otherwise unstable should be re-compacted or undercut and replaced. The ABC should conform to the gradation, liquid limit, plasticity index, resistance to abrasion, and soundness per Section 1005 of the 2024 NCDOT Standard Specifications for Roads and Structures.

The ABC should be placed and be compacted in accordance with Section 520 of the 2024 NCDOT Standard Specifications for Roads and Structures. The ABC should be placed in a single lift. It should be spread after end-dumping on previously-placed ABC to prevent rutting and degradation of the relatively clean sand subgrade soils by rubber-tired dump trucks. The ABC should be compacted to at least 98 percent of its Modified Proctor maximum dry unit weight per ASTM D1557 or AASHTO T180 (as modified by NCDOT), provided nuclear density testing is performed. Otherwise, at least 100 percent compaction is recommended.

To confirm that the specified degree of compaction is being obtained, field compaction testing should be performed in each ABC lift by the ECS' representative. We recommend that compaction tests be performed at a minimum frequency of one test per 5,000 square feet per lift in pavement areas.

Minimum Material Lift Thickness: The minimum lift thickness for asphalt surface course mix S9.5B is 1.0 inch and the maximum lift thickness for S9.5B is 1.5 inches. For sections with more than 1.5 inches of S9.5B surface asphalt, it should be placed in two lifts. Asphalt pavement S9.5B should be compacted to least 90.0 percent of the material's specific gravity G_{mm}.

Drainage: An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the aggregate base course layer, softening of the subgrades and other problems related to the deterioration of the pavement can be expected. This is particularly important at the site due to the moisture sensitive near-surface soils. Furthermore, good drainage should help reduce the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, existing fill, and any soft or unsuitable materials from the 10-foot expanded building and 5-foot expanded pavement limits. Borings and soundings performed in "undisturbed" areas of the site contained an observed thickness of minimal to approximately 4 inches of topsoil. Due to the agrarian use of the site, deeper topsoil or organic laden soils may be present across the site, especially in wet, low-lying, and poorly drained areas. ECS should be retained to verify that topsoil and unsuitable surficial materials have been removed prior to the placement of structural fill or construction of structures.

5.1.2 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons [e.g., fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying any localized yielding materials.

Where proofrolling identifies areas that are unstable or "pumping" subgrade those areas should be repaired prior to the placement of any subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting and moisture conditioning. The situation should be discussed with ECS to evaluate the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in evaluating the cause of the observed unstable materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

Due to the likely tilled soil, in-place densification with a vibratory roller may be needed prior to construction of pavements due to the loose sands encountered in the soundings and hand auger borings.

Due to the near surface soft soils encountered in the vicinity of hand auger boring K-14, undercutting may be needed prior to construction of pavements. Due to the agrarian nature of the site, isolated undercutting may be required in other areas of the site.

5.1.3 Site Temporary Dewatering

Temporary Dewatering: Temporary dewatering operations can be managed by the use of conventional submersible pumps directly in the excavation or temporary trenches to direct the flow of water and to remove water from the excavation. If temporary sump pits are used, we recommend they be established at an elevation 3 to 5 feet below the bottom of the excavation subgrade or bottom of footing. A perforated 55-gallon drum or other temporary structure could be used to house the pump. We recommend continuous dewatering of the excavations using pumps during construction.

If dewater operations are performed at the site, ECS recommends that the dewatering operations be performed in accordance with Local, State and Federal Government regulatory requirements for surface water discharges. ECS would be pleased to be consulted by the client on those requirements, if requested.

5.2 EARTHWORK OPERATIONS

5.2.1 Structural Fill

Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to evaluate if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

Satisfactory Structural Fill Materials: Materials satisfactory for use as structural fill should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES	
Subject	**Property**
Building and Pavement Areas	LL < 40, PI<20
Max. Particle Size	4 inches
Fines Content	Max. 20 %
Max. organic content	5% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction (Upper 1 foot)	98% of Max. Dry Density
Required Compaction (Depths greater than 1 foot)	95% of Max. Dry Density
Dry Unit Weight	>100 pcf
Moisture Content	-2 to +2 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

On-Site Borrow Suitability: The on-site near sands (SP, SM) with fines contents less than 20 percent and free of detritus material should meet the recommendations for re-use as structural fill. The on-site clayey sands (SC) can possibly be used but are more difficult to moisture condition to optimum moisture levels. The lean clays (CL) are not recommended for re-use as structural fill. The lean clays can be used in non-structural areas.

Fill Placement: Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement, and frozen or frost-heaved soils should be removed prior to placement of structural fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils encountered on site at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Section 5.1.2 Proofrolling**.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Any loose or unsuitable materials encountered should be removed and replaced with suitable compacted Structural Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material (AASHTO #57 stone) should be at least 6 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for structural fill and fill placement.

Excavation Safety: Excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not responsible for construction site safety or the contractor's activities; such responsibility by ECS is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by Ms. Dottie Sloan of sfl+a Architects. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

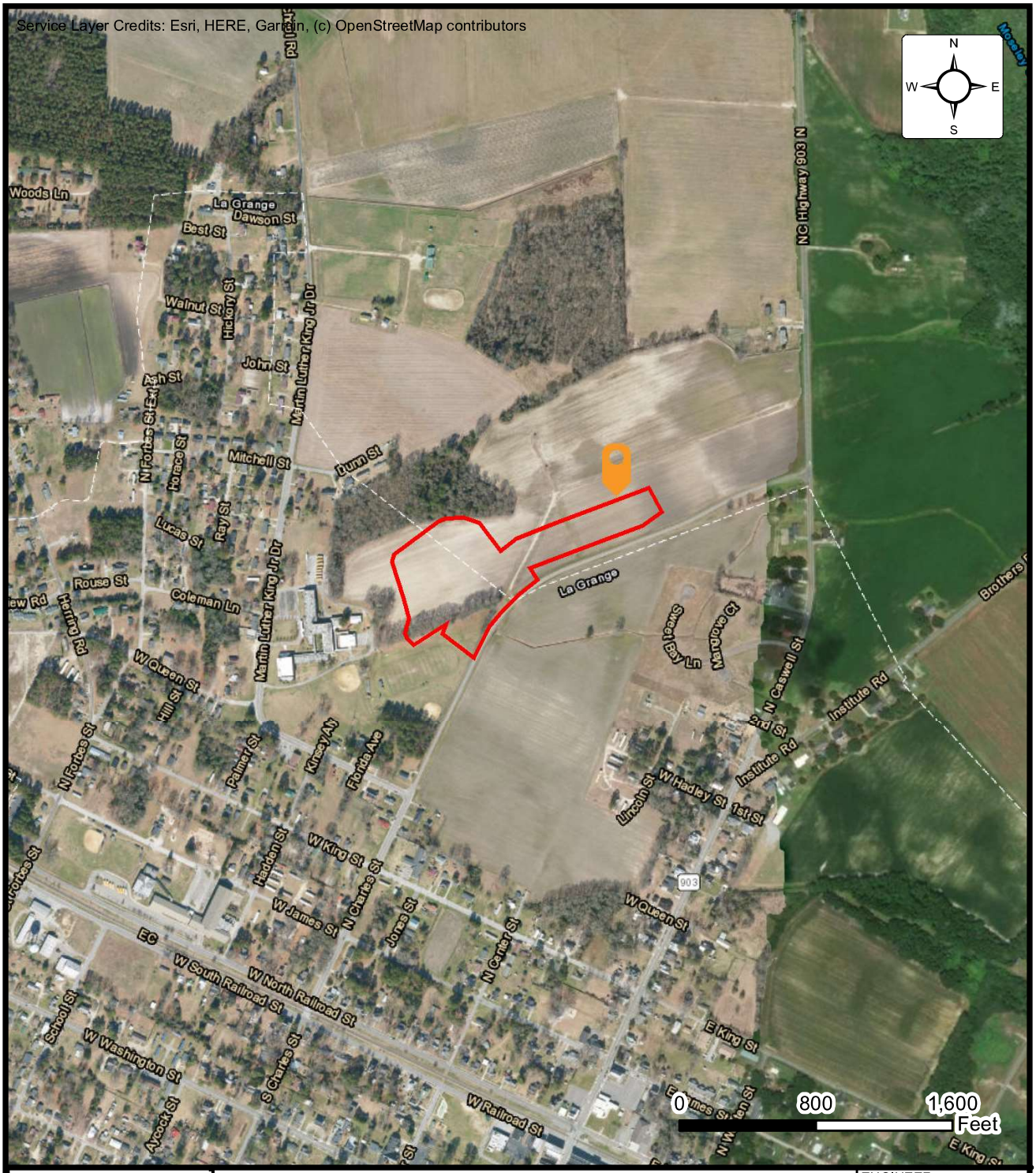
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams & Reports

Site Location Diagram
Exploration Location Diagram



SITE LOCATION DIAGRAM
EB FRINK MIDDLE SCHOOL - NEW

N. CHARLES STREET, LAGRANGE, NC

SFL+A ARCHITECTS

ENGINEER	WEG
SCALE	AS NOTED
PROJECT NO.	22:34599
FIGURE	1 OF 2
DATE	4/29/2024



BORING LOCATION DIAGRAM
EB FRINK MIDDLE SCHOOL - NEW BUILD

N. CHARLES STREET, LAGRANGE, NC
SFL+A ARCHITECTS

ENGINEER	WEG
SCALE	AS NOTED
PROJECT NO.	22:34599
FIGURE	2 OF 2
DATE	4/29/2024

NOT TO SCALE

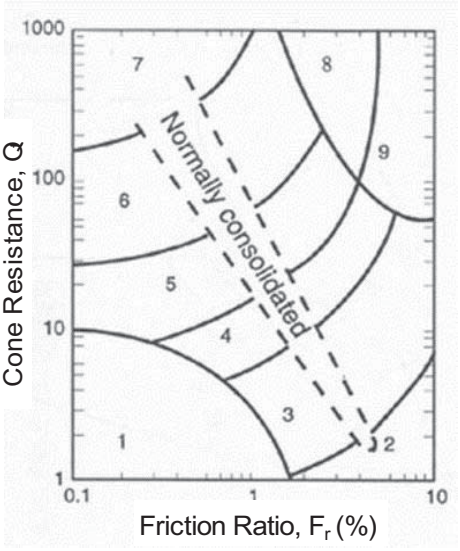
Geotechnical Exploration Information

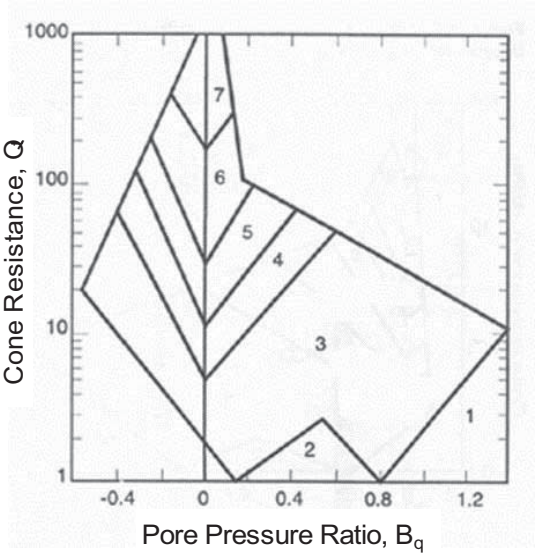
APPENDIX B – Field Operations

Reference Notes for CPT Soundings Logs
Cone Penetration Test Sounding Logs (S-1 through S-10)
Reference Notes for Boring Logs
Hand Auger Boring Logs (K-1 through K-24)
Kessler DCP Test Results (K-1 through K-24)

REFERENCE NOTES FOR CONE PENETRATION TEST (CPT) SOUNDINGS

In the CPT sounding procedure (ASTM-D-5778), an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance (q_c), pore water pressure (u_2), and sleeve friction (f_s). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, preconsolidation pressure, and undrained shear strength. The graphs below represent one of the accepted methods of CPT soil behavior classification (Robertson, 1990).





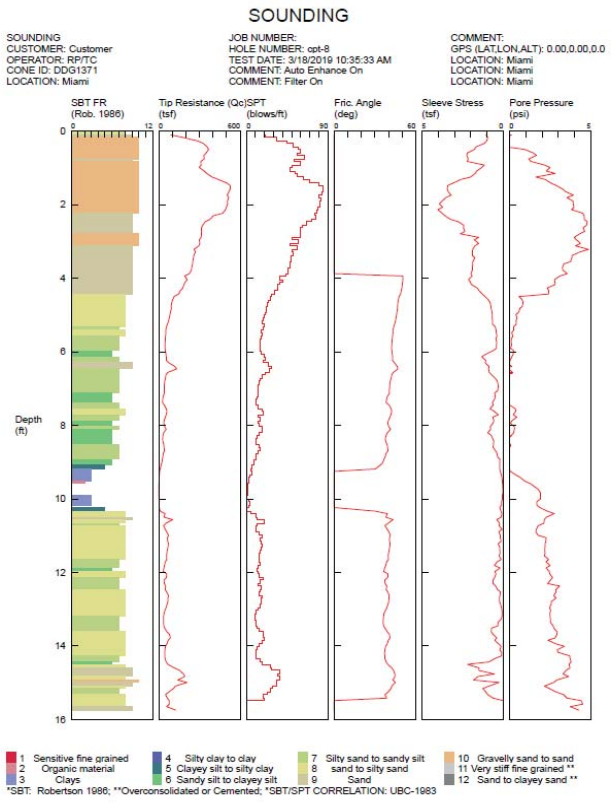
1. Sensitive, Fine Grained
2. Organic Soils-Peats
3. Clays; Clay to Silty Clay
4. Clayey Silt to Silty Clay
5. Silty Sand to Sandy Silt
6. Clean Sands to Silty Sands
7. Gravelly Sand to Sand
8. Very Stiff Sand to Clayey Sand
9. Very Stiff Fine Grained

The following table presents a correlation of corrected cone tip resistance (q_t) to soil consistency or relative density:

SAND		SILT/CLAY	
Corrected Cone Tip Resistance (q_t) (tsf)	**Relative Density**	**Corrected Cone Tip Resistance (q_t) (tsf)**	**Relative Density**
<20	Very Loose	<5	Very Soft
20-40	Loose	5-10	Soft
40-120	Medium Dense	10-15	Firm
		15-30	Stiff
120-200	Dense	30-45	Very Stiff
>200	Very Dense	45-60	Hard
		>60	Very Hard

SUBSURFACE EXPLORATION PROCEDURE: CONE PENETRATION TESTING (CPT) ASTM D 5778

In the CPT sounding procedure, an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance (qc), pore water pressure (U2), and sleeve friction (fs). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, pre-consolidation pressure, and undrained shear strength.



CPT Procedure:

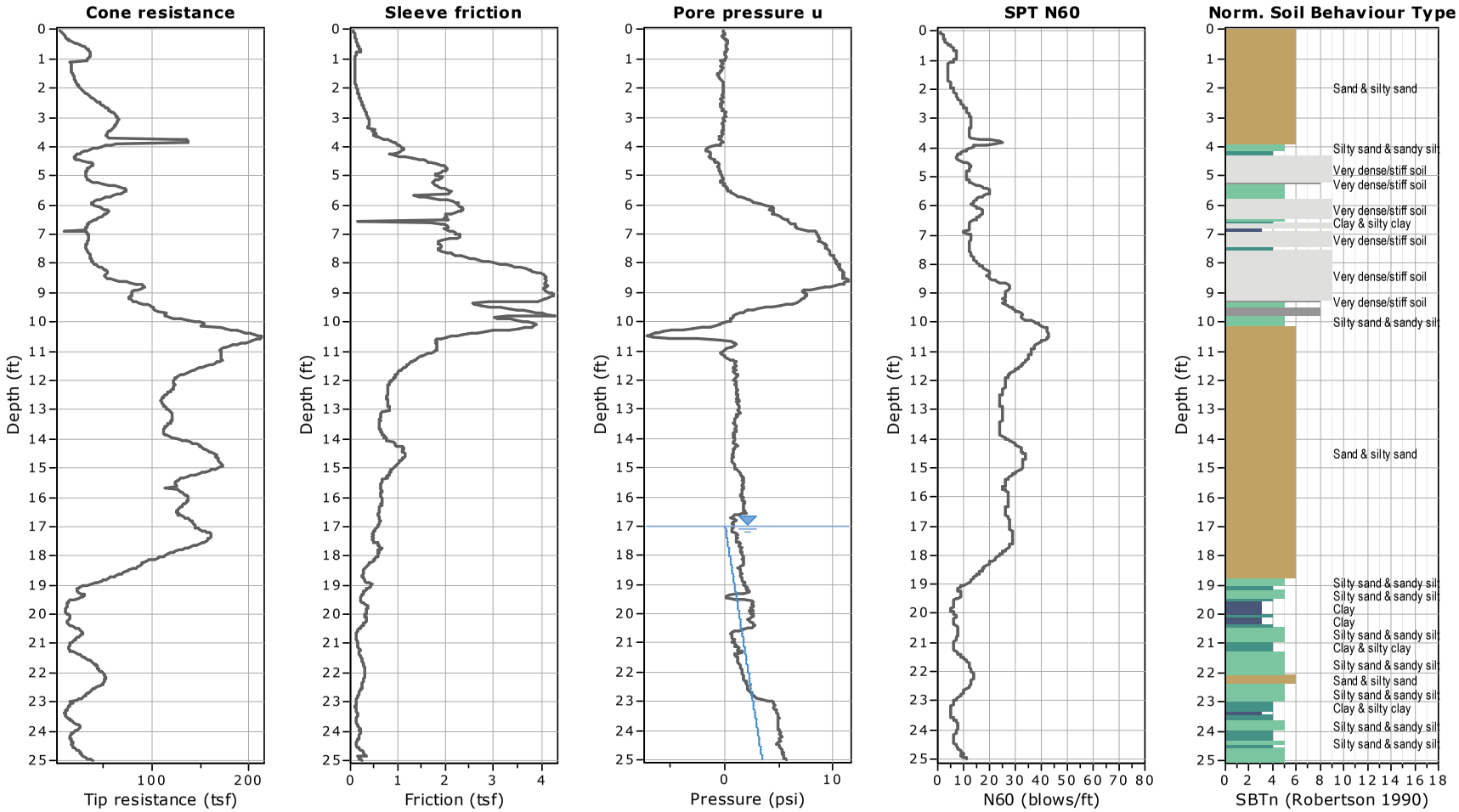
- Involves the direct push of an electronically instrumented cone penetrometer* through the soil
- Values are recorded continuously
- CPT data is corrected and correlated to soil parameters

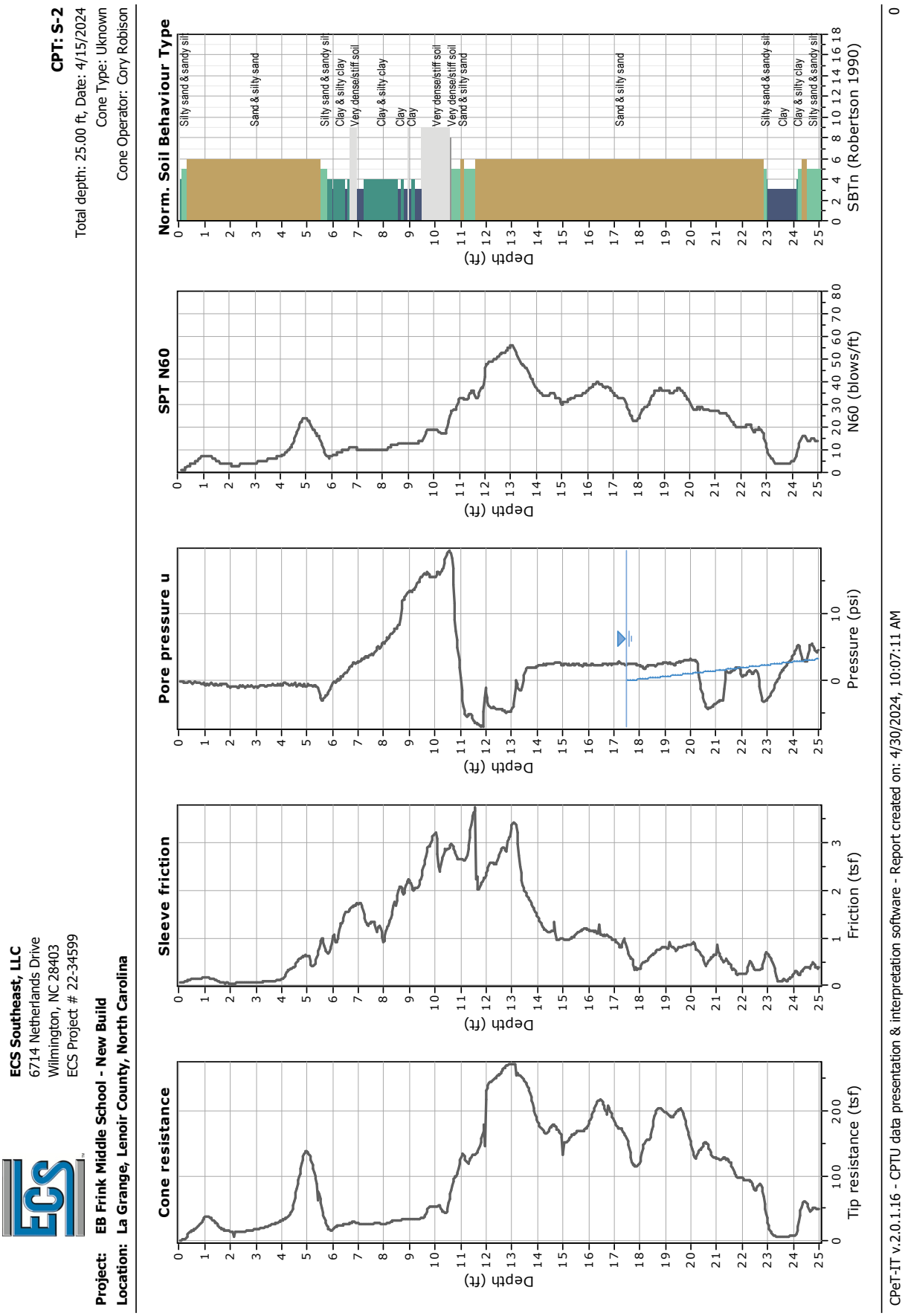
**CPT Penetrometer Size May Vary*

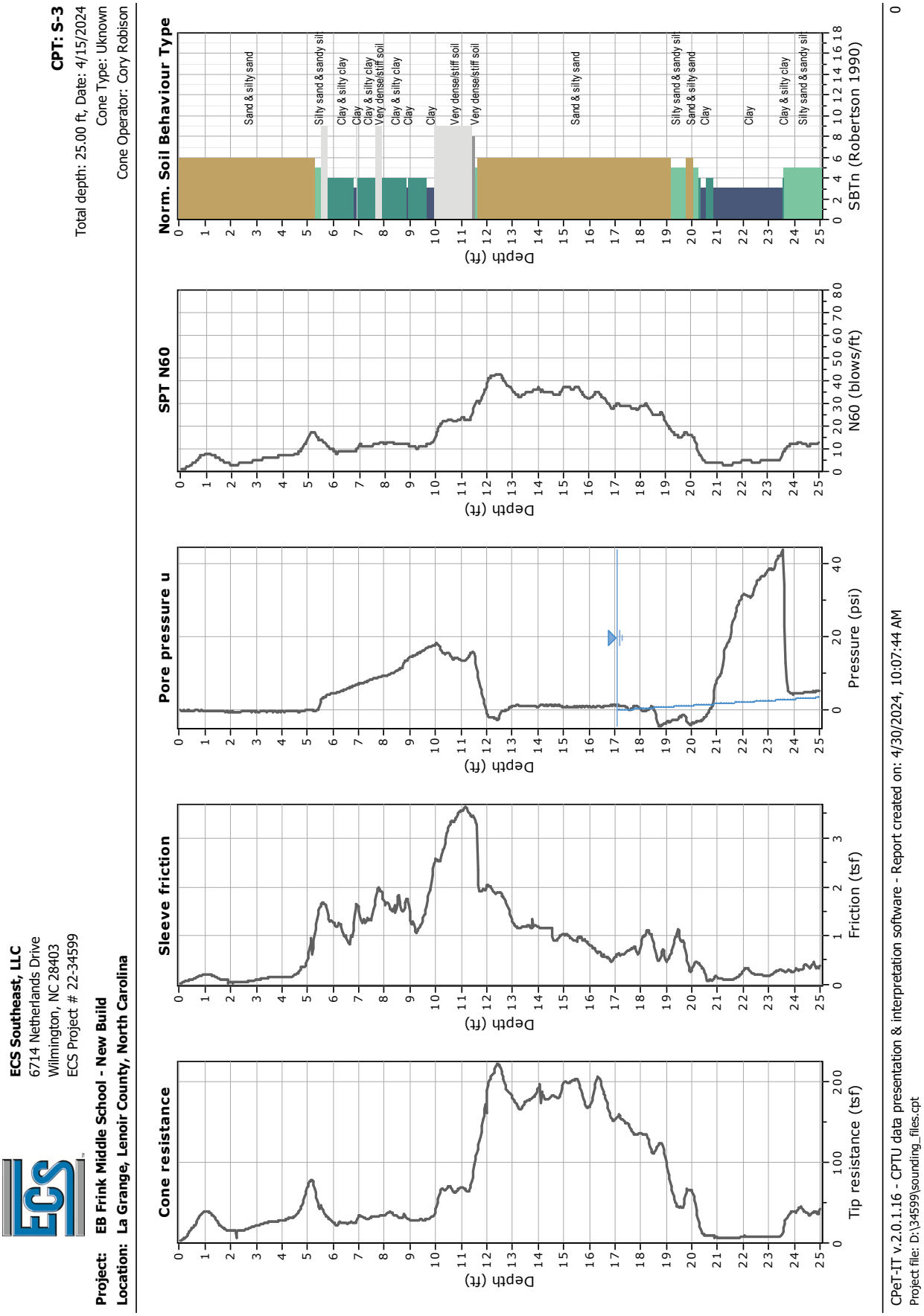
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6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599

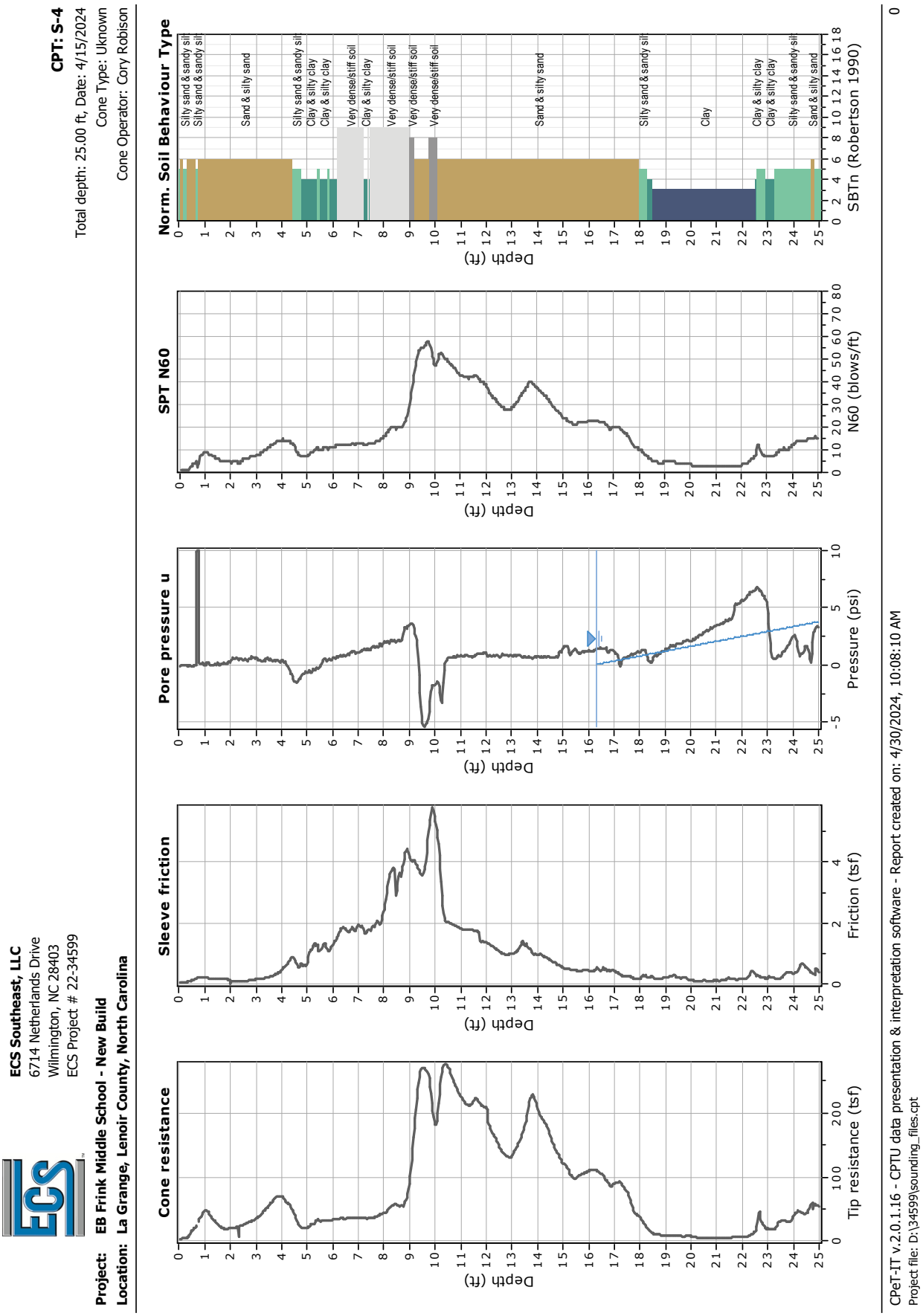
Project: **EB Frink Middle School - New Build**
Location: **La Grange, Lenoir County, North Carolina**

CPT: S-1
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison




CPT: S-2
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison
ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599
Project: EB Frink Middle School - New Build
Location: La Grange, Lenoir County, North Carolina
Cone resistance
Tip resistance (tsf)
Sleeve friction
Friction (tsf)
Pore pressure u
Pressure (psi)
SPT N60
N60 (blows/ft)
Norm. Soil Behaviour Type
SBTn (Robertson 1990)
Silty sand & sandy silt
Sand & silty sand
Silty sand & sandy silt
Clay & silty clay
Very dense/stiff soil
Clay & silty clay
Clay
Clay
Very dense/stiff soil
Very dense/stiff soil
Sand & silty sand
Sand & silty sand
Silty sand & sandy silt
Clay
Clay & silty clay
Silty sand & sandy silt
Depth (ft)
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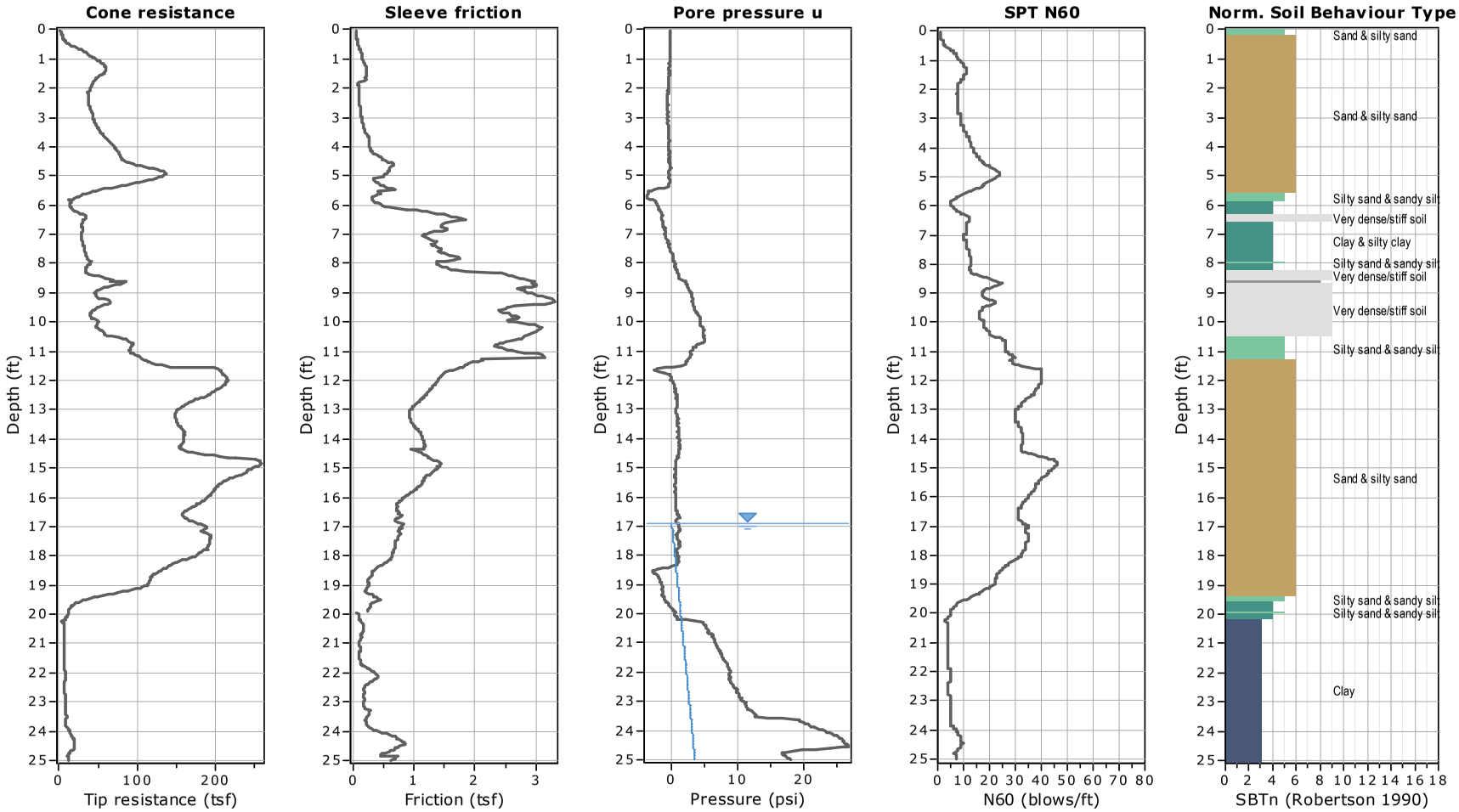

CPT: S-3
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison
ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599
Project: EB Frink Middle School - New Build
Location: La Grange, Lenoir County, North Carolina
Cone resistance
Tip resistance (tsf)
Sleeve friction
Friction (tsf)
Pore pressure u
Pressure (psi)
SPT N60
N60 (blows/ft)
Norm. Soil Behaviour Type
SBTn (Robertson 1990)
Depth (ft)
Sand & silty sand
Silty sand & sandy silt
Clay & silty clay
Clay
Clay & silty clay
Very dense/stiff soil
Clay & silty clay
Clay
Clay
Very dense/stiff soil
Very dense/stiff soil
Sand & silty sand
Silty sand & sandy silt
Sand & silty sand
Clay
Clay
Clay & silty clay
Silty sand & sandy silt
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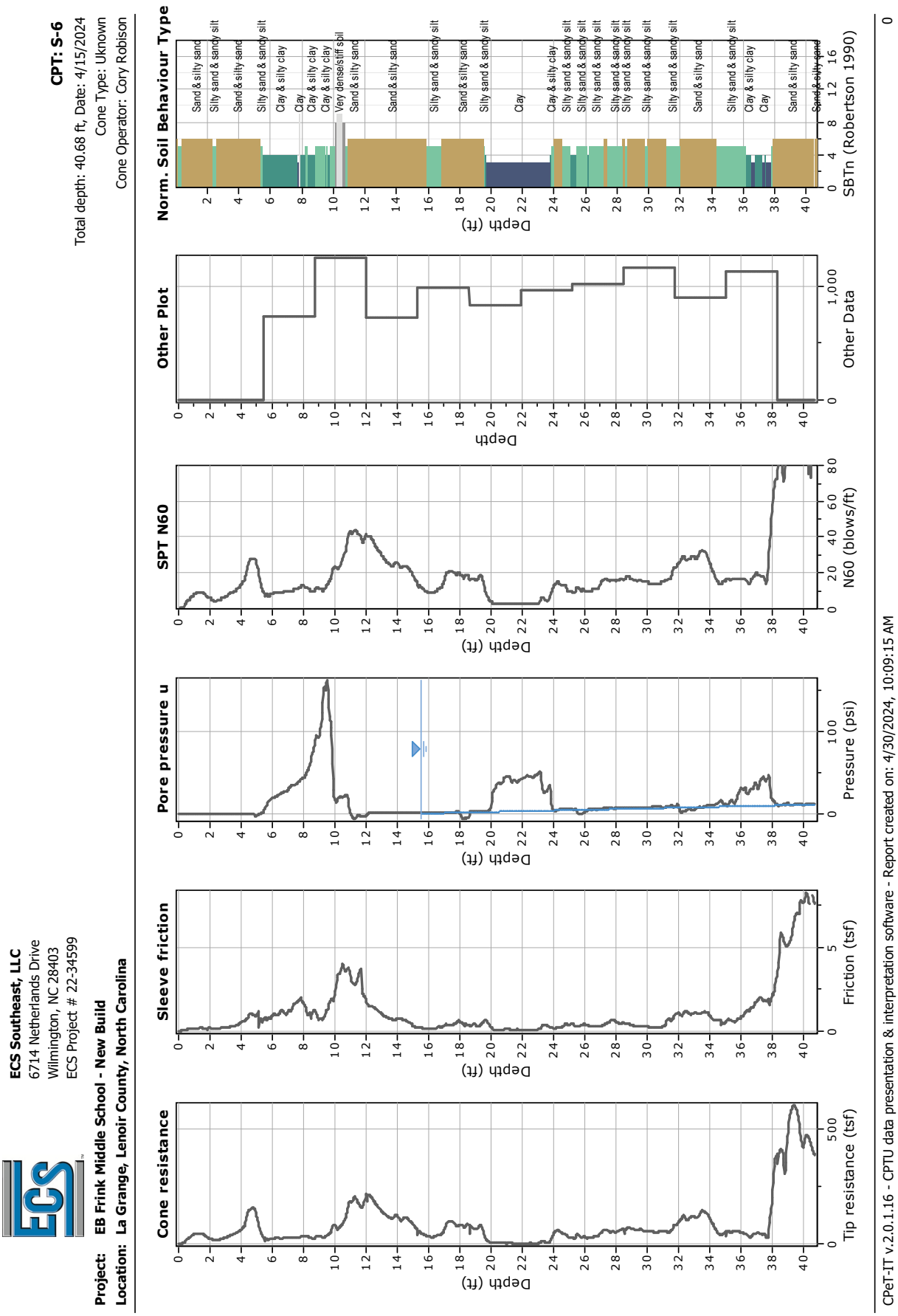

CPT: S-4
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison
ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599
Project: EB Frink Middle School - New Build
Location: La Grange, Lenoir County, North Carolina
Cone resistance
Tip resistance (tsf)
Sleeve friction
Friction (tsf)
Pore pressure u
Pressure (psi)
SPT N60
N60 (blows/ft)
Norm. Soil Behaviour Type
SBTn (Robertson 1990)
Depth (ft)
Silty sand & sandy silt
Sand & silty sand
Clay & silty clay
Very dense/stiff soil
Clay
CPeT-IT v.2.0.1.16 - CPTU data presentation & interpretation software - Report created on: 4/30/2024, 10:08:10 AM
Project file: D:\34599\sounding_files.cpt

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Wilmington, NC 28403
ECS Project # 22-34599

Project: **EB Frink Middle School - New Build**
Location: **La Grange, Lenoir County, North Carolina**

CPT: S-5
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison

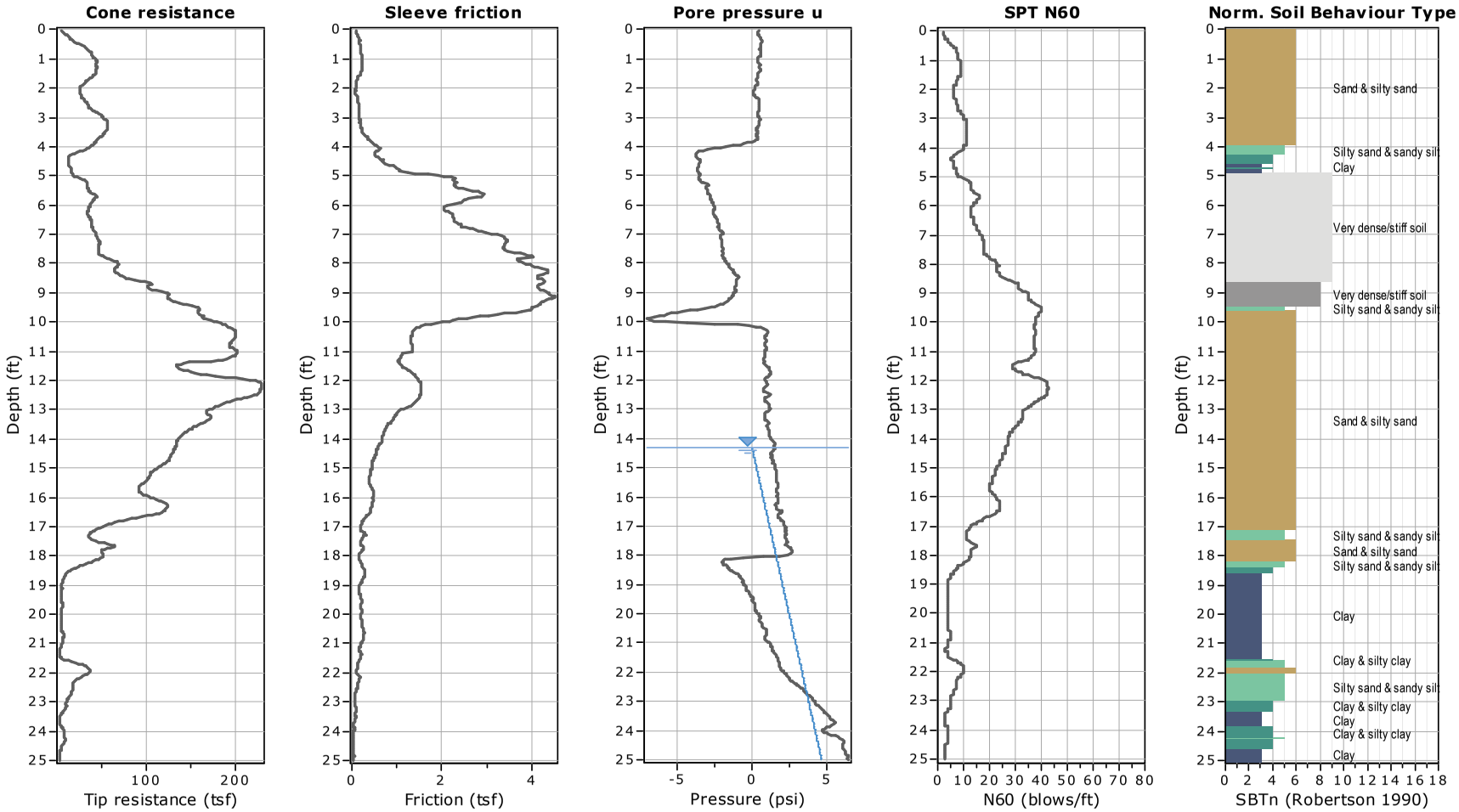



CPT: S-6
Total depth: 40.68 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison
ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599
Project: EB Frink Middle School - New Build
Location: La Grange, Lenoir County, North Carolina
Cone resistance
Tip resistance (tsf)
Sleeve friction
Friction (tsf)
Pore pressure u
Pressure (psi)
SPT N60
N60 (blows/ft)
Other Plot
Other Data
Norm. Soil Behaviour Type
SBTn (Robertson 1990)
Depth (ft)
CPeT-IT v.2.0.1.16 - CPTU data presentation & interpretation software - Report created on: 4/30/2024, 10:09:15 AM
Project file: D:\34599\sounding_files.cpt

ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599

Project: **EB Frink Middle School - New Build**
Location: **La Grange, Lenoir County, North Carolina**

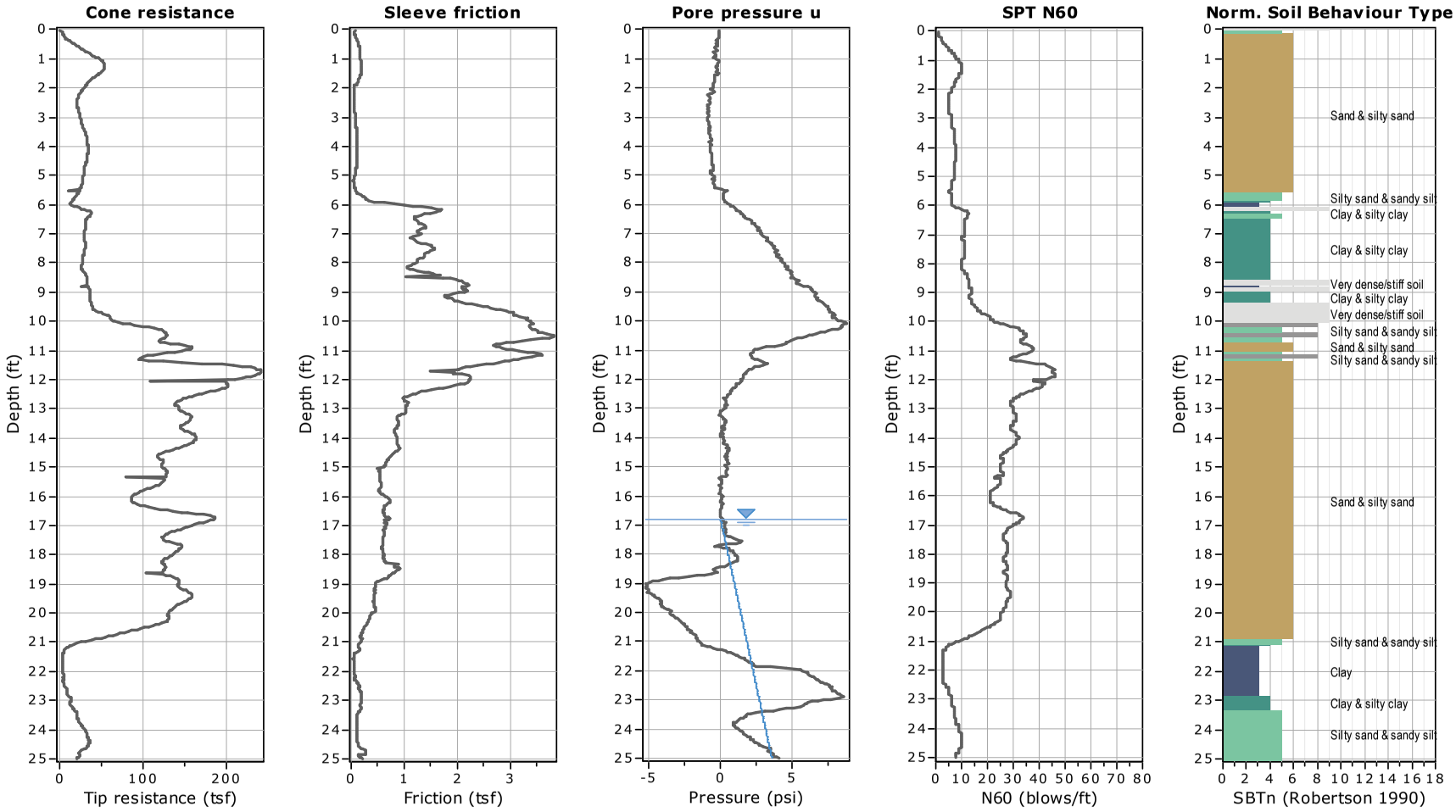
CPT: S-7
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison



ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599

Project: **EB Frink Middle School - New Build**
Location: **La Grange, Lenoir County, North Carolina**

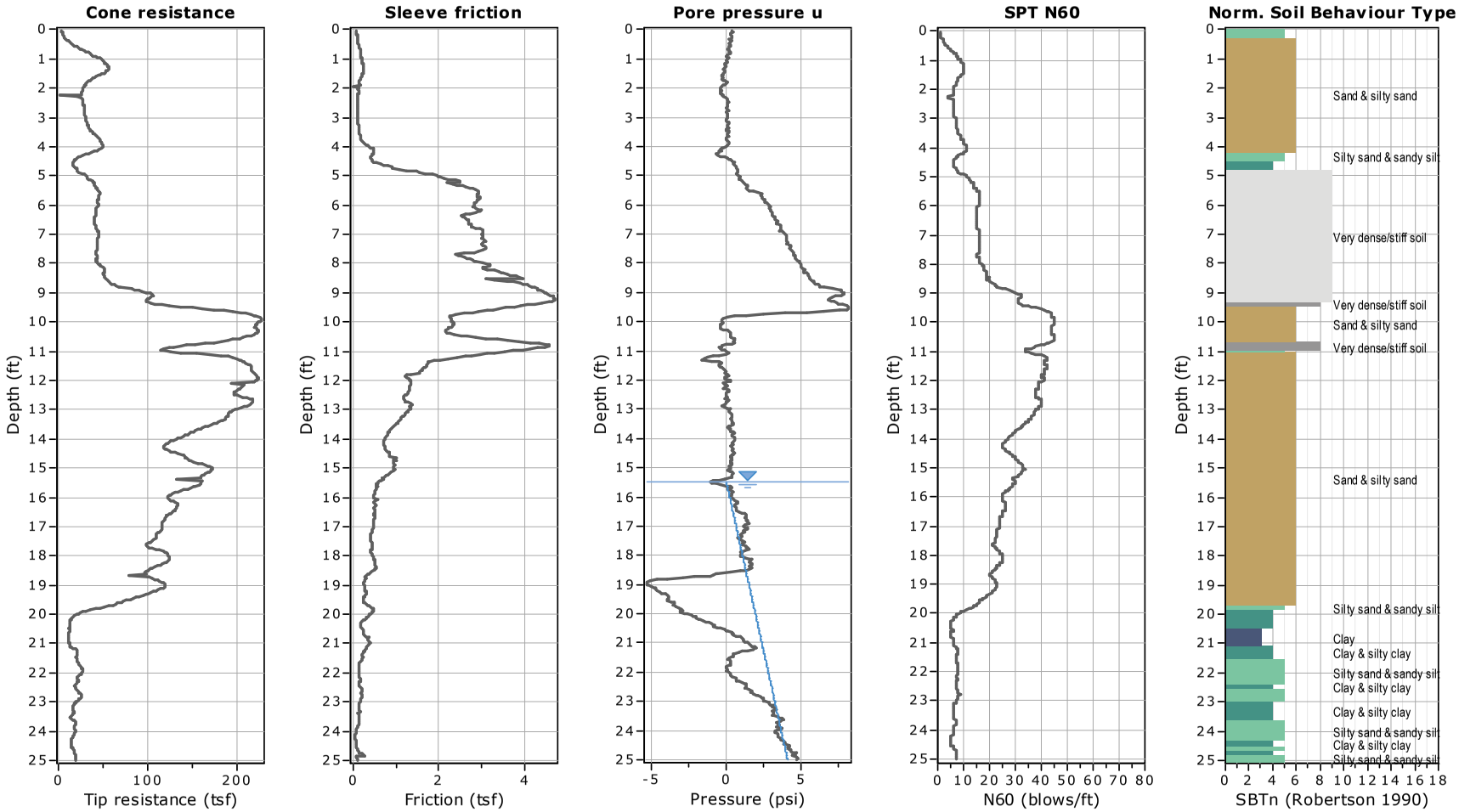
CPT: S-8
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison



ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599

Project: **EB Frink Middle School - New Build**
Location: **La Grange, Lenoir County, North Carolina**

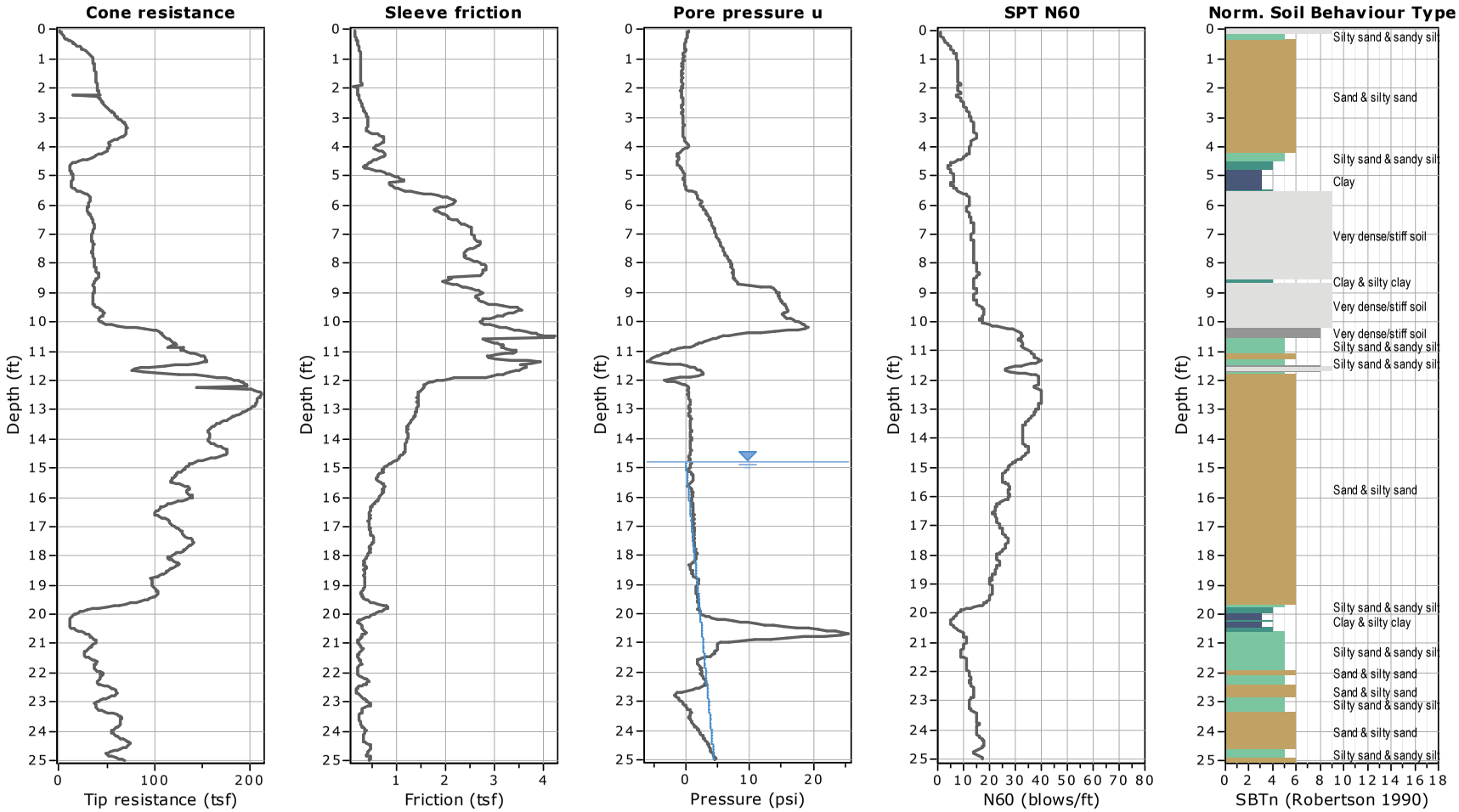
CPT: S-9
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison



ECS Southeast, LLC
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-34599

Project: **EB Frink Middle School - New Build**
Location: **La Grange, Lenoir County, North Carolina**

CPT: S-10
Total depth: 25.00 ft, Date: 4/15/2024
Cone Type: Uknown
Cone Operator: Cory Robison



REFERENCE NOTES FOR BORING LOGS

MATERIAL[1,2]	
	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
GW	WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
GP	POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
GM	SILTY GRAVEL gravel-sand-silt mixtures
GC	CLAYEY GRAVEL gravel-sand-clay mixtures
SW	WELL-GRADED SAND gravelly sand, little or no fines
SP	POORLY-GRADED SAND gravelly sand, little or no fines
SM	SILTY SAND sand-silt mixtures
SC	CLAYEY SAND sand-clay mixtures
ML	SILT non-plastic to medium plasticity
MH	ELASTIC SILT high plasticity
CL	LEAN CLAY low to medium plasticity
CH	FAT CLAY high plasticity
OL	ORGANIC SILT or CLAY non-plastic to low plasticity
OH	ORGANIC SILT or CLAY high plasticity
PT	PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS			
SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION		
DESIGNATION		PARTICLE SIZES
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS		
UNCONFINED COMPRESSIVE STRENGTH, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS	
SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

WATER LEVELS[6]	
	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

FILL AND ROCK			
FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3]Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[6]The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

[7]Minor deviation from ASTM D 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-01**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil Thickness[1.00"]					
			(SM) SILTY FINE SAND, tan, moist					
			(SP) FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

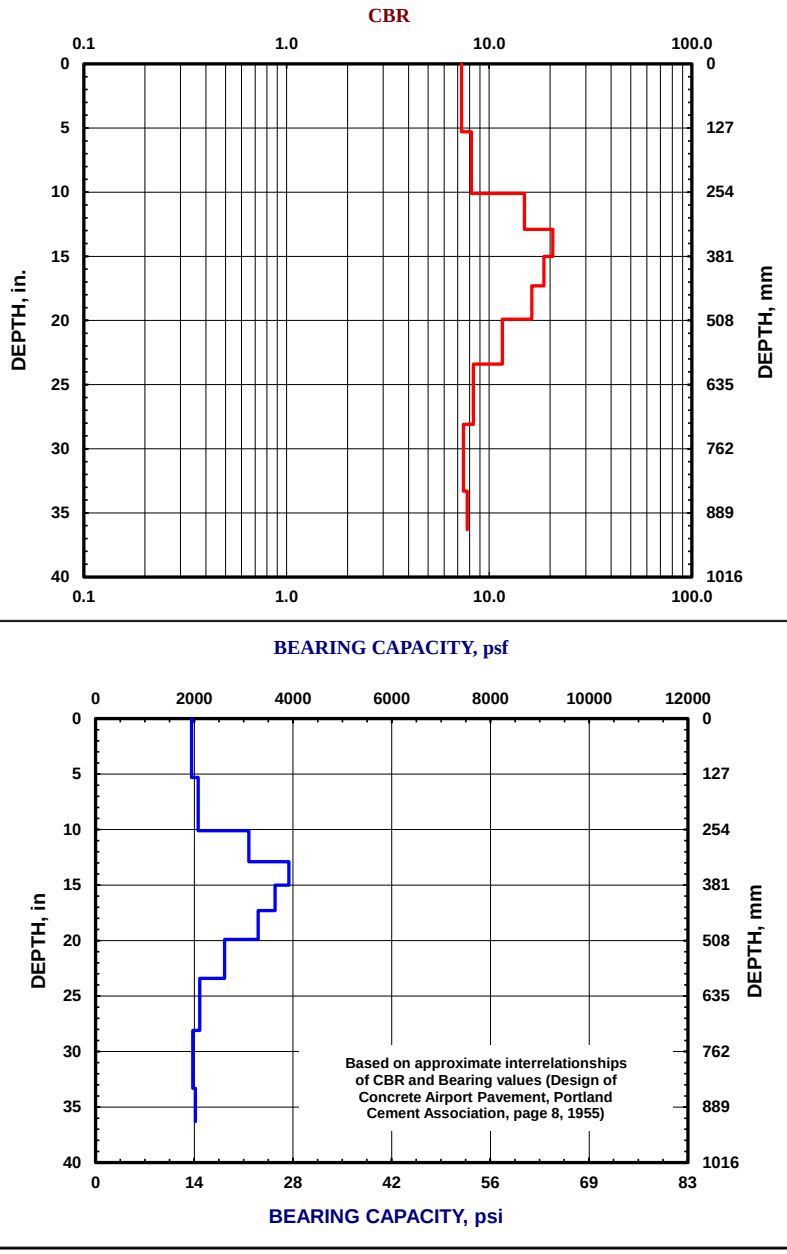
Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-1 **Soil Type(s):** SAND (SM, SP, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	135	1
5	257	1
5	328	1
5	381	1
5	439	1
5	505	1
5	594	1
5	714	1
5	846	1
3	922	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-02**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SP) FINE SAND, white, moist					
			(SP) FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-2 **Soil Type(s):** SAND (SM, SP)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	140	1
5	297	1
5	378	1
5	478	1
5	594	1
5	709	1
5	818	1
5	925	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-03**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SP) FINE SAND, tan/ white, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-3 **Soil Type(s):** SAND (SM, SP, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	203	1
5	312	1
5	427	1
5	549	1
5	688	1
5	851	1
1	902	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-04**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, brown, moist					
			(SP) FINE SAND, tan/ white, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

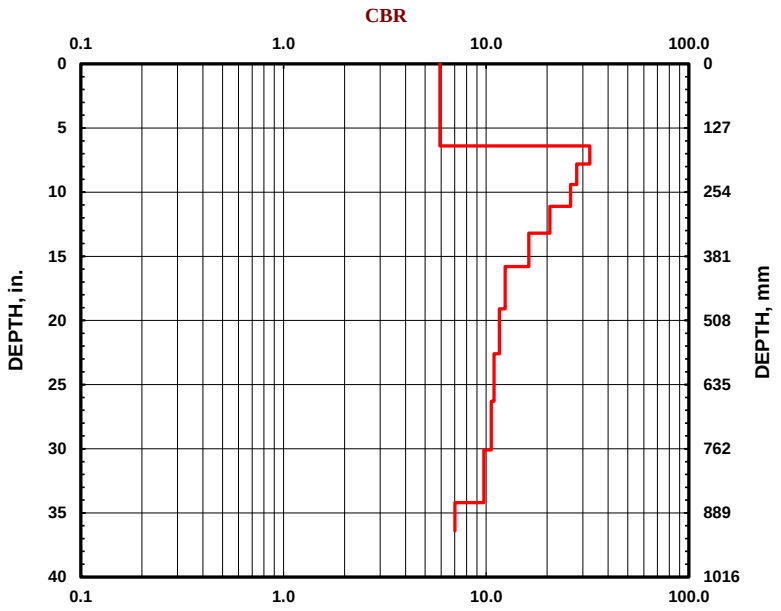
Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

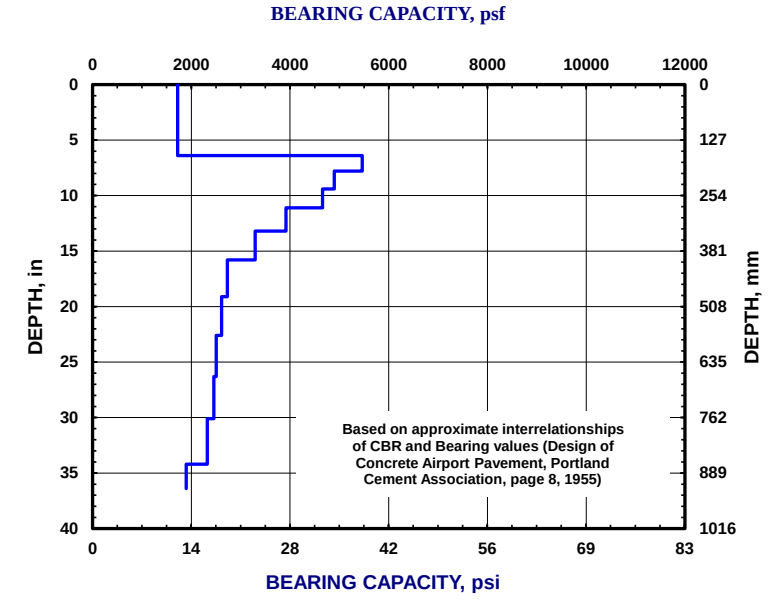
Location: K-4 **Soil Type(s):** SAND (SM, SP)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	163	1
5	198	1
5	239	1
5	282	1
5	335	1
5	401	1
5	485	1
5	574	1
5	668	1
5	765	1
5	869	1
2	925	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-05**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, tan/ orange, moist					
			(SP) FINE SAND, white, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-5 **Soil Type(s):** SAND (SM, SP, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	229	1
5	363	1
5	521	1
5	820	1
2	912	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-06**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SM) SILTY FINE SAND, tan/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

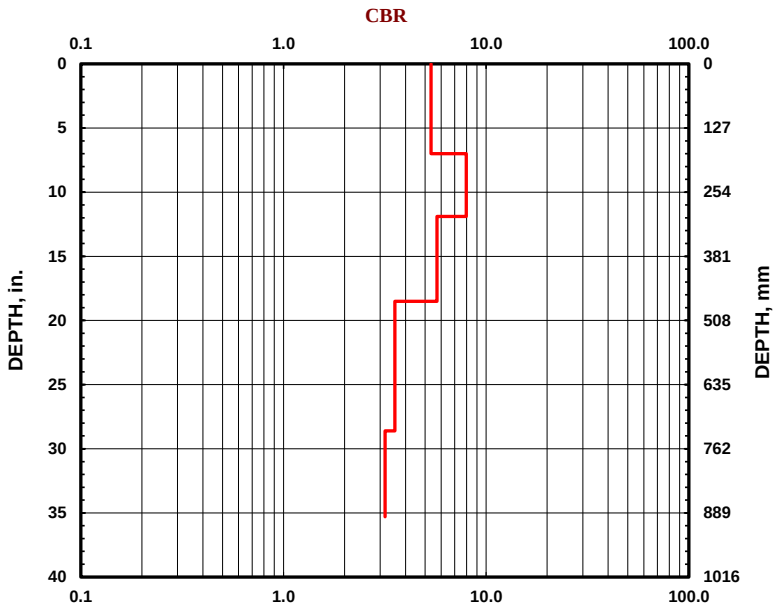
Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

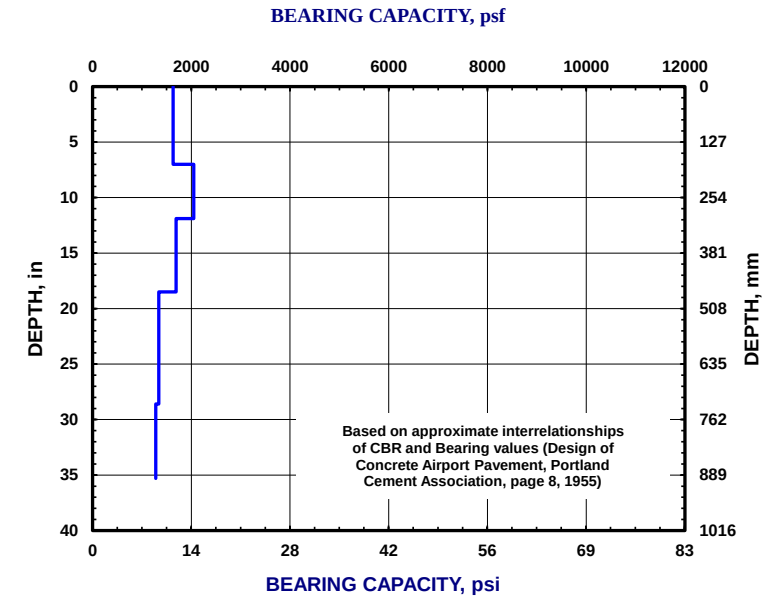
Location: K-6 **Soil Type(s):** SAND (SM)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	178	1
5	302	1
5	470	1
5	726	1
3	897	1
		1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-07**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SM) SILTY FINE SAND, tan/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-7 **Soil Type(s):** SAND (SM)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	201	1
5	282	1
5	363	1
5	442	1
5	541	1
5	660	1
5	828	1
2	907	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-08**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SP) FINE SAND, tan/ orange, moist					
			(SP) FINE SAND, white, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-8 **Soil Type(s):** SAND (SM, SP)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	196	1
5	272	1
5	348	1
5	434	1
5	574	1
5	749	1
2	846	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-09**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, tan/ gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

WL (First Encountered)	WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-9 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	198	1
5	300	1
5	480	1
5	742	1
4	892	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-10**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SP) FINE SAND, tan/ orange, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-10 **Soil Type(s):** SAND (SM, SP, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	173	1
5	267	1
5	361	1
5	465	1
5	655	1
4	813	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-11**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SP) FINE SAND, tan/ white, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-11 **Soil Type(s):** SAND (SM, SP, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	213	1
5	310	1
5	437	1
5	574	1
5	704	1
5	864	1
1	914	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-12**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SM) SILTY FINE SAND, tan/ orange, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 16 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 16-Apr-24

Location: K-12 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	163	1
5	292	1
5	632	1
4	894	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-13**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, tan/ orange, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

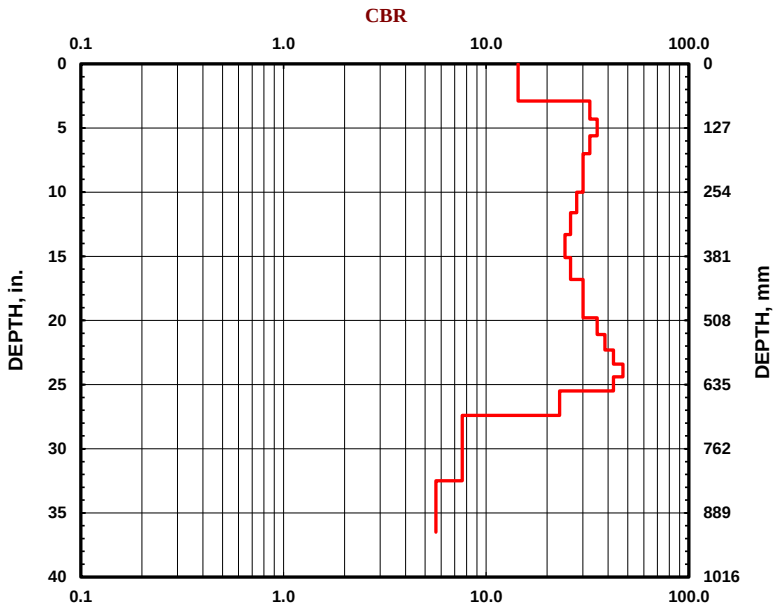
Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

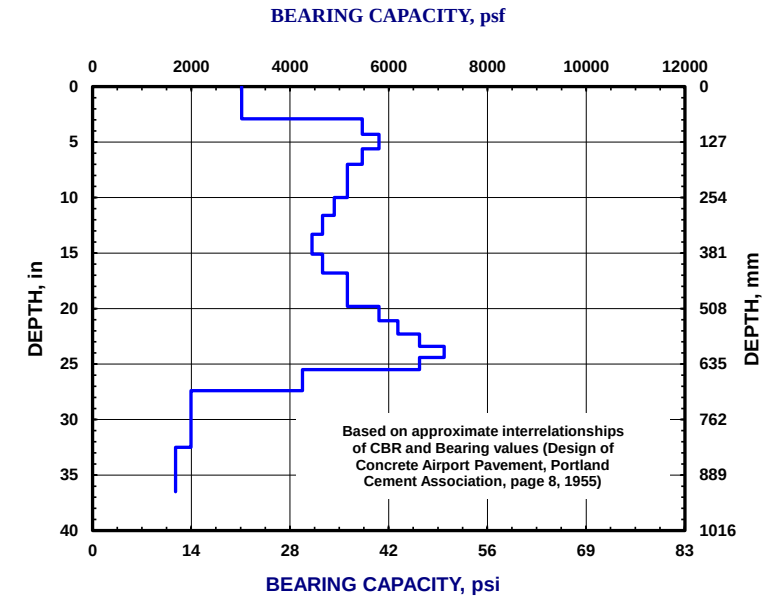
Location: K-13 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	74	1
5	109	1
5	142	1
5	178	1
5	216	1
5	254	1
5	295	1
5	338	1
5	384	1
5	427	1
5	465	1
5	503	1
5	536	1
5	566	1
5	594	1
5	620	1
5	648	1
5	696	1
5	826	1
3	927	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-14**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(CL) SANDY LEAN CLAY, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

Location: K-14 **Soil Type(s):** SAND (SM) CLAY (CL)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	56	1
5	97	1
5	140	1
5	206	1
5	284	1
5	399	1
5	572	1
5	696	1
5	922	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-15**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil Thickness[4.00"]					
			(SM) SILTY FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

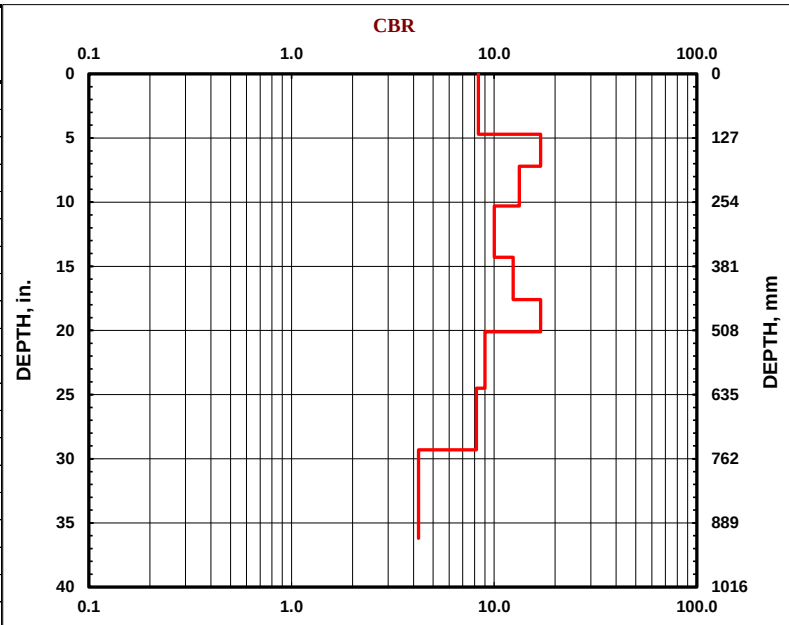
Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

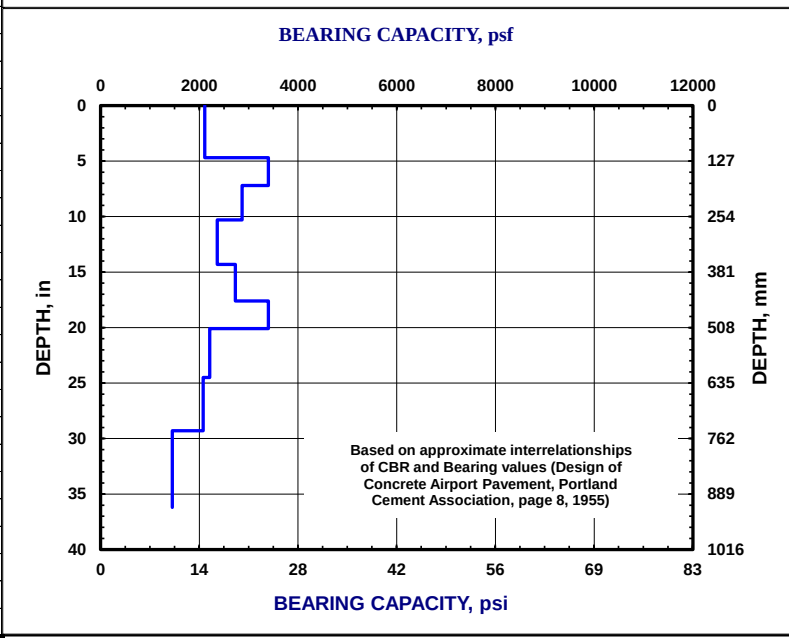
Location: K-15 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	119	1
5	183	1
5	262	1
5	363	1
5	447	1
5	511	1
5	622	1
5	744	1
4	919	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-16**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, dark gray, moist					
			(SP) FINE TO MEDIUM SAND, gray, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

Location: K-16 **Soil Type(s):** SAND (SM, SC, SP)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	135	1
5	193	1
5	254	1
5	343	1
5	465	1
5	653	1
3	927	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-17**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, gray, moist					
			(SC) CLAYEY FINE SAND, tan/ gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

WL (First Encountered)	WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

Location: K-17 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	193	1
5	297	1
5	429	1
5	815	1
1	919	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-18**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, tan, moist					
			(SC) CLAYEY FINE SAND, tan/ gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

WL (First Encountered)	WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

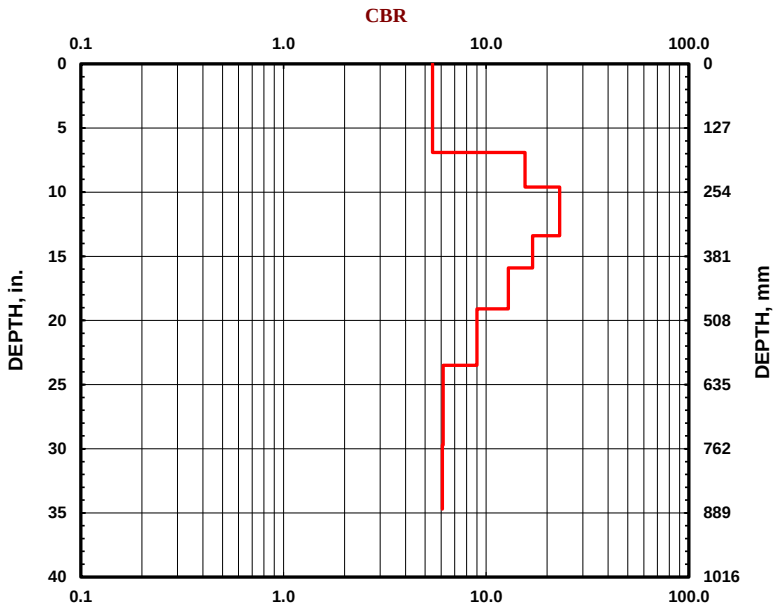
Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

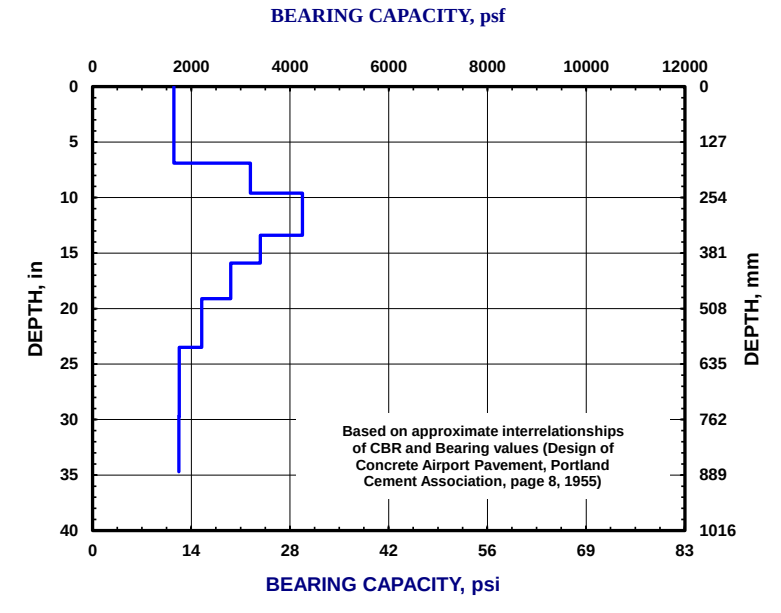
Location: K-18 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	175	1
5	244	1
5	292	1
5	340	1
5	404	1
5	485	1
5	597	1
5	754	1
4	881	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-19**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, tan, moist					
			(SC) CLAYEY FINE SAND, tan/ gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

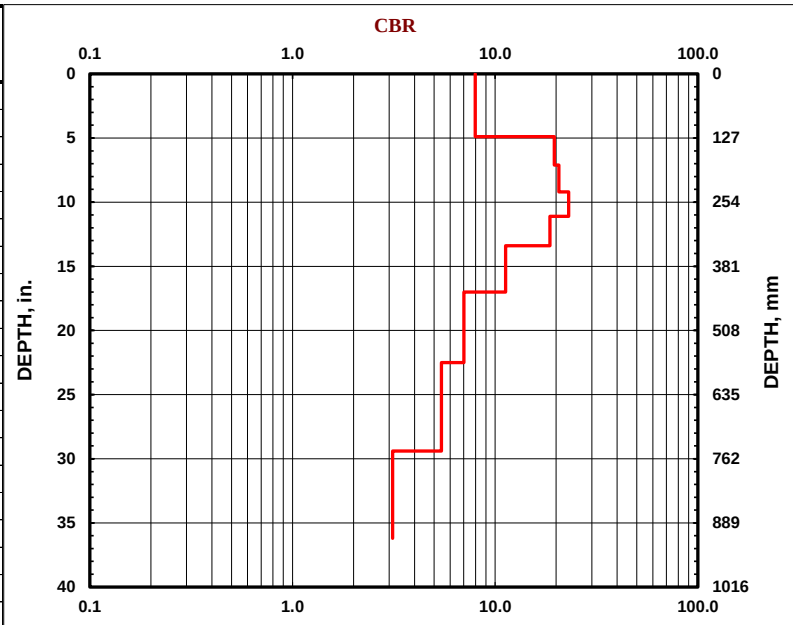
Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

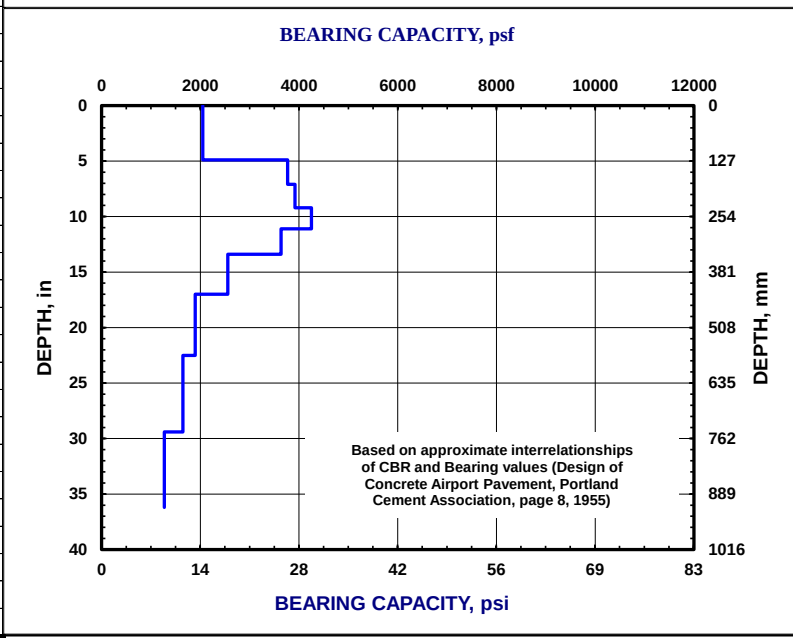
Location: K-19 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	124	1
5	180	1
5	234	1
5	282	1
5	340	1
5	432	1
5	572	1
5	747	1
3	919	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-20**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, tan, moist					
			(SC) CLAYEY FINE SAND, tan/ gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

WL (First Encountered)	WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

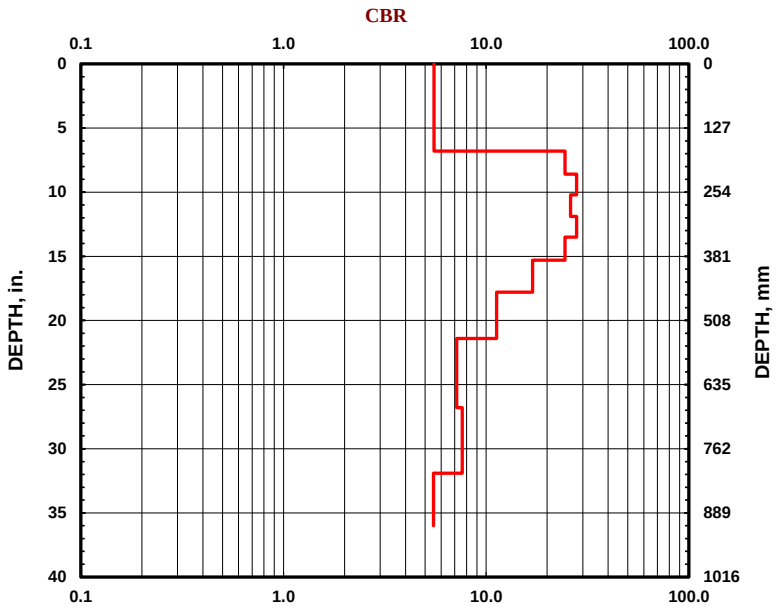
Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

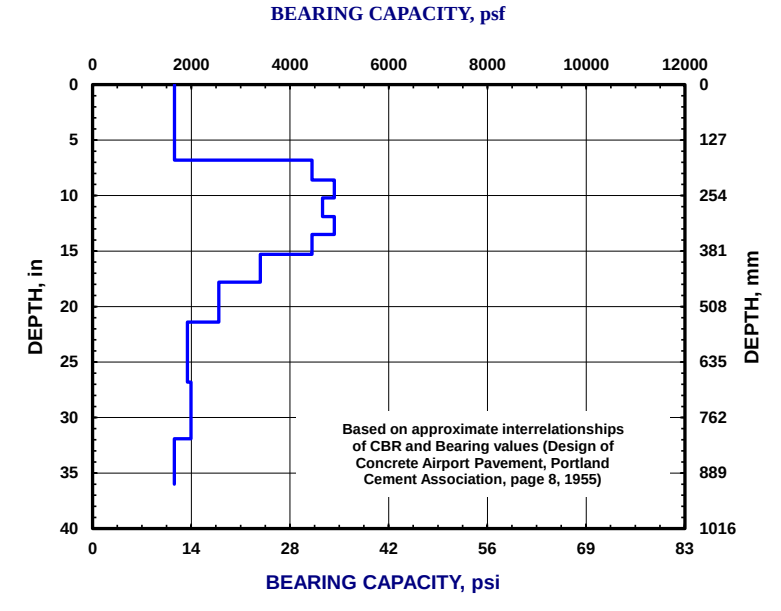
Location: K-20 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	173	1
5	218	1
5	259	1
5	302	1
5	343	1
5	389	1
5	452	1
5	544	1
5	681	1
5	810	1
3	914	1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-21**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, tan, moist					
			(SC) CLAYEY FINE SAND, tan/ gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

Location: K-21 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	104	1
5	173	1
5	226	1
5	305	1
5	462	1
5	648	1
5	754	1
5	843	1
4	935	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-22**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, tan, moist					
			(SC) CLAYEY FINE SAND, tan/ orange, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

Location: K-22 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	112	1
5	155	1
5	198	1
5	257	1
5	312	1
5	384	1
5	488	1
5	632	1
5	785	1
2	897	1
		1
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CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-23**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
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			END OF HAND AUGER AT 4 FT					
5		-5						

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EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

Location: K-23 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	135	1
5	196	1
5	236	1
5	284	1
5	376	1
5	574	1
5	757	1
2	886	1
		1
		1

CLIENT:	PROJECT NO.:	SHEET:
SfL+a Architects	**22:34599**	**1 of 1**
PROJECT NAME:	HAND AUGER NO.:	SURFACE ELEVATION:
EB Frink Middle School - New Build	**K-24**	
SITE LOCATION:		STATION:
N. Charles Street, LaGrange, North Carolina, 28551		
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			(SM) SILTY FINE SAND, tan, moist					
			(SC) CLAYEY FINE SAND, tan/ orange, moist					
			(SC) CLAYEY FINE SAND, gray/ orange, moist					
			END OF HAND AUGER AT 4 FT					
5		-5						

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered)	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**REG**	**Apr 17 2024**	**English**	

HAND AUGER LOG

DCP TEST DATA

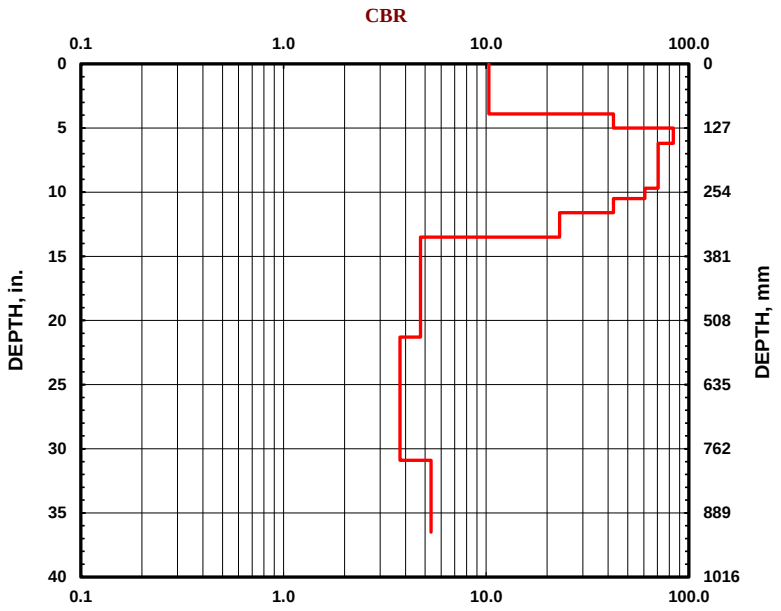
Project: *EB Frink Middle School - New Build* **Date:** 17-Apr-24

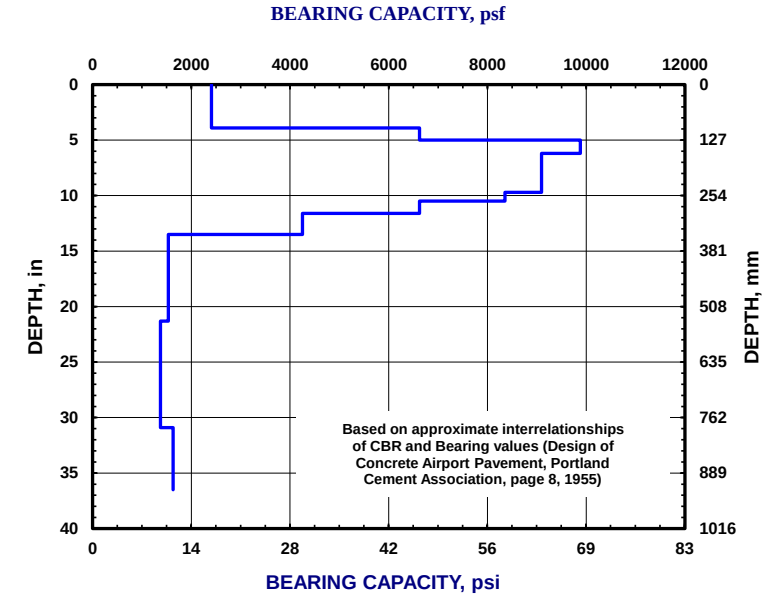
Location: K-24 **Soil Type(s):** SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Cumulative Penetration (mm)	Type of Hammer
0	0	1
5	99	1
5	127	1
5	142	1
5	157	1
5	175	1
5	193	1
5	211	1
5	229	1
5	246	1
5	267	1
5	295	1
5	343	1
5	541	1
5	785	1
4	927	1
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APPENDIX C – Supplemental Report Documents

GBA Document

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation*.

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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Earth Comfort
Renewable Energy for the Southeast
311 Highland Lake Dr • Flat Rock, NC 28731
912.695.7350
earthcomfort@gmail.com

FORMATION THERMAL CONDUCTIVITY TEST AND DATA ANALYSIS

Analysis for: **sfl+A Architects**
Attn: Miyuki Keller, AIA
333 Fayetteville St Raleigh, NC 27601

Test Location: **EB Frink School**
102 MLK, Jr Dr
LaGrange, NC 28551

Report Date: **August 13, 2024**

Test Performed by: **Earth Comfort, LLC**

Charles Davis

Executive Summary

A formation thermal conductivity test was performed at the site of the new EB Frink School. The vertical bore was completed on July 24, 2024 by Total Service Company for Earth Comfort . The test was attached to the vertical bore on August 7, 2024, and removed August 9th. Earth Comfort analyzed the collected data using the "line source" method in GLD Software.

This report provides a general overview of the test and procedures that were used to perform the thermal conductivity test along with a plot of the data in real time and in a form used to calculate the formation thermal conductivity. The following average formation thermal conductivity was found from the data analysis.

- **Formation Thermal Conductivity = 1.55 Btu/hr·ft·°F**

Due to the necessity of a thermal diffusivity value in the design calculation process, an estimate of the average thermal diffusivity was made for the encountered formation.

- **Formation Thermal Diffusivity = .95 ft^2/day**

An estimate of the undisturbed formation temperature was determined from the initial temperature data at startup.

- **Undisturbed Formation Temperature = 66.5 °F**

Formation Thermal Conductivity Test Report

Date..... August 07 - 09, 2024
Location..... 102 MLK Dr, LaGrange, NC
Undisturbed Formation Temperature..... 66.5 °F

Borehole Data - As Provided by Earth Comfort, LLC

Borehole Diameter..... 5.00 inches

Brown and White Sand	0 - 40 ft
Clay/Sand mix	40 - 310 ft

U-bend Size..... 1.00 inch HDPE
U-bend Length..... 610 ft 305 ft each side
Grout Type..... GeoPro Thermal Grout Lite + Sand 1.0 conductivity
Grout Solids..... 25 %
Grouted Portion..... Entire Bore, bottom to top

Test Data

Test Duration..... 48 hours
Average Voltage..... 240.5 V
Average Heat Input Rate per Foot of Bore..... 5,870 W
Average Heat Input Rate..... 19.6 W/ft
Circulator Flow Rate..... 6.47 gpm
Standard Deviation of Power..... 1.50%
Maximum Variation in Power..... 10.00%

SECTION 01 20 00

GENERAL SITEWORK REQUIREMENTS

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SITEWORK LAYOUT

A. Monuments and Benchmarks

1. Maintain all monuments, property corners, bench marks and other reference points.

2. If these are disturbed or destroyed during construction operations, have them replaced by a surveyor licensed in the State of North Carolina. This replacement shall be at no additional expense to the Contract.

B. Laying out the Work.

1. Locate all existing bench marks and other reference points.

2. Protect these points throughout construction.

3. Layout work utilizing these reference points.

C. Record Drawings

1. Maintain a record of the locations of all underground utilities and piping.

2. Maintain a record of any variations of the work.

3. Record Drawings shall be certified by a Land Surveyor registered in the State of North Carolina.

4. Submit these record drawings at Project Closeout.

1.3 EASEMENTS

A. Verify the acquisition of all off-site easements and Rights-of-Way prior to the start of off-site construction. This may be done by contacting the Architect.

B. Restore all off-site easements to the condition existing prior to the start of work.

1.4 MAINTENANCE OF TRAFFIC

A. Maintain vehicular and pedestrian traffic across the frontage of this project. Comply with all applicable safety requirements.

1.5 SUBMITTALS

A. For those submittals, close-out documents and O&M manuals requiring review by the architect's consultants, contractor shall ship such documents directly to the consultant, while sending a copy of the transmittal to the architect.

1.6 CORRELATION OF CONSTRUCTION DOCUMENTS

A. Review construction documents thoroughly prior to the start of construction.

B. Report any conflict or discrepancy discovered in the Construction Documents to the Architect prior to the start of construction.

C. Report any conflict or discrepancy discovered between the Construction Documents and state and local governmental regulations to the Architect prior to the start of construction.

1.7 PROJECT CONDITIONS

A. The conditions existing at the time of inspection for bidding purposes will be maintained by the Owner to the extent practical. However, minor variations may occur due to natural occurrences prior to the start of work.

B. The location of existing underground utilities indicated is approximate only. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated. Call “NC one call” at 1800-632-4949 prior to the start of demolition work for assistance in the location of existing underground utilities.

C. Should charted, uncharted or incorrectly charted utilities be encountered during demolition, contact the Architect immediately for instructions. Cooperate with Owner and utility companies to keep services and facilities in operation.

1.8 SCHEDULING

A. Do not begin work on any off-site roadway improvements until the owner has acquired and recorded all easements and right-of-way required to complete the project.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 – EXECUTION

3.1 PROJECT CLEAN UP

A. Clean site as construction progresses. Do not allow trash or other waste materials to accumulate.

B. Prior to requesting the punch-list inspection, clean the site to the following requirements:

1. Power wash all walks and pavements.

2. The remainder of the site shall be broom clean.

3. Remove all trash and debris.

3.2 EXISTING FACILITIES

A. Preserve existing signs, markers, guardrails and fences in their original condition unless written permission is obtained for their removal and replacement.

B. Replace damaged items at no additional cost to the Contract.

END OF SECTION 01 02 00

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Contract description.
   2. Work by Owner or others.
   3. Owner-furnished products.
   4. Contractor's use of site and premises.

B. Specification Conventions:
   1. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall," or "shall be," or "shall comply with," depending on context, are included by inference where a colon (:) is used within sentences or phrases.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

1.3 CONTRACT DESCRIPTION

A. Work of the Project includes construction of the project identified in the Contract Documents.

B. Perform Work of Contract under contract with the Owner for:
   1. Guaranteed Maximum Price Contract.

C. Coordinate Work with utilities of Owner, and utilities of public and private agencies.

D. Permits: Acquire and furnish all necessary permits for the Work.

E. Contract Work Includes:
   1. Work as indicated in the Project Manual, on Drawings and all other Contract Documents.

1.4 WORK BY OWNER OR OTHERS

A. Coordinate Work with work provided by Owner to facilitate work sequencing and scheduling to include, but not limited to, Owner provided inspection services and utilities of Owner and public or private agencies.

B. NIC (Not in Contract): Items noted NIC (Not in Contract), will be furnished and installed by Owner after substantial completion or prior to substantial completion when Work sequence requires or allows such coordination between Contractor and Owner.

1.5 OWNER-FURNISHED PRODUCTS

A. Items noted in the Contract Documents as to be furnished by the Owner:
   1. Owner's Responsibilities:
      a. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples, to Contractor.
      b. Arrange and pay for delivery to site.
      c. On delivery, inspect products jointly with Contractor.
      d. Submit claims to Owner’s provider for transportation damage and replace damaged, defective, or deficient items.
      e. Arrange for manufacturers' warranties, inspections, and service as may be required from Owner’s provider.
   2. Contractor’s Responsibilities:
      a. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
      b. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
      c. Handle, store, install and finish products.
      d. Repair or replace items damaged after receipt.
   3. Products furnished to site and installed by Owner:
      a. As indicated in the Contract Documents.
   4. Items furnished by Owner for installation by Contractor:
      a. As indicated in the Contract Documents.

1.6 CONTRACTOR'S USE OF SITE AND PREMISES

A. Access to Work Area of Site: Limited to Contractors, Owner, Authorities Having Jurisdiction, Emergency Response Entities, Architect and Consultants.

B. Tobacco and Related Products Restriction:
   1. Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
   2. Use of any form of tobacco and related product is not permitted on the construction site or any school property.

C. Electronic Smoking Devices Restriction: Use of electronic smoking and vapor devices are not permitted on the construction site or any school property.

D. Firearms Restriction: Firearms are prohibited on the construction site. As minimum, signs indicating restriction are to be posted at entrances to construction site and at contractor’s onsite office site trailer.

E. Restriction Signage: As minimum, signs indicating all site restrictions are to be posted at entrances to construction site and at contractor’s onsite office site trailer. Comply with other site signage requirements as may be indicated.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00

ALLOWANCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by Allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Allowance Types include the following:
   1. Unit Cost Allowances.
   2. Stipulated Sum Allowances
   3. Quantity Allowances.
   4. Contingency Allowances.

C. Related Requirements:
   1. Division 01 Section "Unit Prices" for requirements related to Unit Prices.
   2. Division 01 Section “Alternates” for requirements related to Alternates.
   3. Division 01 Section “Contract Modification Procedures”.
   4. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspection.
   5. Divisions 03 through 33 Sections for items of work covered by allowances.

1.3 ALLOWANCES - CONTRACT SUM

A. Include in the Contract Sum all Allowances stated in the Contract Documents.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product and system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the work.

C. Purchase products and systems selected by Architect from the designated supplier and perform allowance work requirements.

1.5 ACTION SUBMITTALS

A. Submit proposals for allowance work requirements included in allowances. Refer to Section 01 26 00 - Contract Modification Procedures.
   1. Include product data, shop drawing, and sample submittals for allowance items in same manner as for other portions of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices and delivery slips to show actual costs, and actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for services, and installation costs of allowance items that include installation as part of the allowance.

1.7 COORDINATION

A. Contractor:
   1. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.
   2. Include each allowance as separate line item in the Schedule of Values.
   3. Assist Architect in selection of products, suppliers, and installers.
   4. Obtain suppliers' and installers' cost data. Submit lump sum cost proposals for the work to Architect and offer recommendations. Refer to Section 01 26 00 - Contract Modifications: Proposal procedures.
      a. Include itemized explanation and documentation of proposed costs.
      b. Cost is to be based upon completing the work within the Contract Time.
   5. Owner written approval is required prior to allowance work and use of allowance funds.
      a. Progress payments for allowance work are not to be requested until Owner has provided written approval of the Contractor's proposal for the allowance work.
   6. Upon Architect’s notification of Owner approval, execute purchase agreement with designated supplier and installer.
   7. Obtain and process shop drawings, product data, and samples.
   8. Provide for delivery and, upon delivery, promptly inspect products for completeness, damage, and defects. Submit claims for transportation damage to supplier and delivery service.

B. Architect:
   1. Consult with Contractor regarding consideration and selection of products, suppliers, and installers.
   2. Consult with Owner to acquire Owner decisions and transmit decisions to Contractor.
   3. Prepare approval notification indicating the appropriate allowance and the amount authorized to be used with attached approved proposals and work descriptions. Distribute for authorization by Contractor and Owner.

1.8 UNUSED MATERIALS

A. After allowance work has been completed and accepted, return unused materials purchased to supplier for credit to Owner and document the credit back to the allowance line item on the next Application for Payment.
   1. If requested by Owner, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed by Owner.

1.9 CHANGES TO ALLOWANCES

A. Remaining allowance amounts will be credited to Owner by Change Order at closeout of Contract.
   1. Owner may choose to require credit for remaining amount, or portion thereof, prior to closeout of Contract.

B. Change to an Allowance Amount:
   1. In the event of a variance between an allowance amount and the approved actual cost, submit a Change Order proposal requesting a change in the Contract Sum.

a. Unit Cost Allowances: Change amount is to be the actual unit cost difference multiplied by the bid quantity.
b. Stipulated Sum Allowances: Change amount is to be the difference between the stipulated sum and the approved actual cost.
c. Quantity Allowances: Change amount is to be the actual quantity difference multiplied by the apportioned unit cost that was included in the Contract Sum.
    1) Exception: Contractor provided bid unit prices for Division 01 Section "Unit Prices" will be the multiplier for quantities greater or less than the allowance quantity when such corresponding work is indicated in "Unit Prices".
d. Contingency Allowances: Change amount is to be the difference between the allowance sum and the approved actual costs.

C. Include itemized explanation and documentation to substantiate changes.

D. No change to Contractor's indirect expense is permitted for selection of higher- or lower-cost materials or systems of the same scope and nature as originally indicated.

E. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

F. Change in Allowance Scope:
1. Submit documentation of a claim for change in scope of allowance work described in the Contract Documents.
2. Do not include Contractor's or subcontractor's indirect expense in the Change Order proposal cost amount unless you have clearly documented that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

1.10 UNIT COST ALLOWANCES (UCA)

A. Included in Unit Cost Allowance:
1. Purchase and Delivery Costs: Costs to Contractor including purchase of materials and equipment, delivery to site, and required purchase taxes, less applicable trade discounts.

B. Other related costs not included in allowance but to be included in Contract Sum:
1. Installation and Other Related Costs: Costs to Contractor including handling, unloading, storage, protection, services, installation and finishing, overhead, profit, bonding, insurance, payroll taxes, rental equipment, fees, incidentals, and other expenses required to complete the work.

C. Use information indicated in the Contract Documents to determine bid quantities.

D. Schedule of Unit Cost Allowances indicated in Part 3 of this Section.

1.11 STIPULATED SUM ALLOWANCES (SSA)

A. Included in Stipulated Sum Allowance:
1. All costs to Contractor including purchase of materials and equipment, delivery to site, taxes, handling, unloading, storage, protection, services, installation and finishing, overhead, profit, bonding, insurance, payroll taxes, rental equipment, fees, incidentals, and other expenses required to complete the work.

B. Schedule of Stipulated Sum Allowances indicated in Part 3 of this Section.

1.12 QUANTITY ALLOWANCES (QA)

A. Included in Quantity Allowance:

1. All costs to Contractor including purchase of materials and equipment, delivery to site, taxes, handling, unloading, storage, protection, services, installation and finishing, overhead, profit, bonding, insurance, payroll taxes, rental equipment, fees, incidentals, and other expenses required to complete the work.

B. Schedule of Quantity Allowances indicated in Part 3 of this Section.

1.13 CONTINGENCY ALLOWANCES (CA)

A. Included in Contingency Allowances:
1. All costs to Contractor including purchase of materials and equipment, delivery to site, taxes, handling, unloading, storage, protection, services, installation and finishing, overhead, profit, bonding, insurance, payroll taxes, rental equipment, fees, incidentals, and other expenses required to complete the work.

B. Schedule of Contingency Allowances indicated in Part 3 of this Section.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 GENERAL

A. Allowance work requirements to be same as similar work type requirements indicated in the Contract Documents unless indicated otherwise.

3.2 SCHEDULE - UNIT COST ALLOWANCES (UCA)

A. **UCA-1: Unit Masonry - BRK1.**
1. Unit Cost: $565.00 per thousand units.
2. Include the stated unit cost for purchase and delivery for face brick. Installation and all other related costs to be included in Contract Sum.
3. Refer to Section 04 20 00 - Unit Masonry.

B. **UCA-2: Unit Masonry - BRK2.**
1. Unit Cost: $385.00 per thousand units.
2. Include the stated unit cost for purchase and delivery for face brick. Installation and all other related costs to be included in Contract Sum.
3. Refer to Section 04 20 00 - Unit Masonry.

3.3 SCHEDULE - STIPULATED SUM ALLOWANCES (SSA)

A. **SSA-1: Security System.**
1. Stipulated Sum: $150,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for various technology equipment.
    a. Equipment types may include the following:
        1) Cameras.
        2) Security.
        3) Electronic security door hardware.
        4) Associated equipment.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

B. **SSA-2: Door Access Hardware.**
1. Stipulated Sum: $50,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for door access hardware, and associated technology equipment.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

C. **SSA-3: Emergency Responder Radio Antenna/Repeater System.**
1. Stipulated Sum: $250,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for an Emergency Responder Radio Antenna/Repeater System (ERRARS). Owner will make decision of need based on Contractor's System Survey indicated in the following paragraph.
3. Separate from the ERRARS stipulated sum allowance indicated above, the Contractor is to include in the base bid the work of providing the required System Survey. This base bid System Survey, along with requirements of the Authority Having Jurisdiction, will determine the ERRARS requirements, if any.

D. **SSA-4: Painting.**
1. Stipulated Sum: $10,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for paint on walls, ceilings, or other miscellaneous surfaces.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

E. **SSA-5: Acoustical Wall Panels.**
1. Stipulated Sum: $15,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for acoustical wall panels.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

F. **SSA-6: Door Hardware.**
1. Stipulated Sum: $15,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for Door Hardware.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

G. **SSA-7: Doors and Frames.**
1. Stipulated Sum: $15,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for Doors and/or Frames.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

H. **SSA-8: Access Doors and Frames.**
1. Stipulated Sum: $7,500.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for wall or ceiling access doors and frames.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

I. **SSA-9: Roofing.**
1. Stipulated Sum: $15,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for installation of Roofing Material and components.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

J. **SSA-10: Signage.**
1. Stipulated Sum: $75,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for lighted building signs and site entry sign.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

K. **SSA-11: Site Signage.**
1. Stipulated Sum: $75,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for lighted building signs and site entry sign.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

L. **SSA-12: Interior Signage.**
1. Stipulated Sum: $10,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for Interior Building Signage.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

M. **SSA-13: Landscaping.**
1. Stipulated Sum: $15,000.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for Site Landscaping.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.

N. **SSA-14: Site Bollards.**
1. Stipulated Sum: $7,500.
2. Include the stated stipulated sum for purchase, delivery, installation, and all other related costs for site bollards. Refer to details on Drawings.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.
4. Locations to be indicated by Architect.

O. **SSA-15: Interactive Floor and Wall System.**
1. Stipulated Sum: $36,000.
2. Include the stated stipulated sum for purchase, delivery, installation and all other related cost for Interactive Floor and Wall System.
3. Allowance is for work in addition to base bid work indicated in Contract Documents.
4. Basis of Design: PowerUpEDU ActiveFloor Pro3 Bundle and Sportswall3 Laser Bundle or equal.

3.4 SCHEDULE - QUANTITY ALLOWANCES (QA)

A. **QA-1: Woven Geo-Textile Separation and Stabilization Fabric In-Place.**
   1. Quantity: 500 square yards.
   2. Include the stated quantity of work for purchase, delivery, installation, and all other related costs.
   3. Coordinate with Division 01 Section "Unit Prices".

B. **QA- 2: Removal of Unsuitable Soil (Bulk).**
   1. Quantity: 1000 cubic yards.
   2. Include the stated quantity of work including off-site disposal, and all other related costs.
   3. Coordinate with Division 01 Section "Unit Prices".

C. **QA-3: Removal of Unsuitable Soil (Trench).**
   1. Quantity: 500 cubic yards.
   2. Include the stated quantity of work including off-site disposal, and all other related costs.
   3. Coordinate with Division 01 Section "Unit Prices".

D. **QA-4: Replacement of Removed Unsuitable Soils or Rock with Off-Site Suitable Soils In-Place.**
   1. Quantity: 1,000 cubic yards.
   2. Include the stated quantity of work for purchase, delivery, installation, and all other related costs.
   3. Coordinate with Division 01 Section "Unit Prices".

E. **QA-5: Replacement of Removed Unsuitable Soils or Rock with Off-Site Aggregate Base Course In-Place.**
   1. Quantity: 750 cubic yards.
   2. Include the stated quantity of work for purchase, delivery, installation, and all other related costs.
   3. Coordinate with Division 01 Section "Unit Prices".

3.5 SCHEDULE - CONTINGENCY ALLOWANCES (CA)

A. **CA-1: General Contingency Allowance.**
   1. Stipulated Sum: $300,000.00.
   2. Include the stated stipulated sum for use as directed by Owner.

END OF SECTION

SECTION 01 21 10
SITEWORK ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements regarding allowances associated with sitework.

B. This Section includes the following unit price allowances:

1. Additional Excavation
2. Additional Excavation in Trenches
3. Additional Excavation in Footings.
4. Mass Rock Removal
5. Trench Rock Removal
6. Subsurface Drain
7. NCDOT Std. No. 57 Stone
8. Woven Geotextile Fabric

C. This Section includes the following lump-sum allowances:

1. Firelane Striping and Signage

PART 2 – PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICE ALLOWANCES

A. Additional Excavation

1. Provide in the Base Bid an allowance of 3,000 c.y. for excavation of material, where authorized or directed, below or in addition to the levels required for the

Work. Dispose of excavated material in an approved location on-site. Backfill with imported structural fill material compacted per specifications. Credit or additions to the Contract Price for actual quantities removed and replaced (based on volume of material cut) shall be made per the Unit Prices contained in the Bid Form. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the State of North Carolina.

B. Additional Excavation in Trenches

1. Provide in the Base Bid an allowance of 200 c.y. for excavation of material in trenches and footings, where authorized or directed, below or in addition to the levels required for the Work. Dispose of excavated material in an approved location on-site. Backfill with #57 stone compacted per specifications. Credit or additions to the Contract Price for actual quantities removed and replaced (based on volume of material cut) shall be made per the Unit Prices contained in the Bid Form. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the State of North Carolina.

C. Additional Excavation in Footings

1. Provide in the Base Bid an allowance of 200 c.y. for excavation of material in trenches and footings, where authorized or directed, below or in addition to the levels required for the Work. Dispose of excavated material in an approved location on-site. Backfill with #57 stone compacted per specifications. Credit or additions to the Contract Price for actual quantities removed and replaced (based on volume of material cut) shall be made per the Unit Prices contained in the Bid Form. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the State of North Carolina. Any required lowering of footings will be done as a negotiated price.

D. Mass Rock Excavation

1. Provide in the Base Bid an allowance of 50 c.y. for excavation of rock. Dispose of excavated rock material in an approved location on-site. Backfill with imported fill material compacted per specifications. Credit or additions to the Contract Price for actual quantities removed and replaced (per the pay limits established in the Specifications) shall be made per the Unit Prices contained in the Bid Form. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the State of North Carolina.

E. Rock Excavation in Trenches

1. Provide in the Base Bid an allowance of 10 c.y. for excavation of rock in trenches. Dispose of excavated rock material in an approved location on-site. Backfill excavation with #57 stone. Credit or additions to the Contract Price for actual quantities removed and replaced (per the pay limits established in the Specifications) shall be made per the Unit Prices contained in the Bid Form. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the State of North Carolina.

F. Rock excavation at Footings

1. Provide in the Base Bid an allowance of 10 c.y. for excavation of rock in footings. Dispose of excavated rock material in an approved location on-site. Backfill excavation with #57 stone. Credit or additions to the Contract Price for actual quantities removed and replaced (per the pay limits established in the Specifications) shall be made per the Unit Prices contained in the Bid Form. Include in the unit price the cost of quantity verification by a Surveyor Licensed in the State of North Carolina.

G. NCDOT #57 aggregate, in place (100 C.Y.)

3.2 ADMINISTRATION OF SITEWORK UNIT PRICE ALLOWANCES

A. Excavation of work under unit price allowances must be authorized in advance by the Owner, Owner's Geotechnical Testing Firm, and the Architect.

B. Unit Prices for each allowance shall be given on the Bid Form.

1. The Owner reserves the right to negotiate said Unit Prices prior to the award of Contract.

C. Allowances required by this Section shall be included in the Base Bid amount.

D. Allowances required by this Section shall be indicated on the Schedule of Values and shall be determined by multiplying the quantity indicated by the unit price given on the Bid Form.

E. Submit invoices or surveyor's certificate, as required, with pay requests that involve the Unit Price Allowances.

F. Credit unused amount of Unit Price Allowance (if any) to Owner by Change Order at Project Closeout.

3.3 ADMINISTRATION OF LUMP-SUM ALLOWANCES

A. Conform to the requirements of the General Conditions.

END OF SECTION 01 21 10

SECTION 01 22 00

UNIT PRICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Unit price requirements for use in preparing Bids.
   2. Measurement and payment criteria applicable to Work performed under a unit price payment method and associated Bid requirements.
   3. Defect assessment and non-payment for rejected Work.
   4. Schedule of Unit Prices.

B. Related Requirements:
   1. Bidding Documents and Forms: Instructions for preparation of pricing for Unit Prices.
   2. Drawing and Specification requirements related to the work type indicated by the items listed in this Section under the Schedule of Unit Prices.

1.3 COSTS INCLUDED IN UNIT PRICES

A. Unit Prices included on the Bid Form shall include full compensation per unit of Work including, but not limited to, all required labor, overhead, profit, products, tools, equipment, plant fees, excavation, disposal fees, loading, transportation, services, incidentals, erection, application, and installation of a unit of the Work.

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the bidding documents and forms are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.5 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification Sections complement the criteria of this Section. In the event of conflict, the requirements of the individual specification Section govern.
   1. Measurement for replacement fill of authorized excavated voids shall be based on volume of void to be filled with compacted fill.
   2. Measurement for fabric and sheet products installed horizontally, is not to include excess and/or overlaps.
   3. Measurement for other types of Work is indicated within the individual Unit Price requirement in the Schedule of Unit Prices at the end of this Section.

B. Take all measurements and compute quantities. Maintain records.
   1. Measurements and quantities will be verified by a soils and materials engineer employed by the Owner.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Measurement Devices:

1. Weigh Scales: Inspected, tested, and certified by the applicable State department within the past year.
2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle. Certified by the applicable State department within the past year.
3. Metering Devices: Inspected, tested, and certified by the applicable State department within the past year.

E. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

F. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.

G. Measurement by Area: Measured by square dimension using mean length and width or radius.

H. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

I. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.6 PAYMENT

A. Payment for Work governed by unit prices will be made based on the actual measurements and quantities of Work that is incorporated into or made necessary by the Work.

B. Payment will not be made for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.7 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct remedies as follows:
1. The defective Work will remain or be partially repaired to the instruction of the Owner, and at the discretion of the Owner, the unit price will be adjusted as follows:
a. Reduced to a new unit price.
2. The authority of Owner to assess the defect, direct remedies, and establish adjustment in unit price and payment is final.

C. The Contract, General Conditions of the Contract, Supplementary General Conditions, or individual specification Sections may modify these options or may identify a specific formula or percentage price reduction.

1.8 DOCUMENTATION

A. Section 01 32 00 - Construction Progress Documentation: Reports.

B. Maintain record of delivery tickets for replacement fill materials delivered to the jobsite. Indicate date, time, origin location, hauler, material description, quantities, and weight.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Provide unit prices for the following Work in compliance with the Contract Documents for similar Work and as directed by Architect.
   1. Refer to "Costs Included in Unit Prices" article in this Section.
   2. Purpose:
      a. To adjust the contract sum if the Owner requires construction in addition to that indicated in the Contract Documents.
      b. To adjust the contract sum for approved variance in quantities indicated for the Quantity Allowances as indicated in Division 01 Section "Allowances".

B. **Unit Price No. 1 - Exit Sign.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

C. **Unit Price No. 2 - Surface Mounted Speaker/Strobe.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

D. **Unit Price No. 3 - Smoke Detector.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

E. **Unit Price No. 4 - Heat Detector.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

F. **Unit Price No. 5 - Fire Alarm Pull Station.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

G. **Unit Price No. 6 - Two Port Data Outlet.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

H. **Unit Price No. 7 - Duplex Power Outlet.**
   1. Include circuitry and hardware. Conduits and boxes to be concealed and recessed.
   2. Unit Price: Provide bid price per each.

I. **Unit Price No. 8 - Sidewalk.**
   1. Unit Price: Provide bid price per square yard.

J. **Unit Price No. 9 - Site Bollards.**
   1. Unit Price: Provide bid price per each.

K. **Unit Price No. 10 - Woven Geo-Textile Separation and Stabilization Fabric In-Place.**
   1. Unit Price: Provide bid price per square yard.
   2. Quantity Allowance: Contractor shall include an allowance price in the Base Bid for quantity indicated in Schedule - Quantity Allowances in Division 01 Section "Allowances".
      a. Coordinate unit price with quantity allowance price.
      b. Refer to requirements in Division 01 Section “Allowances”.

L. **Unit Price No. 11 - Removal of Unsuitable Soils (Bulk).**
1. Disposal to be off-site.
2. Unit Price: Provide bid price per cubic yard.
3. Quantity Allowance: Contractor shall include an allowance price in the Base Bid for quantity indicated in Schedule - Quantity Allowances in Division 01 Section "Allowances".
   a. Coordinate unit price with quantity allowance price.
   b. Refer to requirements in Division 01 Section “Allowances”.

M. **Unit Price No. 12 - Removal of Unsuitable Soils (Trench).**
1. Disposal to be off-site.
2. Unit Price: Provide bid price per cubic yard.
3. Quantity Allowance: Contractor shall include an allowance price in the Base Bid for quantity indicated in Schedule - Quantity Allowances in Division 01 Section "Allowances".
   a. Coordinate unit price with quantity allowance price.
   b. Refer to requirements in Division 01 Section “Allowances”.

N. **Unit Price No. 13 - Removal of Rock (Bulk).**
1. Disposal to be off-site.
2. Unit Price: Provide bid price per cubic yard.
3. Quantity Allowance: Contractor shall include an allowance price in the Base Bid for quantity indicated in Schedule - Quantity Allowances in Division 01 Section "Allowances".
   a. Coordinate unit price with quantity allowance price.
   b. Refer to requirements in Division 01 Section “Allowances”.

O. **Unit Price No. 14 - Replacement of Removed Unsuitable Soils or Rock with Off-Site Suitable Soils In-Place.**
1. Suitable soil fill approval required. Moisture control and compaction required.
2. Do not include costs related to the removal of unsuitable soils or rock. Unit price for removal is provided for in other Unit Price item in this Section.
3. Unit Price: Provide bid price per cubic yard.
4. Quantity Allowance: Contractor shall include an allowance price in the Base Bid for quantity indicated in Schedule - Quantity Allowances in Division 01 Section "Allowances".
   a. Coordinate unit price with quantity allowance price.
   b. Refer to requirements in Division 01 Section “Allowances”.

P. **Unit Price No. 15 - Replacement of Removed Unsuitable Soils or Rock with Off-Site Aggregate Base Course In-Place.**
1. Aggregate fill approval required and is to be Certified ABC material. Compaction required.
2. Do not include costs related to the removal of unsuitable soils or rock. Unit price for removal is provided for in other Unit Price item in this Section.
3. Unit Price: Provide bid price per cubic yard.
4. Quantity Allowance: Contractor shall include an allowance price in the Base Bid for quantity indicated in Schedule - Quantity Allowances in Division 01 Section "Allowances".
   a. Coordinate unit price with quantity allowance price.
   b. Refer to requirements in Division 01 Section “Allowances”.

Q. **Unit Price No. 16 - Additional Site Irrigation.**

1. Location and Scope: Areas adjacent to the building shown as Sod on the Landscape Drawings. Provide irrigation system with eight (8) irrigation zones, automatic control system, all associated control wiring, sleeves, piping, joints, fittings, special fittings, valves, sprinkler heads, accessories, incidentals, and Owner training.
2. Unit Price: Provide bid price per entire irrigation system installed.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Alternates.
   2. Schedule of Alternates.

B. Related Requirements:
   1. Bidding Documents and Forms: Instructions for preparation of pricing for Alternates.
   2. Drawing and Specification requirements related to the work type indicate by the items listed in this Section under the Schedule of Alternates.

1.3 DEFINITIONS

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

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule of Alternates:
   1. Schedule of Alternates included in Part 3 of this Section.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1 - Replace LVT with Resinous Matrix Terrazzo Flooring:

1. Refer to Section 09 66 23 Resinous Matrix Terrazzo Flooring and Sheet A-704.
2. Colorways to match LVT color and install pattern – coordinate with architect.
3. **Alternate No. 1A** - Replace LVT with Terrazzo in Lobby 100A.
4. **Alternate No. 1B** - Replace LVT with Terrazzo in Corridor 200.
5. **Alternate No. 1C** - Replace LVT with Terrazzo in Corridor 300.
6. **Alternate No. 1D** - Replace LVT with Terrazzo in Corridor 400.
7. **Alternate No. 1E** - Replace LVT with Terrazzo in Corridor 500.
8. **Alternate No. 1F** - Replace LVT with Terrazzo in Dining 112.

B. Alternate No. 2 - Door Hardware.

1. Refer to Section 08 71 00 - Door Hardware.
2. **Alternate No. 2A Cylinders and Keying (Owner Preferred):**
   a. Cylinders and Keying: ASSA ABLOY ACCENTRA, formerly known as Yale (YA). No substitutions.
   b. Includes interchangeable cores.
   c. Includes all wireless equipment.

C. Alternate No. 3 - Access Control Systems.

1. Refer to Section 28 00 00 -Basic Electronic Security System Requirements.
2. **Alternate No. 3A – Access Control System (Owner Preferred):**
   a. Provide Access control system: Galaxy Access Control , no substitutions.

D. Alternate No. 4 - Intercom (Owner Preferred):

1. Refer to Section 72 51 16 - Intercom.
2. Provide Intercom: Bogen Nyquist E7000 Series. no substitutions.

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:
   1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 PROPOSAL REQUESTS

A. Owner Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within 15 days after receipt of Proposal Request, submit a quotation indicating the net cost and net time adjustments to the Contract Sum and the Contract Time necessary to execute the change. The terms "net cost" and “net time” as used herein shall mean the difference between the additions and deductions of all properly applied cost and time.
      a. Document each quotation for change in net cost or net time with sufficient data to allow evaluation of quotation.
      b. Include a list of quantities and prices of products and materials required or eliminated, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      d. Include costs of labor and supervision directly attributable to the change.
      e. Include an updated Construction Manager's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Construction Manager Initiated Proposals: If latent or changed conditions require modifications to the Contract, Construction Manager may initiate a claim by submitting a request for a change to Architect.
   1. Include a statement outlining reasons for the proposed change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
   2. The terms "net cost" and “net time” as used herein shall mean the difference between the additions and deductions of all properly applied cost and time.
      a. Document each quotation for change in net cost or net time with sufficient data to allow evaluation of quotation.

b. Include a list of quantities and prices of products and materials required or eliminated, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
d. Include costs of labor and supervision directly attributable to the change.
e. Include an updated Construction Manager's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
f. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.4 MINOR CHANGES IN THE WORK

A. Architect will issue to Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 Architect's Supplemental Instructions.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents.

B. Construction Manager is responsible for informing others in Construction Manager's employ, subcontractors, and suppliers of approved changes to the Work.

C. Stipulated Sum Change Order: Based on Proposal Request and Construction Manager's fixed price quotation or Construction Manager's request for Change Order as approved by Owner and Architect.

D. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs and quantities of units of work which are not pre-determined, execute Work under Construction Change Directive.

E. Construction Change Directive: Architect may issue directive, on AIA Form G714 Construction Change Directive signed by Owner, instructing Construction Manager to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining and change in Contract Sum or Contract Time. Promptly execute change.

F. Execution of Change Orders: Architect will issue Change Orders on AIA Document G701 for signatures by parties as provided in Conditions of the Contract.

G. Correlation of Construction Manager Submittals:
1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum.

2. Promptly revise construction schedule to reflect changes in the work and its effect on other items of work affected by the changes, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Construction Manager to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of directed change, submit an itemized accounting and supporting data necessary to substantiate cost and time adjustments to the Contract. Approved changes to the Contract will be authorized by Change Order.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Administrative and procedural requirements.
   1. Schedule of Values.
   2. Applications for Payment.

B. Related Requirements:
   1. Division 01 Section "Allowances" for procedural requirements governing the handling and processing of Allowances.
   2. Division 01 Section "Unit Prices" for administrative requirements governing the use of Unit Prices.
   3. Division 01 Section "Alternates" for administrative requirements governing the Alternates.
   4. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   5. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Construction Manager's construction schedule.

1.3 DEFINITIONS

A. Contract Start Date: The date of Commencement of the Work as established by the provisions of the Contract.

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

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Construction Manager's construction schedule.
   1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with continuation sheets.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Construction Manager's construction schedule.
   2. Submit the schedule of values in duplicate to Architect within fifteen (15) days after Contract Start Date.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the schedule of values:
      a. Project name and location.
      b. Name of Architect.

c. Architect's project number.
d. Construction Manager's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
   a. Include separate line items under principal subcontracts for project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
      1) If LEED or other sustainable design requirements are included in the project, include line items for such documentation.
   b. Include the following costs as separate line items:
      1) Site mobilization.
      2) Bonds.
      3) Insurance.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Divide each part of the Work into separate line items in the schedule of values that indicate the following for individual parts of the Work:
   a. Cost of materials.
   b. Cost of installation.
7. Allowances:
   a. Provide a separate line item in the schedule of values for each allowance.
   b. For unit cost allowances, show line item value as a product of the unit cost, multiplied by bid quantity. Use information indicated in the Contract Documents to determine bid quantities.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Construction Manager.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Construction Manager's option.
10. For each application for payment period, add line items to the schedule of value indicating change orders approved after the previous period.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid by Owner.

B. Payment Period: Submit at monthly intervals or as otherwise stipulated in the Agreement.
   1. Submit draft copy of Application for Payment seven (7) days prior to due date for review by Architect.

C. Application for Payment Forms:
   1. AIA Document G702, “Application and Certificate for Payment”.
   2. AIA Document G703, “Continuation Sheet for G702”.
   3. Other forms required at appropriate times include the following. Forms for the same purpose indicated here may be superseded by other forms if indicated otherwise in the Contract:
      a. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims".
      b. AIA Document G706A, "Contractor's Affidavit of Release of Liens".
      c. AIA Document G707, "Consent of Surety to Final Payment".
      d. AIA Document G707A, "Consent of Surety to Reduction in or Partial Release of Retainage”.

D. Application Preparation: Complete every entry on form. Certification of Application to be by a person authorized to sign legal documents on behalf of Construction Manager. Certification to be Notarized. Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Construction Manager's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of approved Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Include retainage requirements indicated in the Contract Documents.

E. Substantiating Data: When Architect requires substantiating information, submit data justifying dollar amounts in question.

F. Payroll Reports: Submit data for projects requiring compliance with or reporting for the following:
   1. Davis Bacon Act, as Amended.
   2. Government Grant funding programs.

G. Stored Materials: Provisions for progress payment for stored materials are indicated in the General Conditions of the Contract. Such provisions are subject to modifications that may be indicated in the Owner/Construction Manager Agreement or Supplementary General Conditions. Additional provisions are as follows:
   1. Provide a summary report documenting stored materials indicating the following:
      a. Differentiate between items stored on-site and items stored off-site.
      b. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
      c. Value of previously stored materials installed as part of the Work after date of previous Application for Payment and on or before date of current Application for Payment.
      d. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
      e. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   2. Materials Stored Off-Site: When approvals are granted by Owner and other required parties, approvals are to be acquired by Construction Manager in writing prior to inclusion in next Application for Payment and such written approvals are to be included with the Application for Payment. Payment requests are to match the written approvals. The written approvals are to include all supporting documentation that was submitted for review to gain approval. Such supporting documentation may include,

but not be limited to, certificates of insurance, bonds, paid invoices and consent of surety to payment.

H. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
   2. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.

I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from Construction Manager, subcontractors, sub-subcontractors, suppliers of materials and equipment, and all performers of Work, labor or services for construction period covered by the previous application.
   1. Include AIA Document G706A, “Contractor’s Affidavit of Release of Liens” with supporting documentation referenced as attached thereto.
   2. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   3. When an application shows completion of an item, submit conditional final or full waivers.
   4. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   5. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

J. Initial Application for Payment: Administrative actions and submittals that must precede submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Construction Manager's construction schedule requirements.
   4. Products list requirements.
   5. Schedule of unit prices.
   6. Submittal schedule requirements.
   7. List of Construction Manager's staff assignments.
   8. List of Construction Manager's principal consultants.
   9. Copies of building permits.
   10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   11. Initial progress report.

K. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work certified as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

L. Final Payment Application: After completing all Project Work and Closeout Requirements, submit final Application for Payment with required releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final Documentation for Minority Business Enterprise.
9. Final liquidated damages settlement statement.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. General Coordination Procedures.
   2. Coordination Drawings.
   3. Building Information Model (BIM).
   4. Requests for Information (RFIs).
   5. Project Meetings.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entities performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including Construction Manager's Project Manager, On-Site Superintendent, and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in project meeting room, in temporary field office, and by each temporary tele-phone. Always maintain list as current.

1.4 GENERAL COORDINATION PROCEDURES

A. Electronic Document Management Service (EDMS): Comply with Section 01 31 26 - Electronic Communication Protocols. Provide an internet-based EDMS for electronic construction management document control, processing, review actions, reporting, communications, and other project documentation.

B. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Construction Manager's construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Project meetings.
   6. Startup and adjustment of systems.
   7. Project closeout activities and requirements.

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

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. Coordination Meetings: In addition to other meetings specified in this Section, Construction Manager is to conduct coordination meetings with personnel and Subcontractors to ensure coordination of Work.

E. Coordinate work as to conceal pipes, ducts, electrical conduit and wiring within construction and in a manner as to not be seen. Exceptions are mechanical rooms and electrical rooms and as otherwise approved in writing by Architect.

F. Coordinate locations of fixtures, outlets, and electrical and data devices with finish elements.

G. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion.

H. After Owner occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of Owner’s activities.

3.2 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and re-solve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      e. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawings Organization: Organize coordination drawings as follows:
   1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
   2. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
   3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
   4. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
   5. Mechanical and Plumbing Work: Show the following:
      a. Sizes and bottom elevations of ductwork, piping, piping slopes, valves, conduit runs, and include insulation, bracing, flanges, and support systems.
      b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts, and electrical distribution equipment.
      c. Fire-rated enclosures around ductwork.
   6. Electrical Work: Show the following:
      a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
      b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
      c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.

d. Location of pull boxes and junction boxes dimensioned from column center lines.

7. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
8. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Construction Manager's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Construction Manager, who shall make changes as directed and resubmit.
9. Coordination Drawings Submittal: Prepare coordination drawings according to requirements and with descriptive titles with logical sequencing numbers. Submit coordination drawings to Architect as follows and in format acceptable to Architect.
   a. Printed Submittal: Submit three (3) paper copies of drawings to Architect as indicated for submittals in Division 01 Section "Submittal Procedures."
   b. Digital Submittal: Submit drawings via the Construction Manager provided Electronic Document Management Service (EDMS) as digital formatted files. This Digital Submittal is in addition to the Printed Submittal and only applies when the Contract Documents require the Construction Manager to provide an Electronic Document Management Service (EDMS).

3.3 BUILDING INFORMATION MODEL (BIM)

A. Construction Manager is to produce a Building Information Model (BIM) for the entire project. Architect's model can be used as a base on which the Construction Manager's BIM can be developed, updated, and integrated into Construction Manager's EDMS.

B. Construction Manager's BIM is to be completed within the following number of days:
   1. Thirty (30) days after the Contract Start Date.

C. Construction Manager's BIM shall be used to interpret the construction documents and analyze all elements of the Coordination Drawing tasks, especially related to clash analysis and systems coordination.

D. Construction Manager's BIM shall be made available to Architect and its consultants, contractors, and sub-contractors for daily use in the field during construction tasks.

E. Construction Manager's BIM is to be incorporated and integrated into the Construction Manager's EDMS - BIM integration program.
   1. Integration program is to be compatible with the project's Electronic Document Management Service EDMS.

F. Construction Manager is to provide tutorial instruction to all major subcontractor forepersons on the use of the BIM model during the construction period. Construction Manager is to provide or require all forepersons to be equipped with an iPad type device to be able to access the coordination drawings and model. Construction Manager is to provide or require wireless access throughout the construction areas for continuous access to BIM information modeling information.

G. Clash detection and coordination shall be done using Navisworks software (or equivalent). Construction Manager shall track clash resolution using a 3D coordination log that includes fields for, at a minimum, clash tolerance, clash name, clash group #, area, level, description, x-y coordinates, responsibility, date identified, open/closed status, date closed, priority, and resolution.

H. Construction Manager shall require trade contractors to model, at a minimum, structural steel, envelope connections, secondary framing, any element that requires seismic bracing,

studs, drywall, ceilings, mechanical, electrical, data, plumbing, gas, fire protection, pneumatic tube, and any racked elements.

1. Trade contractors shall use intelligent 3D modeling software such as Revit.
2. Trade contractor's modeling of steel, connections, and M/E/P/FP/LV systems shall be to LOD 400. Trade contractor's modeling shall be as detailed as necessary to accurately represent the major construction elements being modeled (i.e. curtain wall should not be modeled as a solid wall, but should have separate elements for mullions and glass).

I. Models are to include clearances and access zones for code and for anything requiring a human hand to touch it for operating or maintaining the facility.

1. Trade contractors shall apply the following model standards for models used for clash detection and coordination:
   a. Purge model files of any extraneous 2D references and 3D rogue elements prior to submission.
   b. Keep file size to minimum for application speeds.
   c. Keep text and line work on different layers from 3D components where possible.
   d. Clean up drawings and remove items drawn off to the sides of drawings.
   e. Use separate layers for space constraints.
   f. Detach x-refs from drawings.
   g. Do not draw on the “0” layer.
   h. Change view settings to 2D wireframe.
   i. Place model in top view.
   j. Zoom extents.

J. The combined coordination model for a particular area/zone must be clash free prior to the submission of trade contractor shop drawings. Both the combined coordination models and combined shop drawings shall be signed off by all trade contractors. For projects where structure is being installed in an area before coordination is complete in that area, all sleeve and penetration coordination must be complete prior to full construction coordination, and in time to support the structural installation.

3.4 REQUESTS FOR INFORMATION (RFIs)

A. Requests for Information are to be submitted by the Construction Manager for Designer’s action via the Construction Manager’s Electronic Document Management Service (EDMS).

B. Definition: An RFI is 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, assembly, 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 the Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.

C. Whenever timely and possible, request clarifications at the next appropriate project progress meeting, with response recorded in meeting minutes, rendering unnecessary the submittal of an RFI.

D. Acceptable Uses for RFIs: Construction Manager good faith effort to determine resolution from Contract Documents.

1. Prior to submitting an RFI, carefully study all Contract Documents to confirm that sufficient information for interpretation is not included in Contract Documents.

E. Unacceptable Uses for RFIs: Architect will return unacceptable RFIs without review action. Unacceptable RFIs include the following:
   1. Request for approval of submittals (see Section 01 33 00 - Submittal Procedures).
   2. Request for approval of substitutions (see Section 01 60 00 - Product Requirements).
   3. Request for approval of Construction Manager means and methods (Construction Manager's responsibility).
   4. Requests for coordination information already indicated in the Contract Documents.
   5. Changes in the Work requirements, Contract Time, or Contract Sum (see Section 01 26 00 - Contract Modification Procedures).
   6. Request from other entities controlled by Construction Manager. Do not forward requests which solely require internal coordination between Construction Manager its contract entities.
   7. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response.
   8. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question.
      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.

F. Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Construction Manager shall prepare and submit an RFI in the form specified.
   1. RFI Form: AIA Document G716 with supporting attachments; combined into single PDF format electronic file.
   2. Coordinate and submit RFIs in a prompt manner as to avoid delays in the Work. Failure to submit an RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

G. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name and Architect's Project Number.
   2. Date.
   3. Name of Construction Manager.
   4. Name of Architect.
   5. RFI number, numbered sequentially.
   6. RFI subject.
   7. Specification Section number and title and related paragraphs, as appropriate.
   8. Drawing number and detail references, as appropriate.
   9. Field dimensions and conditions, as appropriate.
   10. Construction Manager's suggested resolution. If Construction Manager's suggested resolution impacts the Contract Time or the Contract Sum, Construction Manager shall state impact in the RFI.
   11. Construction Manager's certification signature attesting to Construction Manager's good faith effort to determine from the Contract Documents information requiring interpretation.
   12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
      a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

H. Architect's Action: Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. on a working day will be considered as received the following working day.
   1. Content of Architect's response to RFIs will not constitute, in any manner, a directive or authorization to perform extra work or delay the project. If Construction Manager believes the Architect's response 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 Proposal (see Section 01 26 00 - Contract Modification Procedures).
   2. Architect's action may include a request for additional information from Construction Manager, in which case Architect's time for response will date from time of receipt of additional information.

I. RFI Log: Maintain current status of RFI's via the Construction Manager provided Electronic Document Management Service (EDMS).

J. Promptly review Architect's response action and provide direction to the affected parties.
   1. If an additional or corrected response is required, notify Architect within seven (7) calendar days of the Architect's response action, by submitting to Architect an amended version of the original RFI, identified as specified above.

3.5 PROJECT MEETINGS - GENERAL

A. Construction Manager is to schedule and conduct meetings and conferences at Project site unless otherwise indicated or agreed upon by Construction Manager, Owner and Architect.

B. Attendees: Inform participants and others involved, and individuals whose presence is required, of the date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

C. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

D. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to relevant parties, including Owner and Architect, within three (3) days of the meeting.

E. Project meetings include, but are not limited to, the following and are indicated with more detail further in this Section.
   1. Preconstruction Meeting.
   2. Site Mobilization Meeting.
   3. Progress Meetings.
   4. Pre-Installation Meetings.
   5. Closeout Meeting.

3.6 PRECONSTRUCTION MEETING

A. Construction Manager is to schedule and conduct a Preconstruction Meeting before starting construction, at a time convenient to Owner and Architect, but no later than fifteen (15) days after execution of the Agreement.

B. Attendees: Participants are to be familiar with the project and authorized to conduct matters related to the Work and project. Attendees include representatives of the following:
   1. Owner and others that may be designated by Owner.
   2. Architect.
   3. Architect's Consultants.
   4. Construction Manager Project Manager and On-Site Superintendent.
   5. Major Subcontractors.
   6. Major Suppliers.

7. Commissioning Authority (if commissioning is required for project).
8. Relevant Utility Providers.
9. Relevant Regulatory Agencies Having Jurisdiction.

C. Agenda: Discuss items of significance that could affect progress and quality of the Work, including the following:
1. Designation of key personnel and their duties.
2. Identification of Construction Manager's Safety Officer.
3. Lines of communications.
4. Status of Owner-Construction Manager Agreement, Bonds and Insurance Certificates.
5. Status of Building Permits.
6. Distribution of the Contract Documents.
7. Owner's occupancy requirements.
8. Limits of construction areas and restrictions for environmentally protected areas.
9. Restrictions regarding on-site presence of firearms and use of tobacco products.
10. Working restrictions.
11. Working hours.
12. Tentative construction schedule, including Contract Start Date, Contract Milestones and Contract Completion Date.
13. Procedures for processing field decisions and Change Orders.
14. Procedures for RFIs.
15. Procedures for testing and inspecting.
16. Commissioning activities (if commissioning is required for project).
17. Procedures for processing Applications for Payment.
18. Submittal schedule and procedures.
19. Critical work sequencing and long-lead items.
20. Responsibility for temporary facilities and controls.
21. Procedures for moisture and mold control.
22. Construction waste management and recycling.
23. Office, work, parking, staging and storage areas.
24. Equipment deliveries and priorities.
25. On-Site and Site Access Traffic Control.
26. Protocol for emergency events and first aid.
27. Security.
28. Progress cleaning.
29. Procedures for maintaining Construction Manager as-built drawings and specifications documentation.
30. Project closeout and submission of closeout items and record documents.

3.7 SITE MOBILIZATION MEETING

A. Construction Manager is to schedule and conduct a Site Mobilization Meeting before Construction Manager occupancy of site. If Owner and Construction Manager agree, meeting may be conducted jointly within the Preconstruction Meeting.

B. Attendees: Participants are to be familiar with the project and authorized to conduct matters related to the Work and project. Attendees include representatives of the following:
1. Owner and others that may be designated by Owner.
2. Architect.
3. Construction Manager Project Manager and On-Site Superintendent.
4. Major Subcontractors.
5. Commissioning Authority (if commissioning is required for project).
6. Relevant Utility Providers, (if services required during mobilization).
7. Relevant Regulatory Agencies Having Jurisdiction.

C. Agenda: Discuss items of significance and including the following:
   1. Mobilization schedule.
   2. Use of premises by Owner and Construction Manager.
   3. Owner requirements.
   4. Site access.
   5. Erosion control including measures at site entrances.
   6. Construction facilities and controls.
   7. Temporary utilities.
   8. Survey and building layout.
   9. Security and housekeeping procedures.
   10. Procedures for testing.
   11. Procedures for maintaining Construction Manager as-built (record) drawings and specifications documentation.
   12. Requirements for start-up of equipment.
   13. Inspection and acceptance of equipment put into service during construction period.

3.8 PROGRESS MEETINGS

A. Construction Manager is to schedule and conduct Progress Meetings throughout progress of the Work at regularly scheduled interval as follows:
   1. Once monthly.

B. Attendees: Participants are to be familiar with the project and authorized to conduct matters related to the Work and project. Attendees include representatives of the following:
   1. Owner and others that may be designated by Owner.
   2. Architect.
   3. Architect’s Consultants.
   4. Construction Manager's Project Manager and On-Site Superintendent.
   5. Other relevant parties involved or concerned with current Work progress, or involved in planning, coordination, or performance of future activities. Depending on scheduled activities and phase of Work types, such parties may include the following:
      a. Major Subcontractors.
      b. Major Suppliers.
      c. Commissioning Authority (if commissioning is required for project).
      d. Relevant Utility Providers.
      e. Relevant Regulatory Agencies Having Jurisdiction.

C. Agenda: Include topics for discussion as appropriate to status of Project.
   1. Review and correct or approve minutes of previous progress meeting.
   2. Review of Work progress.
      a. Review pertinent videos/photographs of the Work.
      b. Review construction schedule and completion.
      c. Review corrective action planned to recover activities that are behind schedule.
      d. Review planned progress during succeeding work period.
      e. Coordination of projected progress.
   3. Review Owner provided work and items.
   4. Field observation reports.
   5. Status of corrections to deficient Work.
   6. Progress cleaning.
   7. Identification of problems that impede, or will impede, planned progress.
   8. Review status of submittals, requests for information, supplemental information, change proposals, change orders and pending claims/disputes.
   9. Maintenance of quality and work standards.
   10. Effect of proposed changes on construction schedule and coordination.
   11. Other contract related activities.

D. Drone Aerial Flight Video: For each Progress Meeting, Construction Manager is to produce and provide for viewing, an aerial video of the project indicating progress, status, and pertinent aspects of the Work. Video is to be produced from a choreographed camera-equipped drone flight, produced no more than two (2) days prior to the Progress Meeting. The video is to be used at each meeting in conjunction with specific area photographs to provide an overview of the project status and progress. Video is to be uploaded to the EDMS for archive and viewing by Owner, Architect, and Architect's consultants.

3.9 PRE-INSTALLATION MEETINGS

A. Construction Manager is to schedule and conduct pre-installation meetings at project site prior to commencing Work of specific section. Work requiring pre-installation meeting is indicated in individual specification sections.

B. Require attendance of parties directly affecting, or affected by, Work of specific section.

C. Notify Owner and Architect seven (7) days in advance of meeting date.

D. Prepare agenda and conduct meeting:
   1. Review conditions for installation, preparation, and installation procedures.
   2. Review coordination with related and adjacent work.

3.10 CLOSEOUT MEETING

A. Construction Manager is to schedule and conduct Project Closeout Meeting sufficiently advanced in time to prepare for requesting Substantial Completion Inspection.

B. Attendees: Participants are to be familiar with the project and authorized to conduct matters related to the Work and project. Attendees include representatives of the following:
   1. Owner and others that may be designated by Owner.
   2. Architect.
   3. Architect’s Consultants.
   4. Construction Manager Project Manager and On-Site Superintendent.
   5. Commissioning Authority (if commissioning is required for project).
   6. Others appropriate to closeout matters.

C. Agenda: Items to review include, but are not limited to, the following:
   1. Review Section 01 77 00 - Closeout Procedures.
   2. Construction Manager's inspection of Work.
   3. Start-up of facilities and systems.
   4. Commissioning of Work and systems (if commissioning is required for project).
   5. Testing, adjusting, and balancing.
   6. System demonstration and training for Owner.
   7. Inspections by authorities having jurisdiction.
   8. Final surveys.
   9. Certificate of Occupancy from Authority Having Jurisdiction.
   10. Transfer of insurance responsibilities.
   11. Final cleaning.
   12. Closeout Submittals: Including, but not limited to, the following:
      a. Project Record Documents.
      b. Architect’s and Owner’s disposition regrading approved physical samples.
      c. Operating and Maintenance Manuals.
      d. Warranties Manual.
      e. Spare parts, special tools, operating, maintenance, and extra stock materials.
      f. Keys.
      g. Affidavits.

13. Construction Manager preparation and distribution of Construction Manager's comprehensive punch list.
14. Procedure to request Architect inspection to determine date of Substantial Completion.
15. Completion time for correcting deficiencies.
16. Partial release of retainage.
17. Preparation for final inspection.
18. Final Application for Payment package components including affidavits and other require documents.
19. Construction Manager's demobilization from Site.
20. Archiving and submittal of data using the Construction Manager provided Electronic Documents Management Service (EDMS).
21. Maintenance.

END OF SECTION

SECTION 01 31 26

ELECTRONIC COMMUNICATION PROTOCOLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Electronic Document Management Service (EDMS).

1.3 DEFINITIONS

A. Digital Media Device: Digital media drive device, readable with current Microsoft operating system software.

B. EDMS: Electronic Document Management Service. EDMS is a system for electronic document management, control, and communications between the Construction Manager, Owner, Architect, Architect's consultants, and other project-related consultants approved by the Owner.

C. PDF: Portable Document Format electronic file.

D. Post: To transmit, upload or submit, data or documents to the EDMS for the purposes of review, review actions, record maintenance, logging, documentation, or other reasons for making the information available for remote access electronically.

1.4 SUBMITTALS

A. Product Data: A minimum of five (5) days prior to the Preconstruction Meeting, submit data describing the EDMS. Include information regarding the navigation dashboard and various logs; notification features; procedures regarding upload of files, data, and review actions; log types; accessibility; archive download procedures and navigation functionality of the archive product; video illustrating basic features and usage; and user instruction manual.

1.5 CLOSEOUT SUBMITTALS

A. After project acceptance and prior to final payment, submit a digital archive of the EDMS in accordance with requirements indicated in the DIGITAL ARCHIVE article in this Section.

1.6 COORDINATION

A. At the Preconstruction Meeting, Construction Manager is to provide to Owner and Architect a list of persons (users) Construction Manager will be providing access to and usage of the EDMS. List is to include user's name, company name, trade, email address, phone number and purpose for providing user access to EDMS. At minimum, this will include the Construction Manager's Project Manager, Superintendent(s) and other technical staff as required. These personnel shall have sufficient computer skills required to access, use, and troubleshoot the Construction Manager provided EDMS. Within the list, identify the Construction Manager's primary and secondary persons that users are to contact with questions and requests regarding the EDMS.
   1. Owner and Architect will follow-up by providing Construction Manager with list of persons and consultants whose rolls will require access to and usage of the EDMS.

PART 2 PRODUCTS

2.1 ELECTRONIC DOCUMENT MANAGEMENT SERVICE (EDMS)

A. "PROCORE" project management software application.

PART 3 EXECUTION

3.1 ELECTRONIC DOCUMENT MANAGEMENT SERVICE (EDMS)

A. The Construction Manager is to provide an Electronic Document Management Service (EDMS) for electronic construction management document control and communications between the Construction Manager, Owner, Architect, and other project-related consultants. Unless otherwise designated by the Owner, the system will be maintained and owned by the Construction Manager, but operated collaboratively by the approved users. The EDMS that the Construction Manager provides must be approved by the Owner and Architect. The Construction Manager is responsible for providing training for all approved users on how to use the EDMS at no additional costs to the Contract.

B. The Construction Manager is to work collaboratively with the Architect to set up and configure the EDMS system to set up project folders and access consistent with the Architect’s desired project management structure.

C. The Construction Manager is primarily responsible for the scanning, uploading, and logging of all electronic documents for the project.

D. The Construction Manager is to provide sufficient personnel and equipment as required by its staff, subcontractors, suppliers, etc., to electronically submit and upload all necessary documents. This requirement includes personnel and equipment as required for field/jobsite execution.

E. Project Management Software Application(s):
   1. Provide web-based EDMS for digital access to current project management information associated with the project, including, but not limited to, the following:
      a. Submittals, Shop Drawings, and Samples.
      b. Requests for Information.
      c. Designer Supplemental Instructions.
      d. Requests for Proposals.
      e. Change Proposals.
      f. Change Orders and Allowance Disbursement Documentation.
      g. Meeting Reports.
      h. Agency Reports.
      i. Safety Logs.
      j. Applications for Payment.
      k. Monthly Weather Reports.
      l. Deficiency Reports.
      m. Designer Field Observation Reports.
      n. Punch Lists.
      o. Construction Documents.
      p. Specifications.
      q. Project Drawings.
      r. Progress Schedules.
      s. Project Photographs and Videos.
      t. Construction Manager's Building Information Model (BIM).
      u. Other documentation as may be required by Architect or Owner.

v. Other pertinent information associated with the Contract Documents.
w. Project Closeout Documents: Digital version (duplication) of required closeout documentation. This digital version archive does not relieve Construction Manager from providing all physical paper copy and manual submissions of closeout documentation indicated in the Contract Documents.

2. The Construction Manager shall provide adequate programming expertise to organize and manage the EDMS program and contents.

F. Documents posted are to be in PDF format and posted to EDMS that receives, logs and stores documents; provides for review processing and markup actions; electronic action stamping and signatures; and provides email notifications to responsible parties of posted documents available and requiring actions of responsible parties in the work-flow sequence.
1. Establish the types and categories of documentation (logs) that will be maintained on the web-based submittal service. Logs will include those indicated in this Section and other logs may be added as may be required by the Architect or Owner.
2. It is Construction Manager's responsibility to submit documents in PDF format.
3. Construction Manager, Subcontractors, Suppliers, Owner, Architect and Architect's consultants are to be permitted to use the submittal service at no extra charge.
4. Users of the project management software need an email address, internet access, and PDF review software that includes ability to mark-up and apply electronic action stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the submittal service provider.
5. Submitted paper documents and emailed documents will not be reviewed unless Architect has pre-approved, in writing, that select and specific submittals are to be submitted in a manner other than the EDMS. In such case of Architect’s written approval, the submitted documents and review results are still to be documented by Construction Manager in proper sequence within the EDMS as a matter of record.
6. In the case of submissions of physical samples for product characteristic selections (e.g. colors, finishes and other characteristics), the items are to be physically shipped to the required recipient and, on the same day, Construction Manager is to upload a detailed description of the items and Construction Manager’s review actions to the appropriate EDMS log for tracking and documentation purposes. Same-day EDMS logging and physical shipping is important for accuracy of tracking.
7. Cost: The cost of the EDMS is to be paid by Construction Manager.
   a. Construction Manager to pay all licensing and access fees, and distribute the required software for individual access to the following:
      1) Owner’s Representatives (3 persons).
      2) Architect (3 persons).
      3) Architect’s Structural Consultant (2 persons).
      4) Architect’s MEP/FP Consultant (4 persons).
      5) Architect’s Civil/Site Consultant (2 persons).
      6) Technology Consultant (2 persons).
      7) Architect’s Kitchen Equipment Consultant (1 person).
      8) Commissioning Authority (1 person).
      9) Others that may be required by Architect or Owner (3 persons).
   b. Construction Manager to acquire email addresses from proposed users for the purpose of establishing user access and usability.
8. Training: Construction Manager to provide, schedule and participate in a two (2) hour, web-based training session for all users; further training is the responsibility of the individual user of the service.

3.2 DIGITAL ARCHIVE

A. After Project Completion and prior to Final Payment, submit a digital archive of the historical documentation maintained on the EDMS to Owner and Architect for their separate records.

1. Prior to digital archive download process:
    a. Verify that logs are complete with all final documents and reviews having been uploaded.
    b. Coordinate with the Architect and Owner to verify that the documentation is ready for archiving process.
    c. Do not terminate the Owner's and Architect's user access to the EDMS until verification that both have received the fully operational digital archive.
2. Coordinate with EDMS technical support to acquire comprehensive download of digital archive files, logs and navigational portal (dashboard).
3. Submission Format: Digital Media Device.
    a. Label digital media device to include Owner name, project name, Owner's project number, Construction Manager's name and contact information, Architect company name, EDMS company name and contact information, date and time the archive was downloaded, and list of logs included on digital media device.
    b. Digital archive shall include a HTML file that provides a navigation portal (dashboard) that operates and appears the same as did the web-based service user portal. The navigation portal shall include a hyperlinked list of all logs for Activity Summary view and Full Log view and shall include hyperlinks to view the Project Team view and Event History view. The views for each of the logs shall include viewing windows, with hyperlinks to the documentation files, as it appeared in the respective log views on the web-based service.
    c. Digital archive shall include all documentation, data, hyperlinks, and navigational portal to operate on a PC based system and without additional applications, software, or internet access.
4. Submit the digital archive to the Owner and Architect and verify that each digital archive is operating properly prior to termination of the EDMS. Acquire written approval from Owner for termination of the EDMS.

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
      a. Startup Construction Schedule.
      b. Construction Manager's Construction Schedule.
      c. Schedule Updating.
      d. Daily Construction Reports.
      e. Site Condition Reports.

B. Related Requirements:
   1. Division 01 Section “Administrative Requirements”.

1.3 DEFINITIONS

A. Activity: A distinct part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Contract Start Date: The date of Commencement of the Work as established by the provisions of the Contract.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

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

1.4 INFORMATIONAL SUBMITTALS

A. All schedules, reports, and submittals to be uploaded to the Construction Manager provided Electronic Documents Management Service (EDMS) at times indicated.
   1. Refer to Division 01 Sections “Administrative Requirements” and “Electronic Communication Protocols” regarding EDMS.

B. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file.
   2. PDF electronic file.
   3. Color paper copy where hard copy indicated.

C. Startup Construction Schedule.
   1. For scheduling that requires cost-loaded activities, the Startup Construction Schedule will not constitute approval of schedule of values for cost-loaded activities.

D. Construction Manager's Construction Schedule: Submit as indicated in the CONSTRUCTION SCHEDULE article of this Section.

E. Construction Schedule Updating Reports: Submit as indicated in the CONSTRUCTION SCHEDULE article of this Section.

F. Daily Construction Reports: Maintain on site; to be submitted upon request from Owner or Architect.

G. Site Condition Reports: Submit at time of discovery of differing site conditions.

1.5 QUALITY ASSURANCE

A. Scheduler: Construction Manager's personnel or consultant specializing in CPM scheduling with five (5) years minimum experience in scheduling construction work of complexity comparable to this Project and having use of computer facilities capable of delivering detailed graphic printout and electronic upload within 48 hours of request.

B. Construction Manager's Administrative Personnel: Two years minimum experience in using and monitoring CPM schedules on comparable projects.

1.6 COORDINATION

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

1.7 SCHEDULING REQUIREMENTS

A. Time Frame:
   1. Extend schedule from Contract Start Date to Date of Substantial Completion.
      a. Further extend schedule to indicate activities required from Substantial Completion to Final Completion.
      b. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Network Analysis Diagrams: Prepare diagrams using activity-on-node (AON) format.

C. Use "one day" as the unit of time for individual activities. Indicate nonworking days and holidays scheduled within the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Prepare a network analysis diagram to identify probable critical paths.
   1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include, without limitation, the following activities with estimated time durations:
      a. Preparation and processing of submittals.
      b. Mobilization and demobilization.
      c. Purchase of materials.
      d. Delivery.
      e. Fabrication.
      f. Utility interruptions.
      g. Installation.
         1) Installation durations exceeding 21 days are to be divided into multiple activities as logical construction portions of installation.
      h. Work by Owner that may affect or be affected by Construction Manager's activities.
      i. Testing and commissioning.
         1) Provide sufficient duration for testing and certification of commissioning requirements to be completed prior to Substantial Completion.
      j. Inspections by Authorities Having Jurisdiction.
      k. Certificate of Occupancy.
      l. Closeout Activities.
      m. Preparation and submittal of closeout and record documents.
      n. Substantial Completion Inspection.
      o. Certification of Substantial Completion.
      p. Completion of incomplete Work and deficiencies.
      q. Final Inspection.
   2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
   3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
   4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
      a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start - total float". Identify critical activities. Prepare tabulated reports showing the following:
   1. Contractor or subcontractor and the Work or activity.
   2. Description of activity.
   3. Main events of activity.
   4. Immediately preceding and succeeding activities.
   5. Early and late start dates.
   6. Early and late finish dates.
   7. Activity duration in days.
   8. Total float or slack time.
   9. Average size of workforce.

10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with revising the schedule, prepare tabulated reports showing the following:
   1. Identification of activities that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   4. Changes in activity durations in days.
   5. Changes in the critical path.
   6. Changes in total float or slack time.
   7. Changes in the Contract Time.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 STARTUP CONSTRUCTION SCHEDULE

A. Within ten (10) days of the Contract Start Date, Construction Manager is to prepare and submit Startup Construction Schedule, including network diagram. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
   1. Submit updated startup construction schedule with each Application for Payment.
   2. Submit number of opaque reproductions Construction Manager requires, plus two copies Architect will retain.

3.2 CONSTRUCTION SCHEDULE

A. Prepare and submit Construction Manager's Construction Schedule, including a time-scaled CPM network analysis diagram for the Work.

B. Within thirty (30) days of the Contract Start Date, prepare and submit a draft of proposed Construction Manager’s Construction Schedule for review. Include written certification that major subcontractors have reviewed and accepted proposed schedule.
   1. Submit number of paper color reproductions Construction Manager requires, plus two copies Architect will retain.

C. Within fifty (50) days of the Contract Start Date, prepare and submit the final Construction Manager’s Construction Schedule including completed network analysis consisting of network diagrams and mathematical analysis. Include written certification that major subcontractors have reviewed and accepted proposed schedule.
   1. Submit number of paper color reproductions Construction Manager requires, plus two copies Architect will retain.

D. Failure to include any work item required for performance of the Contract shall not excuse Construction Manager from completing all work within applicable completion dates, regardless of Architect's or Owner’s review of the schedule.

E. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.

F. Establish procedures for monitoring, recording progress and updating Construction Manager’s Construction Schedule.

G. Construction Schedule Updating Reports: At monthly intervals, update schedule to reflect actual construction progress and activities. Submit updated schedule one week before each project Progress Meeting.
   1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Submit updated schedule concurrently with the report of each such meeting and include updated schedule in submittal of each Application for Payment.
   2. As the Work progresses, indicate final completion percentage for each activity.

H. Distribution:
   1. Submit approved schedule to parties requiring schedule information and to Owner, Architect, testing and inspecting agencies, and other parties identified by Owner.
   2. Post paper color copies in project meeting room(s) and temporary field offices.
   3. When revisions are made, submit updated schedules to the same parties and post in the same locations referenced above.
   4. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.3 REPORTS

A. Maintain and submit as indicated in this Section.

B. Daily Construction Reports: Prepare and maintain on site a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. Approximate count of personnel at Project site.
   3. Equipment at Project site.
   4. Material deliveries.
   5. High and low temperatures, general weather conditions and precipitation amounts.
   6. Accidents.
   7. Meetings and significant decisions.
   8. Unusual events.
   9. Stoppages, delays, shortages, and losses.
   10. Emergency procedures.
   11. Orders and requests of authorities having jurisdiction.
   12. Testing scheduled; indicate results and cancelations.
   13. Inspections scheduled; indicated results and cancelations.
   14. Change Orders received and implemented.
   15. Construction Change Directives received and implemented.
   16. Utility services connected and disconnected.
   17. Equipment or system tests and startups.
   18. Partial completions and occupancies.
   19. Substantial Completion certification.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit as a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative, procedural, and other requirements that include:
   1. Submittal Schedule.
   2. Submittal Administrative Requirements.
   3. Submittal Procedures.
   4. Types of Submittals.
   5. Delegated Design Services.

B. Related Requirements:
   1. Division 01 Section “Electronic Communication Protocols”.
   2. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including project construction schedule.
   4. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   5. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   6. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals not indicated in individual Specification Sections as "informational submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is for the Construction Manager to demonstrate the way by which the Construction Manager proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals.
   1. The Construction Manager shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect’s approval of Shop Drawings, Product Data, Samples, or similar submittals unless the Construction Manager has specifically informed the Architect in writing of such deviation at the time of submittal and one of the following written authorizations:
      a. The Architect has given written approval to the specific deviation as a minor change in the Work.

b. A Change Order or Construction Change Directive has been issued authorizing the deviation.

2. The Construction Manager shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by the Architect's approval thereof.

D. Contract Start Date: The date of Commencement of the Work as established by the provisions of the Contract.

E. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users can access files.

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

1.4 SUBMITTAL SCHEDULE

A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate Submittal Schedule with list of subcontracts, the schedule of values, and construction schedule.
2. Initial Submittal: Submit concurrently with submittal of the Startup Construction Schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the submittal of Construction Manager's Construction Schedule.
    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action Submittal or Informational Submittal.
    d. Name of subcontractor and/or supplier.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Progress Schedule construction activity description and number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Comply with 01 31 26 - Electronic Communication Protocols regarding electronic submission requirements for submittals indicated in this Section.

B. Transmit/post each submittal with Architect accepted form.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
5. All submittals requiring color and finish selections will not receive Architect's review action until all such submittals (e.g. material, color, finishes samples and other related requested information) have been received by the Architect.
    a. Architect will assemble final color board(s) for Owner's approval of exterior and interior materials and color schemes prior to Architect's issuance of review action to Construction Manager.

D. Processing Time: Allow time for submittal review, including time for resubmittals. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Single Reviewer: Allow 15 days for each review of each submittal, and each resubmittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Construction Manager when a submittal being processed must be delayed for coordination.
2. Sequential Reviewers: Allow 21 days for each review of each submittal, and each resubmittal when sequential review of submittals by Architect's consultants, Owner, or other parties is required.
3. Submittals Requiring Color Selection: Coordinate and provide timely submission of all submittals requiring color selection for the project's exterior and interior. Architect's review of such submittals will not be completed until all such submittals are received. The purpose is to promote a fully coordinated color/finish scheme for the overall project. Where color selection charts are allowable for Initial Selection, such materials shall be manufacturer's original printed material.
4. In submittal log, provide review action column for each required reviewer such as Architect’s consultants and other parties. Position the Architect's consultant review action columns in the log prior to the Architect’s review action column, reflecting the sequence of reviews.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed/bookmarked file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
    a. File name shall use abbreviated project identifier; hyphen and Specification Section number; hyphen and two-digit sequential number; hyphen and two-digit resubmittal sequential number. (e.g. MBMS-013300-01-00).
3. Apply Construction Manager review action 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 requirements of the Work, Contract Documents, and the Submittal requirements.

4. Provide means for insertion to permanently record review and approval markings of Construction Manager and action taken by Architect.
5. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect, containing the following information:
    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of subcontractor, manufacturer, and supplier.
    f. Category and type of submittal.
    g. Submittal purpose and description.
    h. Specification Section number and title.
    i. Specification paragraph number or drawing designation and generic name for each of multiple items.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Related physical samples submitted directly.
    m. Transmittal number, numbered consecutively.
    n. Submittal and transmittal distribution record.
    o. Other necessary identification.
    p. Remarks.

F. Options: Identify options requiring selection by Architect.

G. Deviations: Conspicuously mark deviations, including minor variations and limitations, from the Contract Documents to include an itemization number. On an attached separate sheet, prepared on Construction Manager's letterhead, record each deviation itemization number and provide an explanation for each deviation and its impact on the Work and the Contract Documents.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval action stamp from Construction Manager and Architect.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Upload/post electronic submittals as PDF electronic files directly to the Construction Manager provided internet-based submittal service specifically established for Project.
    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

B. Product Data: Each element of construction, product, and equipment is to be compiled into a Product Data submittal.
1. If information must be specially prepared for submittal because standard published data is not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Statement of compliance with specified referenced standards.
    d. Testing by recognized testing agency.
    e. Application of testing agency labels and seals.
    f. Notation of coordination requirements.
    g. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

D. Samples: Submit actual physical Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects requiring electronic submittals, provide (upload) corresponding electronic version of the physical submittal that is transmitted to Architect. This purpose is to provide continuity and completeness of the electronic recording and tracking of project submittals. The electronic upload is to include digital image files of all materials and data (including copy of the transmittal) as was transmitted to Architect. Include digital images of the physical items submitted and the identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
5. Samples for Initial Selection: Submit manufacturer's color charts or samples consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected and retain one sample for record.
    b. Finish Characteristics Options: Options include ranges of colors, textures, patterns, and other finish appearance characteristics. Contract sum is to include Architect or Owner selections from ranges indicated to be submitted.
        1) Full Range: Includes all finish characteristics available except Custom options. Full range includes Standard and Premium finish characteristics.
        2) Custom Options: All finish characteristics available and includes Custom finishes.
6. Samples for Verification: Submit samples of the Architect’s initial selection action for the Architect to make final selection action. Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: Partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned to Construction Manager.
        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
    1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Construction Manager if none is indicated.
    2. Manufacturer and product name, and model number if applicable.
    3. Number and name of room or space.
    4. Location within room or space.

F. Comply with requirements indicated in the Contract Documents regarding the following:
    1. Coordination Drawing Submittals.
    2. Construction Manager’s Construction Schedule.

3. Application for Payment and Schedule of Values.
4. Test and Inspection Reports and Schedule of Tests and Inspections Submittals.
5. Closeout Submittals and Maintenance Material Submittals.
6. Maintenance Data.
7. LEED and/or Other Sustainable Design Submittals.

G. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

H. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

I. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

J. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

K. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

L. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

M. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

N. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

O. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

P. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

Q. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

R. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

S. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

T. Other Submittal Requirements: Include requirements indicated in specific Sections.

2.2 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
   2. The responsible design professional shall be licensed to provide the related design services in the State in which the project is located.

PART 3 EXECUTION

3.1 REVIEW AND ACTION

A. Construction Manager’s Review:
   1. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. For submittals that are compliant with the contract requirements, mark with approval stamp before submitting to Architect.
      a. If project is being constructed by Construction Manager delivery, contractors and subcontractors are to submit submittals to Construction Manager. Construction Manager is to complete its review approval prior to submitting to Architect.
   2. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 - General Requirements regarding project closeout and maintenance material submittals.
   3. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Construction Manager's approval indicating and certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

B. Architect Review:

1. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action. The Architect will review and approve, or take other appropriate action upon, submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Construction Manager as required by the Contract Documents. The Architect's review of the submittals shall not relieve the Construction Manager of compliance with the requirements of the Contract Documents. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
2. Informational Submittals: Architect will review each submittal and will not return it; or, will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
3. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review. Submittals that are not marked as approved by the Construction Manager are incomplete submittals.
4. Submittals not required by the Contract Documents may be returned by the Architect without action.
5. Architect requires all exterior and interior material color samples to be submitted prior to final approval of color choices on the project. Exterior color samples will be reviewed and approved separately from interior color samples. Construction Manager must review all color sample submittal format and requirements to avoid resubmittals. Delays due to the failure to procure and submit color samples is the responsibility of the Construction Manager.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Construction Manager of responsibility for compliance with the Contract Document requirements.
   1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Construction Manager's other quality assurance and quality control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Construction Manager to provide quality assurance and quality control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:
   1. Division 01 Section "Allowances" for testing and inspecting allowances.
   2. Divisions 03 through 33 Sections for specific test and inspection requirements.

1.3 REFERENCES

A. Referenced Standards: For products or workmanship specified by reference to a document or documents not included in the Project Manual, comply with requirements of the standard, except when more rigid and/or stringent requirements are specified or are required by applicable codes. Such specified exceptions and applicable codes do not nullify requirement for compliance with other requirements within the referenced standard. Documents referred to are product or workmanship standards established by and published by Associations, Trades, Organizations, or other groups that establish consensus quality standards.

B. Issuance Date of Reference Standards: Comply with reference standard by date of issue current on date of Contract Documents, except where specific date is established by applicable code. Issuance date is also known as edition date or version date.
   1. Reapproved and Reapproval Dates: Comply with all the changes, amendments, modifications, and other such requirements established as part of the reapproved Reference Standard.

C. When specified reference standard conflicts with Contract Documents, request clarification from Architect before proceeding.

D. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in reference standard documents.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum number (as indicated in individual specification sections) of previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Installer/Applicator/Erector: Contractor or another entity engaged by Construction Manager as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
   1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
   2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

G. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

H. Source Quality Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

I. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.6 INFORMATIONAL SUBMITTALS

A. Construction Manager's Quality Control Plan: For quality assurance and quality control activities and responsibilities.

B. Qualification Data: For Construction Manager's quality control personnel.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality control service.

1.7 QUALITY CONTROL PLAN

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

B. Quality Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality assurance and quality control procedures similar in nature and extent to those required for Project.
1. Project quality control manager shall not have other Project responsibilities.

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

D. Testing and Inspection: In quality control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Construction Manager-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Construction Manager-elected tests and inspections.

2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.

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

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

1.8 REPORTS AND DOCUMENTS

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

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

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.

3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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

1.9 TESTING AND INSPECTION SERVICES

A. Owner will employ and pay for specified services of an independent firm to perform testing and inspection unless noted otherwise.

B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Owner or Architect.
1. Laboratory: Authorized to operate at Project location.
2. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Testing, inspections, and source quality control may occur on or off project site. Perform off-site testing as required by Owner or Architect.

D. Reports will be submitted by independent firm to Owner, Construction Manager and Architect in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Also, independent firm will submit reports to Authorities Having Jurisdiction (AHJ) when required by AHJ’s.
1. Submit final report indicating correction of Work previously reported as non-compliant.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
1. Notify Architect and independent firm 24 hours prior to expected time for operations requiring services.
2. Make arrangements with independent firm and pay for additional samples and test required for Construction Manager's use.

F. Testing and employment of testing agency or laboratory shall not relieve Construction Manager of obligation to perform Work in accordance with requirements on Contract Documents.

G. Construction Manager is to monitor costs incurred for testing and inspections services by the Owner's hired third-party entity(s). When project Work is 75 percent complete, provide written notification to Owner and Architect indicating the following:
1. Percentage of project Work completed.
2. Total amount Owner has incurred for testing and inspection services to date.
3. List of additional testing and inspections Construction Manager expects to be required, along with estimated costs, for completion of the project Work.

H. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Owner or Architect. Payment for re-testing or re-inspections will be charged to Construction Manager by deducting testing charges, and other costs directly related to re-testing or re-inspection, from Construction Manager’s Contract Sum/Price.

I. Agency Responsibilities:
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 Owner, Architect and Construction Manager of observed irregularities or non-conformance of Work products.
6. Perform additional tests required by Owner or Architect.
7. Attend preconstruction meetings and progress meetings.

J. Agency Reports: After each test or inspection, promptly submit reports by way of electronic or hard-copy transmission to Owner, Construction Manager and Architect. Also, submit reports to Authorities Having Jurisdiction (AHJ's) when required by AHJ's. Reports are to include the following:
1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product, specifications section and other related Contract requirements.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of test.
10. Conformance with Contract Documents.
11. When requested by Owner or Architect, provide a more detailed interpretation of test or inspection results.

K. Limits On Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency of laboratory may not assume duties of Construction Manager.
4. Agency or laboratory has no authority to stop the Work.

1.10 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing

engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections may require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Labeling: Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
   1. Label Information: Include manufacturer’s or fabricator’s identification, approved agency identification, and the following information, as applicable, on each label.
      a. Model number.
      b. Serial number.
      c. Performance characteristics.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
   2. Notify Architect seven (7) days in advance of dates and times when mockups will be constructed.
   3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
   4. Demonstrate the proposed range of aesthetic effects and workmanship.
   5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      a. Allow seven (7) days for initial review and each re-review of each mockup.
   6. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   7. Where mockup has been accepted by Architect and is specified in product specification sections to be removed; remove mockup and clear area when directed to do so by Architect.

1.11 QUALITY CONTROL

A. Owner Responsibilities: Where explicitly indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform quality control services including, but not limited to, tests and inspections.
   1. Owner will furnish Construction Manager with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Construction Manager.

B. Construction Manager Responsibilities: Where not explicitly indicated as Owner's responsibility, Construction Manager will engage a qualified testing agency to perform quality control services including, but not limited to, tests and inspections. Also, Construction Manager is to perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Construction Manager by authorities having jurisdiction, whether specified or not.
   2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
   4. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
   5. Testing and inspecting requested by Construction Manager and not required by the Contract Documents are Construction Manager's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Construction Manager's responsibility, provide quality control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Construction Manager in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Owner, Architect, Commissioning Authority, and Construction Manager promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Construction Manager.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Construction Manager.

G. Tolerances: Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
1. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
2. Adjust products to appropriate dimensions; position before securing products in place.

H. Quality Control of Work and Installation: Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
1. Comply with manufacturers' instructions, including each step, in sequence.
2. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
3. 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.
4. Perform Work by persons qualified to produce required and specified quality.
5. Verify field measurements prior to fabrication of products.
6. Verify field measurements are as required prior to beginning installation of Work.
7. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

I. Coordination: Coordinate sequence of activities to accommodate required quality assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

J. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare and maintain a record of tests and inspections that includes the following:
1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Owner's and Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Cutting and patching requirements are to comply with the Contract Documents.

B. Protect construction exposed by or for quality control service activities.

C. Repair and protection are Construction Manager's responsibility, regardless of the assignment of responsibility for quality control services.

3.3 SCHEDULE OF MOCKUPS

A. Exterior Wall Mockup:
   1. Provide mockup as indicated on Drawings. Mockup construction is to be separate from project final construction and is to be removed from project site after Construction Manager acquires approval for removal from Architect.

B. Interior Room Mockup:
   1. Provide mockup of the following room:
      a. Room: Typical Classroom.
   2. Final schedule and progressive installation of work and finishes for approval to be coordinated between the Architect, Owner, and Construction Manager. It is not expected that the entire mockup be completed prior to review and approval. The intent is to allow for an incremental assessment of the intended level of workmanship and compliance prior to the overall project installation of the products and finishes as deemed necessary by the Architect.
   3. Mockup requirements are to be installed and approved by the Owner and Architect. Work completed in the room mockup shall be incorporated into the final work upon approval.
   4. Room Mockup Scope:
      a. All work requirements within the room are to be installed as part of the mockup.

END OF SECTION

SECTION 01 45 00

INSPECTION REQUIREMENTS

PART 1 GENERAL

Architect of Record: Eric Lindstrom, AIA, LEED AP – SfL+a Architects, PA
Structural Engineer of Record: Timothy Hilton, P.E. – Bennett & Pless
Building Official: Lenoir County

This Statement of Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the 2018 North Carolina State Building Code. It includes a Schedule of Special Inspection Services applicable to this project. The name of the Inspector(s) and the identity of other approved agencies intended to be retained for conducting these inspections will be released by the owner following the bid opening.

The Inspector(s) shall keep records of all inspections and shall furnish inspection reports to the Owner, Structural Engineer, and Architect of Record. A copy of all reports shall be kept on site at the contractor's trailer. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Owner, Structural Engineer and Architect of Record. The Inspections program does not relieve the Contractor of his or her supervision or inspection responsibilities.

The Contractor is responsible for notifications to Inspector and/or other agencies as required at least two days is advance. The Contractor is responsible for all additional costs incurred by failure to meet requirements or pass any/all inspections and/or testing as required in this section.

Interim reports shall be submitted to the Owner, Structural Engineer and Architect of Record.

Interim Report Frequency: Monthly

A Final Report of Inspections documenting completion of all required Special Inspections and correction of any discrepancies should be submitted prior to issuance of a Certificate of Use and Occupancy.

Job Site safety and means and methods of construction are solely the responsibility of the Contractor.

1.1 ITEMS REQUIRING IBC CHAPTER 1 INSPECTIONS/VERIFICATIONS

A. IBC Chapter 1 and NFPA required inspections include, but are not limited to, the following:
   - 110.3.1 Footing or foundation inspection
   - 110.3.2 Concrete slab or under-floor inspection
   - 110.3.3 Lowest floor elevation
   - 110.3.4 Frame Inspections
   - 110.3.5 Lath or gypsum board inspection
   - 110.3.6 Fire-resistant penetrations
   - 110.3.7 Energy efficiency:

     It is appropriate to take special note of the required energy efficiency compliance inspections. Ensuring compliance with ANSI/ASHRAE/IESNA Standard 90.1 – 2019 is a critical part of the inspection process and MUST be specifically addressed. The American Society of Heating and Air Conditioning Engineers (ASHRAE) is the foremost technical society in the fields of heating, ventilation, air conditioning and

refrigeration. ASHRAE Standard 90.1 is an ANSI approved national consensus standard co-sponsored by ASHRAE and the Illuminating Engineering Society of North America (IESNA). The Standard provides minimum energy efficiency requirements for the design and construction of new buildings and new construction in existing buildings. In particular, it applies to new buildings and their systems, building additions and their systems, and new systems and equipment in existing building.

The scope of the requirements of Standard 90.1 covers the design of the building envelope, the lighting systems, HVAC systems and other energy using equipment. For the OSF Approved Inspector, the 90.1 Users Manual is the best available source of information, worksheets and checklists for the purpose of ensuring compliance with Standard 90.1. These forms cannot be reproduced here due to the copyright restrictions. However, the 90.1 Users Manual can be obtained from the American Society of Heating and Air Conditioning Engineers, Incorporated, 1791 Tullie Circle, Atlanta, Georgia 30329. The telephone number is 404-636-8400. On the net they can be reached at ashrae.org.

Specifically, we refer you to the following in the Standard 90.1 User Manual:

1. Building Envelope Compliance Forms, page 5-71;
2. HVAC Compliance Forms, pages 6-79 through 6-80;
3. Service Water Heating Compliance Forms; page 7-17; and
4. Lighting Compliance Forms, page 9-34.

These forms MUST be submitted to OSF at the final review stage. The Chapter 1 inspector shall request these forms be provided at the initial pre-construction meeting. The design professional shall have them available for that meeting.

909.3 Special inspection and test requirements (smoke control systems)

B. Mechanical Code: M107.1. Required inspections

1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.

2. Rough-in inspection shall be made after the roof, framing, fireblocking and bracing are in place and all ducting and other components to be concealed are complete, and prior to the installation of wall or ceiling membranes.

C. Plumbing Code: P107.1 Required inspections and testing

1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before any backfill is put in place.

2. Rough-in inspection shall be made after the roof, framing, fireblocking, firestopping, draftstopping and bracing is in place and all sanitary, storm and water distribution piping is roughed-in and prior to the installation of wall or ceiling membranes.

D. Electrical Code:

1. Underground inspection shall be made after trenches or ditches are excavated and bedded, conduit installed, and before backfill is placed.

2. Rough-in inspection shall be made after the roof, framing, fireblocking and bracing are in place and other components to be concealed are complete, and prior to the installation of concealing construction.

E. National Fire Alarm Code: Section 4.5:

1. The installing contractor shall furnish a written statement stating that the system has been installed in accordance with approved plans and tested in accordance with the manufacturer's published instructions and the appropriate NFPA requirements (Section 4.5.1.2).

2. This shall be accompanied by the record of completion form (Figure 4.5.2.1) Verification of compliance of the completed installation shall be included in the responsibilities of the Chapter 1 inspector (Section 4.5.2.4).

1.2 ITEMS REQUIRING IBC, CHAPTER 17 SPECIAL INSPECTIONS

A. IBC Chapter 17 requires special inspections including the following items as defined by their respective sections as noted:
IT-1 SPECIAL CASES (Refer to NCBC Section 1705.1.1)
IT-2 STEEL CONSTRUCTION (Refer to Section 1705.2 and the Exception; Table 1705.2.3)
IT-3 CONCRETE CONSTRUCTION (Refer to NCBC Section & Table1705.3; Ch. 19)
IT-4 MASONRY (Refer to NCBC Section 1705.4)
IT-5 WOOD (Refer to NCBC Section 1705.5)
IT-6 SOILS (Refer to NCBC Table 1705.6 & Section 1705.6)
IT-7 DRIVEN DEEP FOUNDATIONS (Refer to NCBC Section 1705.7)
IT 8 CAST-IN-PLACE DEEP FOUNDATIONS (Refer to NCBC Section 1705.8)
IT 9 HELICAL PILES (Refer to NCBC Sections 1705.9)
IT 10 FABRICATED ITEMS (Refer to NCBC Section 1705.10 & 1704.2.5)
IT 11 WIND RESISTANCE (Refer to NCBC Sections 1705.11; 1705.11.1 – 1705.11.3; & 1609.3.1)
IT-12 SEISMIC RESISTANCE (Refer to NCBC Sections 1705.12)
IT 13 TESTING FOR SEISMIC RESISTANCE (Refer to Section 1705.13)
IT-14 SPRAYED FIRE-RESISTANT MATERIALS (Refer to NCBC Sections 1705.14)
IT 15 MASTIC AND INTUMESCENT FIRE-RESISTANT COATING 1705.15
IT-16 EXTERIOR INSULATION & FINISH SYSTEM (EIFS)
IT 17 FIRE-RESISTANT PENETRATIONS AND JOINTS (Refer to NCBC Sections 1705.17; 1705.17.1; & 1705.17.2)
IT-18 SMOKE CONTROL (Refer to NCBC Section 1705.18)

1.3 REPORTING SERVICES

A. It is the inspectors' responsibility to verify that the contractor conforms to this section of the code. Furthermore, it is vital to understand that mechanical, electrical and plumbing seismic and vibration analysis and inspections are required and must include the seismic protection for electrical raceways, and equipment; plumbing, piping and related equipment; and, seismic protection for mechanical systems.

B. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect or Owner.

C. Reports will be submitted by independent firm to Architect, Contractor, and authority having jurisdiction, in duplicate, indicating observations and results of tests and indicating

compliance or non-compliance with Contract Documents.

1. Submit final report indicating correction of Work previously reported as non-compliant.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Architect and independent firm 48 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

E. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

F. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

G. Agency Responsibilities:
1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor 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 Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests required by Architect.
7. Attend preconstruction meetings and progress meetings.

H. Agency Reports: After each test, promptly submit two copies of report to Architect, Contractor, and authority having jurisdiction. When requested by Architect, provide interpretation of test results. Include the following:
1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

I. Limits On Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency or laboratory may not assume duties of Contractor.
4. Agency or laboratory has no authority to stop the Work.

1.4 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 of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect 30 days in advance of required observations.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Section 01 33 00 - Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

STATEMENT OF SPECIAL INSPECTIONS

Project: *EB Frink Middle School*
Location: *La Grange, NC*

Owner: *Lenoir County Schools*

Design Professional in Responsible Charge: Eric Lindstrom, AIA, LEED AP – SfL+a Architects, PA
Structural Engineer of Record: Timothy Hilton, P.E. – Bennett & Pless.

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☒ Mechanical/Electrical/Plumbing

☒ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Owner and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Owner and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Owner and the Registered Design Professional in Responsible Charge.

Final Report of Special Inspections documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *WEEKLY* or ☐ per attached schedule.

Prepared by:

_____
(type or print name)

_____
Signature Date

Design Professional Seal

Owner's Authorization:

_____
Signature Date

Building Official's Acceptance:

_____
Signature Date

SCHEDULE OF INSPECTION AND TESTING AGENCIES

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☒ Soils and Foundations
- ☒ Cast-in-Place Concrete
- ☒ Precast Concrete
- ☒ Masonry
- ☒ Structural Steel
- ☒ Cold-Formed Steel Framing
- ☒ Retaining Walls Taller than 5'
- ☐ Deep Foundations
- ☒ Spray Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical & Electrical Systems
- ☐ Architectural Systems
- ☐ Seismic Requirements
- ☐ Other

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Special Inspections	*SI*	*OWNER TO PROVIDE*
2. Structural Engineer of Record	*SER*	*Bennett & Pless*
3. Testing Laboratory	*ITL*	*OWNER TO PROVIDE*
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

QUALITY ASSURANCE PLAN

Quality Assurance for Seismic Resistance

Seismic Design Category	*B*

Quality Assurance for Wind Requirements

Basic Wind Speed (3 second gust)	*133 mph*
Wind Exposure Category	*C*

Statement of Responsibility

Each contractor responsible for the construction of a main wind- or seismic-force-resisting system, designated seismic system or a wind- or seismic-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the building official and the owner prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain the following:

a. Acknowledgment of awareness of the special requirements contained in the statement of special inspections;
b. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official;
c. Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of the reports; and
d. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

SCHEDULE OF SPECIAL INSPECTIONS

Legend

ITL - Inspections Testing Laboratory
SER - Structural Engineer of Record
SI - Special Inspections
IT-# - Inspection Type
C - Continuous Special Inspections
P - Periodic Special Inspections

IT-1 SPECIAL CASES (Refer to NCBC Section 1705.1.1)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☐	Construction materials and systems that are alternatives to materials and systems prescribed by the 2012 NCBC.	☐	☐	NCBC 1705.1.1, #1	
☐	☐	☐	Unusual design applications of materials described in the 2012 NCBC.	☐	☐	NCBC 1705.1.1, #2	
☐	☐	☐	Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.			NCBC 1705.1.1, #3	
☐	☐	☐	Special Events (as decided / required by Code Enforcement).	☐	☐	Local Authority Having Jurisdiction	
☐	☒	☒	Retaining Walls.	☐	☒		

IT-2 STEEL CONSTRUCTION (Refer to Section 1705.2 and the Exception; Table 1705.2.3)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☒	Structural Steel.	☐	☒	AISC 360	NCBC 1705.2.1 & Exception
☐	☐	☒	Cold-formed Steel Deck.	☐	☒	SDI QA/QC	NCBC 1705.2.2
☐	☐	☐	Open-web Steel Joists and Joist Girders.	☐	☐		NCBC 1705.2.3 & Table
☐	☐	☐	1. Installation of open-web steel joists and joist girders. a. End connections - welding or bolted.		☐	SJI specifications listed in Section 2207.1	
			b. Bridging - horizontal or diagonal.				
☐	☐	☐	i. Standard bridging.		☐	SJI specifications listed in Section 2207.1	
☐	☐	☐	ii. Bridging that differs from the SJI specifications listed in Section 2207.1		☐		Uplift Bridging
☐	☐	☒	Cold-formed steel trusses spanning 60 feet or greater		☒		NCBC 1705.2.4

IT-3 CONCRETE CONSTRUCTION (Refer to NCBC Section & Table1705.3; Ch. 19)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☒	1. Inspect reinforcement, including pre-stressing tendons and verify placement.	☐	☒	ACI 318 Ch 20, 25.2, 25.3, 26.6.1 – 26.76.3; & NCBC 1908.4	

☐	☐	☒	2. Reinforcing Bar welding: a. Verify weldability of reinforcing bars other than ASTM A706. b. Inspect single-pass fillet welds, maximum 5/16". c. Inspect all other welds.	☐	☒	AWS D1.4; ACI 318:26.6.4	
☐	☐	☒	3. Inspect anchors cast in concrete.		☒	ACI 318: 17.8.2	
☐	☐	☒	4. Inspect anchors post-installed in hardened concrete members. a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. b. Mechanical anchors and adhesive anchors not defined in 4.a.	☒	 ☒	ACI 318: 17.8.2.4 ACI 318: 17.8.2	
☐	☐	☒	5. Verify use of required design mix.		☒	ACI 318: Ch. 19, 26.4.3, 26.4.4, NCBC 1904.1, 1904.2. 1908.2, 1908.3	
☐	☐	☒	6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	☒		ASTM C 172; ASTM C 31; ACI 318: 26.4, 26.12	
☐	☐	☒	7. Inspect concrete and shotcrete placement for proper application techniques.	☒		ACI 318: 26.5, NCBC 1908.6, 1908.7. 1908.8	
☐	☐	☒	8. Verify maintenance of specified curing temperature and techniques		☒	ACI 318: 26.5.3-26.5.5 NCBC 1908.9	
☐	☐	☐	9. Inspect of pre-stressed concrete for: a. Application of pre-stressing forces; and b. Grouting of bonded pre-stressing tendons.	☐ ☐		ACI 318: 26.10	
☐	☐	☒	10. Inspect erection of precast concrete members		☐	ACI 318: Ch. 26.8	
☐	☐	☐	11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.		☐	ACI 318: 26.11.2	
☐	☐	☒	12. Inspect formwork for shape, location and dimensions of the concrete members being formed.		☒	ACI 318:26.11.1.2(b)	

IT-4 MASONRY (Refer to NCBC Section 1705.4)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☒	Masonry Construction.	☒	☒	TMS 402/ ACI 530/ ASCE 5 and TMS 602/ACI 530.1/ASCE 6,	See NCBC 1705.4 Exceptions
☐	☐	☐	Empirically designed masonry (per 2109), glass unit masonry (per 2110) or masonry veneer (per Ch 14) in Risk Category IV.	☐	☐	TMS 402/ ACI 530/ ASCE 5, Level B Quality Assurance	

IT-5 WOOD (Refer to NCBC Section 1705.5)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☐	Prefabricated wood structural elements and assemblies to be in accordance with the requirements set forth in NCBC Section 1704.2.5.	☐	☐	NCBC 1704.2.5	
☐	☐	☐	High Load Diaphragms.	☐	☐	NCBC 1705.5.1 & 1704.2	
☐	☐	☐	Temp & permanent bracing on metal-plate-connected trusses spanning ≥ 60 ft.	☐	☐	NCBC 1705.5.2	

IT-6 SOILS (Refer to NCBC Table 1705.6 & Section 1705.6)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☒	☐	☒	1. Verify materials below shallow foundation are adequate to achieve the design bearing capacity.		☒	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	See NCBC 1705.6 exception
☐	☐	☒	2. Verify excavations are extended to proper depth and have reached proper material.		☒	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	
☒	☐	☒	3. Perform classification and testing of compacted fill materials.		☒	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	
☒	☐	☒	4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	☒		NCBC 1705.6; geotechnical report & construction documents from RDPIRC	
☒	☐	☒	5. Prior to placement of compacted fill, inspect sub-grade and verify that site has been prepared properly.		☒	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	

IT-7 DRIVEN DEEP FOUNDATIONS (Refer to NCBC Section 1705.7)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☐	1. Verify element materials sizes and lengths comply with the requirements.	☐		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	2. Determine capacities of test elements and conduct additional load tests as required.	☐		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	3. Inspect driving operations and maintain complete and accurate records for each element.	☐		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	

☐	☐	☐	4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element.	☐		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	5. For steel elements, perform additional inspections in accordance with Section 1705.2.			NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705.2.			NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge.			NCBC 1705.7; geotechnical report & construction documents from RDPIRC	

IT 8 CAST-IN-PLACE DEEP FOUNDATIONS (Refer to NCBC Section 1705.8)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☐	1. Inspect drilling operations and maintain complete and accurate records for each element.	☐		NCBC 1705.8; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	☐		NCBC 1705.8; geotechnical report & construction documents from RDPIRC	
☐	☐	☐	3. For concrete elements, perform tests and additional special inspections in accordance with section 1705.3.	☐		NCBC Section 1705.8; geotechnical report & construction documents from RDPIRC	

IT 9 HELICAL PILES (Refer to NCBC Sections 1705.9)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☐	Inspect during installation. Record: 1. Installation equipment used. 2. Pile dimensions. 3. Tip elevations. 4. Final depth. 5. Final installation torque. 6. Other pertinent installation data as req'd by RDPIRC.	☐		NCBC Section 1705.9; geotechnical report & construction documents from RDPIRC	

IT 10 FABRICATED ITEMS (Refer to NCBC Sections 1705.10 & 1704.2.5)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☒	Inspect during fabrication. 1. Structural, 2. Load-bearing or 3. Lateral load-resisting members or assemblies.	☐	☒	NCBC Section 1705.10 or 1704.2.5.	SI are not required if the fabricator meets 1704.2.5, #1 or #2; or if the fabricator is approved per 1704.2.5.1

IT 11 WIND RESISTANCE (Refer to NCBC Sections 1705.11; 1705.11.1 – 1705.11.3; & 1609.3.1)

Inspection Task	C	P	Standard	Notes / Comments
Only required in the following instances: 1. In wind Exposure Category B, where V*asd* is ≥ 120 MPH (per 1609.3.1), or 2. In wind Exposure Category Cor D, where V*asd* is ≥ 110 MPH (per 1609.3.1).				
Structural Wood. 1. Gluing elements of the main wind force-resisting system. 2. Nailing, bolting, anchoring, etc. of elements of the main wind force-resisting system.	☐	☐	NCBC 1705.11.1	Not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the MWR system, where the fastener spacing of the sheathing is > 4" o.c.
Cold-formed steel light frame construction. 1. Welding operations of elements of the MWRS 2. Screw attachment, bolting, anchoring and other fastening of elements of the MWRS including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs		☐ ☐	NCBC 1705.11.2	Not required for shear walls and diaphragms, where either of the following applies: **#1**. Sheathing is gypsum bd or fiberboard; **#2**. Sheathing is wood structural panel or steel sheets on one side of the shear wall, panel or diaphragm assembly and the fastener spacing of the sheathing is > 4"o.c.
Wind-resisting components 1. Roof covering, roof deck and roof framing connections 2. Exterior wall covering and wall connections to roof and floor diaphragms and framing		☐ ☐	NCBC 1705.11.3	

IT-12 SEISMIC RESISTANCE (Refer to NCBC Sections 1705.12)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
			SI in sections 1705.12.1 – 1705.12.9 are not required for structures designed and constructed in accordance with one of the following: 1. Structure is light-frame construction, S_{DS} is not greater than 0.5; and building height is not greater than 35'. 2. SFRS of the structure is reinforced masonry or reinforced concrete, S_{DS} is not greater than 0.5; and building height is not greater than 25'.				
☐	☐	☐	Structural steel in the seismic force-resisting systems of buildings and structures assigned to SDC B, C, D, E or F.	☐	☐	NCBC 1705.12.1.1; AISC 341	Not required in the SFRS of buildings or structures in SDC B or C not specifically detailed for seismic resistance, with response modification coefficient, R, ≤3
☐	☐	☐	Structural steel elements in the seismic force-resisting systems of buildings or structures assigned to SDC B, C, D, E or F other than those covered in Section 1705.12.1.1, including struts, chords and foundation elements.	☐	☐	NCBC 1705.12.1.2; AISC 341	Not required in the SFRS of buildings and structures in SDC B or C with response modification coefficient, R, ≤3
☐ ☐	☐ ☐	☐ ☐	Structural Wood in the seismic force-resisting systems of structures assigned to SDC C, D, E or F. 1. Field gluing operations of elements of seismic force-resisting system 2. Nailing, bolting, anchoring and other fastening of elements of the seismic force-resisting system	☐	☐	NCBC 1705.12.2	These SI are not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the SFRS when the fastener spacing of the sheathing is > 4" o.c. Includes wood shear walls, wood diaphragms, drag struts braces, panels & hold-down's.

☐ ☐	☐ ☐	☐ ☐	Cold-formed steel light frame construction in the SFRS of structures in SDC C, D, E, or F. 1. Welding operations of elements of the SFRS 2. Screw attachment, bolting, anchoring, and other fastening of elements of the SFRS including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs		☐ ☐	NCBC 1705.12.3	Not required for shear walls and diaphragms, including screw installation, bolting, anchoring and other fastening to components of the SFRS where either of the following applies: **#1**. Sheathing is gypsum bd or fiberboard; **#2**. Sheathing is wood structural panel or steel sheets on one side of the shear wall, panel or diaphragm assembly and the fastener spacing of the sheathing is > 4"o.c
☐	☐	☐	Designated seismic systems for structures assigned to Seismic Design Category C, D, E or F. Verify the label, anchorage and mounting conform to the certificate of compliance	☐	☐	ASCE 7, Section 13.2.2	
☐	☐	☐	Architectural components – erection and fastening of exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer in structures assigned to Seismic Design Category D, E or F		☐	NCBC 1705.12.5	Not required for: #1. Exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer ≤ 30' in height above grade or walking surface. #2. Exterior cladding and interior and exterior veneer weighing 5 psf or less. #3. Interior nonbearing walls weighing 15 psf or less.
☐	☐	☐	Access floors - anchorage in structures assigned to Seismic Design Category D, E or F.		☐	NCBC 1705.12.5.1	

☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	Plumbing, Mechanical and electrical components: Seismic Design Categories C, D, E or F: 1. Anchorage of electrical equipment for emergency and standby power. 2. Installation and anchorage of piping systems for Hazardous materials and associated mechanical units. 3. Installation and anchorage of ductwork for Hazardous materials. 4. Installation and anchorage of vibration isolation systems where the required clearance is ≤ 1/4“ between the equipment support frame and restraint. Seismic Design Categories E or F: 1. Anchorage of other electrical equipment.		☐ ☐ ☐ ☐ ☐	NCBC 1705.12.6, #1 NCBC 1705.12.6, #3 NCBC 1705.12.6, #4 NCBC 1705.12.6, #5 NCBC 1705.12.6, #2	
☐	☐	☐	Storage racks ≥ 8’ in height in Seismic Design Categories D, E or F.		☐	NCBC 1705.12.7	
☐	☐	☐	Seismic isolation systems in seismically isolated structures assigned to SDC B, C, D, E, or F.		☐	NCBC 1705.12.8	
☐	☐	☐	Installation of cold-formed steel special bolted moment frames in the SFRS of structures assigned to SDC D, E, or F.		☐	NCBC 1705.12.9	

IT 13 TESTING FOR SEISMIC RESISTANCE (Refer to Section 1705.13)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	☐	Structural Steel. 1. Nondestructive testing for seismic resistance for SFRS for buildings assigned to SDC B, C, D, E or F.	☐	☐	NCBC 1705.13.1 NCBC 1705.13.1.1 or AISC 341	Exception: SDC B or C buildings with a response modification coefficient ≤ 3.

☐	☐	☐	Structural Steel Elements. 1. Nondestructive testing for seismic resistance of structural steel elements in the SFRS of buildings and structures assigned to SDC B, C, D, E or F if not covered in 1705.13.1.1.	☐	☐	NCBC 1705.13.1.2 AISC 341	Exception: SDC B or C buildings with a response modification coefficient ≤ 3.
☐	☐	☐	Nonstructural Components for structures assigned to SDC B, C, D, E or F where the requirements of Section 13.2.1 of ASCE 7 for nonstructural components, supports or attachments are met by seismic qualification as specified in Item 2 therein, the RDPIRC shall specify on the approved construction documents the requirements for seismic qualification by analysis, testing or experience data.	☐	☐	NCBC 1705.13.2	
☐	☐	☐	Designated seismic systems for structures assigned to SDC C, D, E or F that are subject to the requirements of Section 13.2.2 of ASCE 7 for certification, the RDPIRC shall specify on the approved construction documents the requirements to be met by analysis, testing or experience data.	☐	☐	NCBC 1705.13.3	
☐	☐	☐	Seismic Isolation Systems in Seismically isolated structures assigned to SDC B, C, D, E, or F.			NCBC 1705.13.4; ASCE 7, section 17.8	

IT-14 SPRAYED FIRE-RESISTANT MATERIALS (Refer to NCBC Sections 1705.14)

SER	SI	Inspection Task	C	P	Standard	Notes / Comments
☐	☐	Sprayed fire-resistant materials.	☐	☐	NCBC 1705.14.4.2 & ASTM E605	4/1000sf
☐	☐	1. Floor, roof and wall assemblies	☐	☐	NCBC 1705.14.4.3	4 @12”x12”
☐	☐		☐	☐	NCBC 1705.14.4.4	4 @12”x12”
☐	☒	2. Cellular Decks	☐	☒	NCBC 1705.14.4.5	25%
☐	☒	3. Fluted Decks	☐	☒	NCBC 1705.14.4.6	9@12”
☐	☒	4. Structural members	☐	☒	NCBC 1705.14.4.7	7@12”
☐	☐	5. Beams and Girders	☐	☐	NCBC 1705.14.4.8	12@12”
☐	☒	6. Joists and Trusses	☐	☒	NCBC 1705.14.4.9	4@12”
		7. Wide-flanged columns				
		8. Hollow structural section and pipe columns				

IT 15 MASTIC AND INTUMESCENT FIRE-RESISTANT COATING 1705.15

Inspection Task	C	P	Standard	Notes / Comments
Mastic and Intumescent fire-resistant coating applied to structural elements and decks.	☐	☒	NCBC 1705.15; AWCI 12-B	

IT-16 EXTERIOR INSULATION & FINISH SYSTEM (EIFS)

SI	Inspection Task	C	P	Standard	Notes / Comments
☐	EIFS application.	☐	☐		Not required for: 1. EIFS applications installed over a water-resistive barrier that drains to the exterior. 2. EIFS applications installed over masonry or concrete walls.
☐	Water-resistive barrier coating when installed over a sheathing substrate.	☐	☐	ASTM E2570	

IT 17 FIRE-RESISTANT PENETRATIONS AND JOINTS (Refer to NCBC Sections 1705.17; 1705.17.1; & 1705.17.2)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
			Applies to all new high-rise buildings and all new buildings in Risk Category III or IV. Additions, Changes of Use, NCEBC Ch 14 evaluated buildings and Level 3 Alterations within existing high-rises and / or Risk Category III or IV buildings will also require these special inspections.				
☐	☐	☐	Inspection of tested and listed penetration firestop systems: 1. Through penetrations: a. Verify materials before installation.	☐	☐	NCBC 1705.17.1; ASTM E2174-10ae1	
☐	☐	☐	b. Verify against design (Cutsheet or EJ).				10% of installations per floor or per area. Area = 1 sf – 10,000 sf.
☐	☐	☐	c. For each type of firestop: i. Witness 10% of installations, or				
☐	☐	☐	ii. Destructive testing on 2% of installations.				2% of installations per floor or per area. Area = 1sf – 10,000 sf
☐	☐	☐	d. Verify all firestops are installed.				
☐	☐	☐	2. Membrane penetrations: a. Verify materials before installation.				
☐	☐	☐	b. Verify against design (Cutsheet or EJ).				10% of installations per floor or per area. Area = 1sf – 10,000 sf
☐	☐	☐	c. For each type of firestop: i. Witness 10% of installations or				
			ii. Destructive testing on 2% of installations.				2% of installations per floor or per area. Area = 1sf – 10,000 sf
			d. Verify all firestops are installed.				

☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	Installation of tested and listed fire-resistant joint systems: 1. Verify materials before installation. 2. Verify against design (cutsheet or EJ) . 3. For each type of joint system: a. Witness installation of 5% min of total lineal feet of joint system being installed, or b. Destructive testing, disassembly or visual inspection at the rate of at least 1 sample for every 500 lineal feet of the joint system.	☐	☐	NCBC 1705.17.2; ASTM E2393-10a	

IT-18 SMOKE CONTROL (Refer to NCBC Section 1705.18)

Inspection Task	C	P	Standard	Notes / Comments
Inspection of smoke control system.	☐	☐	NCBC 1705.18	

FINAL REPORT OF SPECIAL INSPECTIONS

Project: *EB Frink MS*

Location: *La Grange, NC*

Owner: *Lenoir County*

Design Professional in Responsible Charge: *Eric Lindstrom, AIA, LEED AP – SfL+a Architects, PA*

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the State of Special Inspections submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections).

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

Licensed Professional Seal

_____

Signature Date

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Temporary Utilities.
   2. Construction Facilities.
   3. Temporary Controls.
   4. Moisture and Mold Control.
   5. Operation, Termination and Removal.

1.3 GENERAL

A. Use Charges:
   1. Installation, use charges, maintenance of and removal of temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities for construction operations without cost, including, but not limited to, Architect, testing agencies, separate contractors and authorities having jurisdiction.

B. Informational Submittals:
   1. Erosion and Sedimentation Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
   2. Moisture Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
      a. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
      b. Indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
      c. Indicate sequencing of work that requires water, such as sprayed fire resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
   3. Dust and HVAC Control Plan: Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
      a. Locations of dust control partitions at each phase of work.
      b. HVAC system isolation schematic drawing.
      c. Location of proposed air-filtration system discharge.
      d. Waste handling procedures.
      e. Provide positive means to prevent air-borne dust and debris from entering the HVAC air distribution systems, louvers, ductwork, and pathways.
      f. Other dust control measures.

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

D. Temporary Use of Permanent Facilities: Architect and Owner must approve the use of permanent equipment for temporary uses. Approval does not designate acceptance of the system. Prior to operation of permanent equipment for temporary purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
   1. In the case of permanent equipment installed by a separate contractor, and prior to requesting approval of Architect and Owner, engage separate contractor and acquire written approval for each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

E. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
   3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures."

F. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

1.4 TEMPORARY UTILITIES

A. Temporary Electricity:
   1. Provide power service required from utility source as needed for construction operation.
   2. Complement existing power service capacity and characteristics as required for construction operations.
   3. Provide power outlets, with branch wiring and distribution boxes located as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.
   4. Permanent convenience receptacles may not be utilized during construction.

B. Temporary Lighting For Construction Purposes:
   1. Provide and maintain lighting for construction operations to achieve minimum lighting level of 2 watt/sq ft.
   2. Provide and maintain minimum 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.
   3. Provide and maintain minimum 0.25 watt/sq ft HID lighting to interior work areas after dark for security purposes.
   4. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.
   5. Maintain lighting and provide routine repairs.

6. Permanent building lighting may be utilized during construction.

C. Temporary Heating:
   1. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
   2. Enclose building prior to activating temporary heat in accordance with Temporary Controls article in this Section.
   3. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise for specific activities and products.

D. Temporary Cooling:
   1. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
   2. Enclose building prior to activating temporary cooling in accordance with Temporary Controls article in this Section.
   3. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise for specific activities and products.

E. Temporary Ventilation:
   1. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Temporary Communication Services:
   1. Internet Service and Wi-Fi Access: Provide and maintain, broadband internet service in field office as part of a functioning field office. Provide desktop computer with Microsoft operating system, Microsoft Office 365 software suite, modem, copier, and printer. Provide access and functionality for Owner, Architect, and Architect's consultants.

G. Temporary Water Service:
   1. Provide suitable quality water service as needed to maintain specified conditions for construction operations.
   2. Extend branch piping with outlets located so water is available by hoses with threaded connections.

H. Temporary Sanitary Facilities:
   1. Provide and maintain required facilities and enclosures. Use of New facility is not permitted. Provide facilities at time of project mobilization.

1.5 CONSTRUCTION FACILITIES

A. Field Offices and Storage Buildings: Provide with the following minimum requirements.
   1. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings and project construction.
   2. Locations: Locate structures minimum distance of 30 feet from existing and new structures.
   3. Construction: Structurally sound, secure, weather tight enclosures, and maintained during project construction.
      a. Exterior Envelope:
         1) Thermal properties to be appropriate to occupancy and storage requirements.
         2) Weather resistant materials and finishes.
   4. Removal: At completion of Work, remove buildings, foundations, utility services, and debris. Construct and finish areas in accordance with the Contract Documents.
      a. If areas are not indicated to receive new construction, restore areas to pre-construction condition.

5. Relocating field office functions to a part of the new construction requires Owner's written agreement.

B. Storage Buildings: Sized for project related material storage requirements, allowing for access and orderly provision for maintenance and inspection of products in accordance with Section 01 60 00 - Product Requirements.
   1. Interior finishes to be as required to provide specified conditions for storage of products.
   2. Heating and ventilation to be as required to maintain products in accordance with Contract Documents.
   3. Lighting to be as required for maintenance and inspection of products.
   4. Maintain storage buildings and surrounding areas.

C. Field Office: Weather tight, modular type buildings constructed with floors raised above ground, securely anchored to foundations, steps, landings, and ramps as required for occupant entry/egress.
   1. Install and make ready for occupancy within 15 days after Notice to Proceed.
   2. Overall Size: Minimum overall dimensions.
      a. 64 x 36 feet.
   3. Spaces separate from each other as follows:
      a. Office(s) for Construction Manager staff and functions.
      b. Meeting room for project meetings:
         1) Tables and chairs to accommodate 16 persons.
         2) Minimum 55 inch LED television/monitor mounted on wall for viewing during meetings; equipped with multiple HDMI connections and wireless connectivity.
      c. Designated space for As-Built drawings to be maintained for the duration of the construction.
      d. Toilet facilities; fully functioning; continuously stocked with toilet paper, paper towels and hand cleansing products.
   4. Interior Finishes: Sheet type materials for walls and ceilings, pre-finished or painted; resilient flooring and base.
   5. Electrical outlets to be distributed throughout spaces for easy access.
   6. Lighting: Interior lighting to be 50 foot candles at desk top height; exterior lighting at entry/egress doors.
   7. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions of 76 degrees F in summer and 68 degrees F in winter.
   8. Furnishings to be sturdy construction; include hanging rack for drawings and drawings review table.
   9. Parking: Gravel surfaced parking and walk travel ways to office entries. Maintain walk travel ways free of debris, overgrowth, mud, water, and snow.
   10. Maintenance and Cleaning: Provide services as needed and as follows.
      a. Weekly janitorial services for common areas, meeting room, and toilets; bi-weekly cleaning and maintenance for offices.
   11. Employee Residential Occupancy: Not allowed on Owner's property.

D. Vehicular Access:
   1. Access Location:
      a. As indicated on Drawings.
   2. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.
   3. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.

4. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.
5. Provide unimpeded access for emergency vehicles. Maintain 20 feet wide driveways with turning space between and around combustible materials.
6. Provide and maintain access to fire hydrants free of obstructions.
7. Provide means of removing mud from vehicle wheels before entering streets.
8. Do not use existing on-site paved surfaces for construction traffic.

E. Parking:
1. Construct temporary gravel surface parking areas to accommodate construction personnel.
2. When site space is not adequate, provide additional off-site parking.
3. Use of existing parking facilities used by construction personnel is not permitted.
4. Do not allow heavy vehicles or construction equipment in parking areas.
5. Do not allow vehicle parking on existing pavement.
6. Permanent Pavements and Parking Facilities:
    a. Bases for permanent roads and parking areas may be used for construction traffic.
    b. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
    c. Use of permanent parking structures is permitted.
7. Maintenance:
    a. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
    b. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
8. Removal, Repair:
    a. Remove temporary materials and construction when permanent paving is usable.
    b. Remove underground work and compacted materials to depth of 2 feet; fill and grade site as specified.
    c. Repair permanent facilities damaged by use, to original condition.
9. Mud from Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

F. Progress Cleaning and Waste Removal:
1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.
3. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
4. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.
5. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

G. Project Identification:
1. Project Identification Sign:
    a. One painted sign of construction, design, and content shown on Drawings, location as designated by Architect and Owner.
2. Project Informational Signs:

a. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering for legibility at 100 feet distance.
b. Provide sign at each field offices and storage buildings.
c. Provide state traffic agency directional traffic signs to direct traffic into and within site. Relocated as Work progress requires.
d. No other signs are allowed except those required by law.

3. Sign Painter: Experienced as professional sign painter for minimum three years.
4. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.
5. Sign Materials:
   a. Structure and Framing: New, wood, structurally adequate.
   b. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inches thick, painted both sides, standard large sizes to minimize joints.
   c. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
   d. Lettering: Exterior quality paint, colors as selected.
6. Installation:
   a. Install project identification sign within 15 days after Notice to Proceed.
   b. Erect at designated location.
   c. Erect supports and framing on secure foundation, rigidly braced, and framed to resist wind loadings.
   d. Install sign surface plumb and level. Anchor securely.
   e. Paint exposed surfaces of sign, supports, and framing.
7. Maintenance: Maintain signs and supports clean, repair deterioration and damage.
8. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

H. Traffic Regulation:
1. Provide temporary signs, signals, devices, flag persons, flares and lights as required by codes or local authorities.
2. Signs, Signals and Devices:
   a. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
   b. Automatic Traffic Control Signals: If required by and as approved by local jurisdictions.
   c. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.
   d. Flag Person Equipment: As required by authority having jurisdiction.
3. Flag Persons: Provide trained, equipped, and State DOT certified flag persons to regulate traffic when construction operations or traffic encroaches on public roadway.
4. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
5. Haul Routes:
   a. Consult with authority having jurisdiction and establish public thoroughfares to be used for haul routes and site access.
   b. Confine construction traffic to designated haul routes.
   c. Provide traffic control as required by authority having jurisdiction and at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
6. Traffic Signs and Signals:
   a. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

b. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Construction Manager's control, and areas affected by Construction Manager's operations.
c. Relocate as Work progresses, to maintain effective traffic control.

7. Removal:
a. Remove equipment and devices when no longer required.
b. Remove post settings and foundations entirely.
c. Repair damage caused by installation.

1.6 TEMPORARY CONTROLS

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Division 01 Section "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and dis-charge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent proper-ties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site for the duration of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
1. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
2. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Egress: Maintain protected temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
   1. For projects where smoking in not entirely prohibited throughout site:
      a. Prohibit smoking within buildings under construction. Designate area on site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
      b. Prohibit smoking in construction areas.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
   4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
   5. Portable Fire Extinguishers: Provide UL rated extinguishers appropriate to application needs, capacity, class and extinguishing agent as required by locations and classes of fire exposures. Comply with current requirements of NFPA, OSHA, and local authorities having jurisdiction.
      a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable exit.
      b. Provide minimum one fire extinguisher in each field office and storage building and as otherwise required in construction areas.

K. Barriers:
   1. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction and demolition operations.
   2. Provide barricades, pathways and covered walkways required by governing authorities for public rights-of-way and for public access to and egress from existing buildings.
   3. Provide protection for plants designated to remain. Replace damaged plants.
   4. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

L. Fencing:
   1. Construction: Provide commercial grade chain link fencing and gates not less than 6 feet high unless Drawings indicate otherwise.

M. Security:
   1. Security Program:
      a. Protect Work from theft, vandalism, and unauthorized entry.
      b. Initiate program at project mobilization.
      c. Maintain program throughout construction period until Owner occupancy.
   2. Entry Control:

a. Restrict entrance of non-construction persons and vehicles into Project site.
b. Allow entrance only to authorized persons.

N. Dust Control:
1. Execute Work by methods to minimize raising dust from construction operations.
2. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
3. Provide positive means to prevent air-borne dust and debris from entering HVAC air distribution systems, louvers, ductwork, and pathways.

O. Noise Control:
1. Provide methods, means, and facilities to minimize noise produced by construction operations during school (or other facility type) operating hours.

1.7 MOISTURE AND MOLD CONTROL

A. Construction Manager's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to air-borne mold spores, protect as follows:
1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure, but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary HVAC systems to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

1.8 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary facilities and controls on a daily and 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Owner acceptance of project.

C. Termination and Removal: Remove each temporary facility when no longer required, when it has been replaced by authorized use of a permanent facility, and no later than Owner acceptance of project. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Construction Manager. Owner reserves right to take possession of Project identification signs.
   2. Prior to inspection for Owner acceptance, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."
   3. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
   4. Remove temporary underground installations entirely. Fill, grade and finish as required by Contract Documents.
   5. Clean and repair damage caused by installation or use of temporary work.
   6. Restore existing conditions and construction to original condition.
   7. Restore new project work construction to specified condition.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Product Delivery Requirements.
   2. Product Storage and Handling Requirements.
   3. Environmental Requirements
   4. Product Options.
   5. Product Substitution Requests.
   6. Equipment Electrical Characteristics and Components.
   7. Spare Parts And Maintenance Products.
   8. Substitution Request Form (attached at end of this Section).

B. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures.
   2. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.3 DEFINITIONS

A. Basis of Design Product Specification: A specification in which a specific manufacturer or manufacturer's product is named and accompanied by the words "Basis of Design," and may include make or model number or other designation, to establish significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

B. Provide, Furnish, and Supply:
   1. Provide: To furnish and install.
   2. Furnish: To supply, deliver, unload, inspect for damage, and store.
   3. Supply: Same as Furnish.

C. Install: To unpack, assemble, erect, apply, place, construct, finish, cure, protect, clean, start up, and make ready for use.

D. Product: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. Product is material, machinery, components, equipment, fixtures, and systems forming the work result. Product is not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products are new and never before used.
   1. All products installed as part of the Work are to be new products, unless otherwise indicated. New products are products that have not been previously incorporated into another project or facility and has not been used. Products salvaged, recycled or re-used from other projects are not considered new products.
      a. Salvaged, recycled or re-used products are permitted only when specifically indicated as such in the Contract Documents.
   2. Named Product: Items identified by manufacturer or manufacturer's product name, and may include make or model number or other designation shown or listed in

manufacturer's published product literature, that is current as of date of the Contract Documents.

3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

E. Project Manual: The book-sized volume(s) that includes information about procurement requirements (if any), contracting requirements, and specifications for the Work.

1.4 PRODUCT DELIVERY REQUIREMENTS

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. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.5 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers’ instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

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

1.6 ENVIRONMENTAL REQUIREMENTS

A. Ambient air temperature and humidity levels to be as required prior to, during and after installation of Work. Minimum requirements to be as recommended by product manufacturer unless requirements indicated in Work specification section are more stringent.

1.7 PRODUCT OPTIONS

A. Products Specified by Reference Standards and/or by Description Only: Use product complying with the referenced standards and descriptions.

B. Products Specified by Naming One or More Manufacturers: Use product of one of manufacturers named and complying with specifications.
   1. Substitutions allowed only if so stated in the list of manufacturers. Comply with Substitution Request requirements.
   2. If Basis of Design manufacturer is indicated, use of Basis of Design product is preferred if other manufacturers are indicated; but, required if no other manufacturer is indicated.

1.8 PRODUCT SUBSTITUTION REQUESTS

A. Comply with the requirements indicated in the General Conditions of the Contract, the Supplementary General Conditions and as indicated in this Article.

B. Substitution Requests during the Bidding Period: Architect will consider Requests For Substitutions from Construction Manager only, and only up to fourteen (14) days before receipt of Bids.

C. Substitution Requests during the Construction Period: Substitutions may be considered from Construction Manager only, and only when a product becomes unavailable through no fault of Construction Manager.
   1. During Construction Period, substitutions will not be considered by Architect or Owner when they are indicated or implied on Shop Drawings, Product Data, or other submittal requirements, without separate written and certified Substitution Request.

D. Substitution Request Submittal Procedure:
   1. Submit two copies of each Substitution Request to Architect for consideration. Use Substitution Request Form located at end of this Section. Limit each request to one proposed Substitution. The requirements for Substitution Request are indicated on the Substitution Request Form and as otherwise indicated in the Contract documents.
   2. During the Bidding Period (when permitted), Architect will notify Construction Manager of accepted substitutions by issuance of Addendum.
   3. During the Construction Period, Architect will notify Construction Manager of accepted substitutions in written form. After which, Construction Manager will provide submittal requirements indicated in the related specification Section.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

B. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

C. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

D. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where products are accompanied by the term "as selected," Architect will make selection.

F. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

G. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
   1. If no product available within specified category matches and complies with other specified requirements, comply with Product Substitution Requests requirements in this Section for proposal of product.

H. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from submitted samples" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items; unless indicate otherwise within the Submittals article of specification Section.

2.2 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically permitted or required by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

2.3 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. At minimum, comply with specified requirements and reference standards.

C. Specified products define standard of quality, type, function, dimension, appearance, and performance required.

D. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.

E. Where all other criteria are met, Construction Manager is to give preference to products that:
   1. If used on interior, have lower emissions.
   2. If wet-applied, have lower VOC content.
   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.
   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. Are Cradle-to-Cradle Certified.
   10. Have a published Environmental Product Declaration (EPD).
   11. Have a published Health Product Declaration (HPD).
   12. Have a published GreenScreen Chemical Hazard Analysis.

F. Furnish interchangeable components from same manufacturer for components being replaced.

2.4 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.5 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Required items are for Owner's future maintenance stock and are in addition to items required to install and complete the Work as indicated in the Drawings and Specifications.

B. Coordinate with Owner to deliver and store Spare Parts and Maintenance Products.

C. Required items are indicated in the following location(s):
1. In individual Specification Sections in Divisions 01 through 49.
2. In the Drawings.

D. Items include, but are not limited to, tools, special tools, spare parts, maintenance products, extra materials, and similar items.
1. Items are to match that which was provided as part of the Work during construction unless otherwise indicated.

E. Label, Package, and Deliver Items: Coordinate delivery times and locations with Owner for attendance and receiving.
1. Package, label and deliver to Project site and place in location as directed by Owner.
   a. Label items with legible print indicating manufacturer’s name, model, series, and color identification.
2. Receipts of Delivery: Prepare, prior to delivery, an itemized receipt for items required to be delivered, to be signed and dated by Construction Manager and Owner representatives at time of delivery. The receipt shall indicate the following information for each item delivered:
   a. Project Identification.
   b. Date and time of delivery.
   c. Location of delivery.
   d. Item Specification Section Number and Title.
   e. Item Description.
   f. Quantity/Size/Amount Required (as indicated in specifications).
   g. Quantity/Size/Amount Delivered.
   h. Signatures/dates certifying delivery by Construction Manager and receipt by Owner.
3. Submit receipts as support documentation with the List Of Spare Parts and Maintenance Products.

F. Closeout Submittal: Submit the List of Spare Parts and Maintenance Products as indicated in Section 01 78 39 - Project Record Documents, article Record Certifications Submittals.
1. Prepare itemized list to include all items and quantities required. List to be columnized with columns indicating information indicated above for the Receipts of Delivery. Behind the list, insert the certified Receipts of Delivery, sorted by delivery dates.

PART 3 EXECUTION

Not Used.

SUBSTITUTION REQUEST FORM

Project: _____ Substitution Request Number: _____

_____ Architect's Project Number: _____

To: _____ From Company: _____

_____ Date: _____

Re: _____ Contract For: _____

Specification Title: _____ Section #: _____

Article/Paragraph References: _____

Proposed Substitution: _____

Manufacturer: _____ Phone: _____

Manufacturer Address: _____

Trade Name: _____ Model #: _____

I have attached complete proposed Substitution data substantiating its compliance with the Contract Documents, including:

1. Reference to Article and Paragraph numbers in Specification Section.
2. Manufacturer's name and address, product, trade name, model or catalog number, performance and test data, and reference standards.
3. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, properties, performance, warranties, and other pertinent characteristics.
4. Certified test data to show compliance with performance characteristics specified.
5. Samples, color and finish options, and shop drawings as applicable or requested.
6. Details indicating changes required in other Work.
7. Cost data comparing proposed substitution with specified product, to include net cost difference.
8. Availability of maintenance service and source of replacement parts as applicable.
9. Other information as necessary to assist Architect's evaluation.

I, _____, certify that:

1. I have provided the information required above.
2. I have investigated proposed substitution within context of adjacent materials and construction, I and determined that it meets or exceeds quality and performance levels of specified product.
3. I will coordinate installation of accepted substitution and make approved changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. I waive claims for additional costs or time extension which may subsequently become apparent.
5. I will reimburse Owner and Architect for review or redesign services associated with re-approval requirements by authorities having jurisdiction and redesign services required otherwise.

Certified By: _____ Signature: _____ Date: _____

Construction Manager: _____ Phone: _____

Address: _____

Notary State of: _____ County of: _____

Subscribed and sworn to before me on this _____ day of _____ in the year _____

by: _____ .

Notary Public Signature: _____ My Commission Expires: _____

Notary Public Printed Name: _____

SECTION 01 73 00

EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Examination.
   2. Preparation.
   3. Construction Layout.
   4. Field Engineering.
   5. Installation.
   6. Cutting and Patching.
   7. Coordination of Owner-Installed Products.
   8. Progress Cleaning.
   9. Starting and Adjusting.
   10. Protection of Installed Construction.
   11. Maintenance Service.

B. Related Requirements:
   1. Division 01 Section "Summary" for limits on use of Project site.
   2. Division 01 Section "Submittal Procedures".
   3. Division 01 Section "Closeout Procedures".
   4. Division 01 Section “Project Record Documents” for submitting documentation.
   5. Division 07 Section "Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Existing In-Place Materials and Construction: Materials and construction that existed prior to the beginning of Work for this Project and is to remain without compromise after the Work of this Project.

B. Cutting: Removal of existing in-place materials and construction necessary to permit installation or performance of the Work of this Project.

C. Patching: Fitting and repair work required to restore existing in-place materials and construction to original conditions after installation of other work.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. General: Verify that existing conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Existing Site Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting or affected by the Work.
   1. Verify the locations and invert elevations at points of connection to sanitary sewer, storm sewer, water-service piping, underground electrical and communication services, and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving project site.

C. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

D. Examine and verify specific conditions described in individual specification sections.

E. Verify utility services are available, of correct characteristics, and in correct locations.

F. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

G. Examine rough-in of mechanical and electrical systems to verify actual and compliant locations for connections before equipment and fixture installation.

H. Verify compatibility between new Work to be apply and existing substrates upon which new Work is to be applied, including compatibility with existing finishes, sealers, or primers.

I. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

J. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

K. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

L. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Construction Manager, submit a request for information to Architect.

M. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

D. Verify that the required tools, equipment, utilities, products, and materials are available to the area of Work and that all items are in condition as to produce coordinated workflow and compliant Work.

E. Separator for Dissimilar Materials: Separate dissimilar materials to prevent galvanic, chemical, and other corrosive action by applying a permanent separator material.
   1. Separator Material Requirements:
      a. Permanent type that will remain concealed in the applied location without running, staining, or migrating onto visible finish surfaces.
      b. Material approved by manufacturers of materials being separated.
   2. Separator material may include the following if it complies with the indicated separator material requirements.
      a. Zinc molybdate alkyd coating, minimum dry film thickness of 15 mil.
      b. Bituminous coating, minimum dry film thickness of 15 mil.
      c. Self-adhering rubberized asphalt sheet.
      d. Other permanent separator material complying with indicated requirements.

F. Exterior Wood Without Shop Applied Finish: Where field-coated wood materials are indicated, back-prime all concealed surfaces with primer/sealer recommended by coating manufacturer for substrate materials.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a Professional Land Surveyor, registered in the State in which the project is located, to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish limits on use of Project site.
   3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   4. Inform installers of lines and levels to which they must comply.
   5. Check the location, level and plumb, of every major element as the Work progresses.
   6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

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

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Final Property Survey:
   1. Construction Manager is to engage the services of a Professional Land Surveyor to prepare a final property survey showing significant features and real property as constructed in accordance with the Contract Documents.
   2. The land surveyor is to be registered in the State in which the project is located.
   3. Survey is to indicate final completed property conditions and features.
   4. Survey is to include land surveyor signed certification that the principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
      a. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
   5. Construction Manager is to review the survey documentation to confirm that the survey indicates the Work is compliant with the requirements of the Contract Documents. Noncompliant Work is to be corrected by the Construction Manager and the correction(s) are to be updated in the survey and certified by surveyor in the survey documentation.
      a. Construction Manager is to submit compliant final survey to Owner with Construction Manager's written letter certifying that the final survey indicates the Work to be compliant with the requirements of the Contract Documents.
      b. Record the compliant final property survey with the appropriate authorities having jurisdiction as the official "Property Survey".
      c. Record Documents: Include the following in the project closeout record documents.
         1) Copy of the surveyor certified, compliant final property survey.
         2) Copy of Construction Manager's compliance certification.
         3) Evidence of official recording of compliant final property survey with the appropriate authorities having jurisdiction.

3.5 INSTALLATION

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

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for in-stalling anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Execute cutting, fitting, and patching to complete Work, and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

C. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.

D. Patching Existing In-Place Materials: Use materials for patching identical to the existing in-place materials. For exposed surfaces, use materials that visually match the existing in-place adjacent surfaces.

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

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, and floor construction. Completely seal voids.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Division 07 of the Specifications, to full thickness of penetrated element.

J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

K. Identify hazardous substances or conditions exposed during the Work to Owner and Architect for decision or remedy.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's separate construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner provided work and separate contractors.
1. Construction Schedule: Incorporate services and work activities of Owner provided work and separate contractors into the project's Construction Schedule.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 degrees F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements of local and state authorities and as indicated in the contract documents related to Construction Waste Management and Disposal.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 and other Sections related to "Commissioning".

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Testing and Balancing: Test and balance HVAC and controls system to operate at required levels of performance. Record and submit process and final testing and balancing results indicating compliance with project requirements.

F. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide protection and maintain conditions that ensure installed Work is without damage or deterioration until Owner acceptance of project. Temporarily remove protective measures as required for required inspections, then reapply protective measures until Owner acceptance of project.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 MAINTENANCE SERVICE

A. Maintenance Service Period: As indicated in individual specification sections or, if not indicated, not less than one (1) year from the Date of Substantial Completion.

B. Provide service and maintenance for components and systems as indicated in individual specification sections and provide the following minimum requirements.
   1. Implement systematic, scheduled, and on-site services.
   2. Coordinate service dates and times with Owner to avoid disruption of Owner’s operations.
   3. Examine system components at a frequency consistent with maintaining reliable operations.
   4. Clean, adjust, and lubricate as required.

5. Repair or replace parts that are not functioning properly with parts produced by the manufacturer of the original component or system.

C. Maintenance service shall not be assigned or transferred to any other agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative, certification and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Procedures Prior to Substantial Completion.
   2. Substantial Completion Procedures.
   3. Final Completion Procedures.
   4. Final Cleaning.
   5. Repair of the Work.

B. Related Requirements:
   1. Division 01 Section "Administrative Requirements".
   2. Division 01 Section "Execution" for progress cleaning of Project site.
   3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
   4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
   6. Sections indicating specific operation and maintenance manual requirements for the Work in those Sections.
   7. Sections indicating specific closeout and special cleaning requirements for the Work in those Sections.
   8. Sections indicating Commissioning Requirements for verification and compilation of data into operation and maintenance manuals.

1.3 PROCEDURES PRIOR TO SUBSTANTIAL COMPLETION

A. Complete the following a minimum of two (2) months prior to execution of Demonstration and Training for Owner.
   1. Operation and Maintenance Manuals: Refer to Section 01 78 23 - Operation and Maintenance Data for requirements.
      a. Submit Initial O&M Manuals two (2) months prior to training for Owner.

B. Complete the following a minimum of thirty (30) days prior to issuance of Construction Manager Request for Substantial Completion Inspection.
   1. Project Closeout Meeting: Refer to Section 01 30 00 - Administrative Requirements for requirements. Provide notice to indicated attendees a minimum of seven (7) days prior to meeting.

C. Complete the following a minimum of ten (10) days prior to issuance of Construction Manager Request for Substantial Completion Inspection.
   1. Project Record Documents: Initial Submittals of the Record Documents.
      a. Refer to Section 01 78 39 - Project Record Documents.
      b. Complete all Section requirements and submit Initial Submittals indicated.

2. Demonstration and Training: Initial Submittal of the Demonstration and Training Manual.
    a. Refer to Section 01 79 00 - Demonstration and Training.
    b. Complete all Section requirements and submit Initial Submittal indicated.
3. Acquire and prepare documentation required as part of the Construction Manager Request for Substantial Completion Inspection.
4. Submit LEED and other Sustainable Design Submittals required in Division 01 for sustainable design and reporting requirements.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Substantial Completion Inspection: Submit a written request to Architect for inspection for certification of date of Substantial Completion a minimum of thirty (30) days prior to date the work will be completed and ready for final inspection. Include Construction Manager's List of Incomplete Items (AKA Punch List) as further detailed in the LIST OF INCOMPLETE ITEMS article in this Section.
    1. On receipt and review of request, Architect will either proceed with scheduling inspection or notify Construction Manager of unfulfilled requirements that preclude certification of Substantial Completion.
        a. In such case that the Architect provides notification to Construction Manager of unfulfilled requirements, Construction Manager will complete the noted and other such incomplete requirements that preclude certification of Substantial Completion. Whereafter, Construction Manager will issue another written request to Architect of inspection.
    2. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Construction Manager of items, either on Construction Manager's list of incomplete work or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
        a. If, during inspection, the Architect determines certification cannot be issued, the Architect will discontinue further inspection and provide notification report to Construction Manager of such determination.
        b. In such case that the Architect's inspection report determines that certification cannot be issued, complete the noted and all incomplete work and provide written request for reinspections to include a copy of the Architect's previous report of the failed inspection. Copy of report to include Construction Manager's certification and date and Construction Manager initials of completion by each deficient item completed in preparation for reinspections.
        c. Results of completed inspection will form the basis of requirements for final completion.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
    1. Submit final Certificate For Payment according to Division 01 Section "Payment Procedures."
    2. Construction Manager Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection report and list of items to be completed or corrected (punch list), indicating completion as follows:
        a. Each item dated and initialed by Construction Manager's Superintendent as being inspected and complete.
        b. Certification by Construction Manager's Project Manager that Punch List and all Work is complete.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Corrected closeout and project documentation that was previously deficient.
5. Remaining closeout and project documentation not yet submitted.
6. Submit Final Operation and Maintenance Manuals Submittal as indicated in Section 01 78 23 - Operation and Maintenance Data.
7. Submit Final Project Record Documents Submittal as indicated in Section 01 78 39 - Project Record Documents.
8. Submit Final Demonstration and Training Manual: Refer to Section 01 79 00 - Demonstration and Training.

B. Final Completion Inspection: Submit a written request to Architect for final inspection to determine acceptance a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests.
1. On receipt and review of request, Architect will either proceed with scheduling inspection or notify Construction Manager of unfulfilled requirements that preclude certification of final Certificate For Payment.
   a. In such case that the Architect provides notification to Construction Manager of unfulfilled requirements, Construction Manager will complete the noted and other such incomplete requirements that preclude certification of final Certificate For Payment. Whereafter, Construction Manager will issue another written request to Architect of inspection.
2. Architect will process the final Certificate For Payment after inspection or will notify Construction Manager of incomplete requirements that must be completed or corrected before certificate will be issued.
   a. If, during inspection, the Architect determines certification cannot be issued, the Architect will discontinue further inspection and provided notification report to Construction Manager of such determination.
   b. In such case that the Architect's inspection report determines that certification cannot be issued, complete the noted and all incomplete work and provide written request for reinspections to include a copy of the Architect's previous report of the failed inspection. Copy of report to include Construction Manager's certification and date and Construction Manager initials of completion by each deficient item completed in preparation for reinspections.
      1) Construction Manager's written request for reinspections to include an updated final Certificate For Payment and updated Construction Manager Certified List of Incomplete Items.

1.6 LIST OF INCOMPLETE ITEMS

A. Time of Submittal: Construction Manager is to submit along with written request to Architect for inspection to determine Substantial Completion.

B. Prepare and submit a comprehensive list of contract requirements and work to be completed and corrected (Construction Manager's Punch List), indicating the value of each item on the list and reasons why the Work is incomplete.

C. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Construction Manager that are outside the limits of construction. Also, include at the beginning of the list, incomplete contract requirements (administrative and otherwise) other than construction work.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Construction Manager’s Certification signature and date (First page only).
    f. Page number “of” Total pages.
4. Submit list of incomplete items in the following format:
    a. PDF electronic file. Architect will return annotated file.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

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

C. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
    1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
        a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
        b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
        c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
        d. Remove tools, construction equipment, machinery, and surplus material from Project site.
        e. Remove snow and ice to provide safe access to building.
        f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
        g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
        h. Sweep concrete floors broom clean in unoccupied spaces.

i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

D. Construction Waste Disposal:
1. Remove construction waste from site and dispose of waste in accordance with regulatory codes, laws, ordinances, and requirements of Authority Having Jurisdiction.
2. Comply with waste disposal requirements to include, but not limited to Section 01 73 00 - Execution as related to Progress Cleaning.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Remove and replace chipped, scratched or otherwise marred cast stone units and natural stone units.
3. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
4. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
5. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Emergency, Operation and Maintenance Documentation Directory Manual.
   2. Emergency Manual - systems, subsystems and equipment.
   3. Operation Manual - systems, subsystems and equipment.
   4. Systems and Equipment Maintenance Manual - systems, subsystems and equipment.
   5. Product Maintenance Manual.

B. Related Requirements:
   1. Sections indicating Closeout Procedures.
   2. Sections indicating Submittal Procedures for submitting copies of submittals for operation and maintenance manuals.
   3. Sections indicating Commissioning Requirements for verification and compilation of data into operation and maintenance manuals.
   4. Sections indicating specific operation and maintenance manual requirements for the Work in those Sections.
   5. Sections indicating Demonstration and Training requirements.

1.3 DEFINITIONS

A. Digital Media Device: Digital media drive device, readable with current Microsoft operating system software. Digital files are to allow for reviewer comments and markup to be added.

B. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

C. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manuals Content: Content is to include pertinent data and data specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Where applicable, clarify and update content of manuals to correspond to revisions and field conditions.

B. Manuals Format: Format to be as follows and as further detailed in this Section and the Contract Documents:
   1. Electronic Copies (PDF electronic file): Assemble each manual into a composite electronically indexed file. Submit on Digital Media Device.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory. Label each digital media device indicating content name

of manual; project identification name and numbers; and names and phone numbers of Owner and Contractor (and Construction Manager, if any).

b. Electronic files are to allow for reviewer comments and markups to be added.

2. Paper Copies: Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Initial Manuals Submittal:
1. Submit at time indicated in Section 01 77 00 - Closeout Procedures.
2. Submit two (2) Electronic Copies of Manuals as described in this Section.
3. Submit one (1) Paper Copies of Manuals as described in this Section.

D. Final Manuals Submittal:
1. Correct deficiencies from Initial Submittal.
2. Submit at time indicated in Section 01 77 00 - Closeout Procedures.
3. Submit two (2) Electronic Copies of Manuals as described in this Section.
4. Submit three (3) Paper Copies of Manuals as described in this Section.

1.5 REQUIREMENTS FOR MANUALS

A. Comply with these requirements for each Manual to be submitted for this Project. Requirements apply to both Paper Copy and Electronic Copy manual formats and for Initial and Final Manual submissions.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:
1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager (if any).
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority (if any).
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manual.
10. Cross-reference to related systems in other manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. Main headings in table of contents to be Specification Section Number and Title. Inset below each main heading the description of the documentation provided and table of contents reference number in sequence as follows:
a. Number prefix to be Section Number (without spaces), followed by two-digit sequence number.
b. Examples: 044200-01; 044200-02; etc. 081416-01; 081416-02; etc.
2. Divider tab insert numbers to match table of content reference numbers.
3. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Electronic Copies of Manuals: Prepare manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use manufacturer's electronic files when available. Otherwise, scan paper documents to electronic files for inclusion.
   2. File Names and Bookmarks: Provide digitally linked bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting book-marks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
   3. Submittal Media: Electronic Digital Media Device. Two copies of device; labeled with identification information; inserted into sleeve at front of Paper Copies of Manuals.

G. Paper Copies of Manuals: Prepare manuals in the form of hard copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 x 11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary, to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine with printed title of manual type; project name and Owner project number(s); subject matter of contents; and name, address and telephone number of Contractor (and Construction Manager, if any). At the bottom of each binder front and spine, indicate "01 78 23 - O&M Data - Vol 1 of 4" (sequence Volume # by manual type).
   2. Dividers: Heavy-paper dividers with plastic insert tabs for insertion of table of contents reference number.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
   4. Supplementary Text: Prepared on 8-1/2 x 11-inch white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

PART 2 PRODUCTS

2.1 EMERGENCY, OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems".

2.2 EMERGENCY MANUAL

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.
   5. Power failure.
   6. Water outage.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

2.3 OPERATION MANUAL

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semi-annual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 EXECUTION

3.1 MANUAL PREPARATION

A. Emergency, Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of emergency, operation or maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Contract Drawings.
   2. Record Shop Drawings.
   3. Record Specifications (Project Manual).
   4. Record Product Data and Samples.
   5. Record Certifications.
   6. Record Project Warranties.

B. Related Requirements:
   1. Division 01 Section "Execution" for additional requirements including, but not limited to, Final Property Survey, and Starting and Adjusting equipment.
   2. Division 01 Section "Closeout Procedures" for general closeout procedures.
   3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
   4. Divisions 03 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 DEFINITIONS

A. Digital Media Device: Digital media drive device, readable with current Microsoft operating system software. Digital files are to allow for reviewer comments and markup to be added.

B. Record Prints: Construction Manager maintained documents on which the Construction Manager records approved new information and revisions to the original information thereon. The recording process and result is often referred to as “marked-up” and “as-built” documents.

1.4 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents in the field for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents during normal working hours by the Designers and Owner.

1.5 CLOSEOUT SUBMITTALS

A. General Requirements:

1. Reproductions of photocopy type and electronic scanned type:
    a. Quality: Reproductions are to accurately depict the colors and information on the Construction Manager's Record Prints and other documents.
    b. Size: Reproductions on paper media and as PDF electronic files are to be the same size as the Construction Manager's Record Prints and other documents.
2. Prior to making submissions, verify quality of color and legibility of reproduction.
3. For each submission, include all pages and sheets of the required documentation, whether, or not, changes and additional information were recorded thereon.
4. Initial Record Submittals: Submit for Architect.
    a. Submittal time to be as indicated in Section 01 77 00 - Closeout Procedures.
5. Final Record Submittals: Submit for Owner and for Architect, each.
    a. Prior to submission, correct deficiencies observed after the Initial Submittal.
    b. Submittal time to be as indicated in Section 01 77 00 - Closeout Procedures.

B. Record Contract Drawings Submittal.
1. Initial Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.
2. Final Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device

C. Record Shop Drawings Submittal.
1. Initial Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.
2. Final Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.

D. Record Specifications Submittal.
1. Initial Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.
2. Final Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.

E. Record Product Data and Samples Submittal.
1. Initial Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.
2. Final Submittal:
    a. Paper Copy Format: Submit photocopy of Record Prints.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.
3. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate Record Product Data as a component of manual and in formats as required for O&M manuals submission.

F. Record Certifications Submittal.
1. Initial Submittal:
    a. Paper Copy Format: Submit photocopies of Certifications.
    b. Electronic Scanned Files Format: Submit on Digital Media Device.
2. Final Submittal:
    a. Paper Copy Format: Submit originals of Certifications for Owner, and photocopy of Certifications for Architect.

b. Electronic Scanned Files Format: Submit on Digital Media Device.

G. Record Project Warranties Manual Submittal.
1. Initial Submittal: Warranties with information filled in, but not executed with certification signatures and dates.
a. Paper Copy Format: Submit photocopies in Warranties Manual.
b. Electronic Scanned Files Format: Submit on Digital Media Device.
2. Final Submittal: Documents to be executed with certification signatures and dates.
a. Paper Copy Format: Submit originals in Warranties Manual for Owner, and photocopies in Warranties Manual for Architect.
b. Electronic Scanned Files Format: Submit on Digital Media Device.

PART 2 PRODUCTS

2.1 RECORD PRINTS - CONTRACT DRAWINGS AND SHOP DRAWINGS

A. Construction Manager is to maintain Record Prints as marked-up copies of original Contract Drawings and approved Shop Drawings in two (2) format types. Both formats to be maintained current and to be available for review by Owner and Architect throughout construction progress.
1. Marked-Up Paper Copies Format.
2. Electronic Marked-Up (annotated) PDF Format.
a. Annotations and associated data to be distinct and viewable by PDF software applications "Bluebeam REVU" and "Adobe Acrobat".

B. Preparation: Promptly incorporate new and revised drawings, notes, and approved installation variations as modifications are issued. Construction Manager’s personnel to be proficient at recording graphic and electronic information in both format types. During project closeout, both format types will be submitted as the Construction Manager's Record Prints for the Contract Drawings and the Shop Drawings.
1. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to provide information for Construction Manager to apply to corresponding marked-up Record Prints.
2. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
3. Accurately record information in an acceptable drawing technique.
4. Record data daily after obtaining it.
5. Record and check the markup before enclosing concealed installations.
6. Cross-reference Record Prints to corresponding archive photographic documentation.

C. Content: Types of items requiring marking include, but are not limited to, the following:
1. Dimensional changes to Drawings.
2. Revisions to details shown on Drawings.
3. Depths of foundations below first floor.
4. Locations and depths of underground utilities.
5. Revisions to routing of piping and conduits.
6. Revisions to electrical circuitry.
7. Actual equipment locations.
8. Duct size and routing.
9. Locations of concealed internal utilities.
10. Changes made by Change Order, Construction Change Directive and Field Orders.
11. Changes made following Architect's written orders.
12. Details not on the original Contract Drawings.
13. Field records for variable and concealed conditions.

14. Record information on the Work that is shown only schematically.

D. Mark the Record Prints completely and accurately.

E. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

F. Mark important additional information that was either shown schematically or omitted from original Drawings.

G. Incorporate new drawings received, including but not limited to, drawings received as part of Addenda, Construction Change Directives, Change Orders or Field Orders.

H. When entire drawing sheet is replaced by a newly issued drawing, indicate with a large red "X" through the entire deleted sheet and note in red the identification of the new drawing sheet (e.g. "This Sheet Replaced By _____; Change Order # ____; Dated _____).
1. Insert the new drawing sheet behind the deleted drawing and identify it similarly (e.g. "This Sheet Added To Replace _____; Change Order #____; Dated _____).

I. Note Construction Change Directive numbers, Alternate numbers, Change Order numbers, Field Order numbers and similar identification, where applicable.

2.2 RECORD CONTRACT DRAWINGS SUBMITTAL

A. Paper Copy Format:
1. Bind each set of final marked-up Record Prints into volume sets in like manner as the original contract drawings.
2. Annotate in red the following in a prominent and consistent location on each sheet (including sheets with no markups).
   a. Designation "PROJECT RECORD CONTRACT DRAWINGS".
   b. Name of Construction Manager.
   c. Signature and Date.

B. Electronic Scanned Files Format:
1. Scan marked-up Record Prints as PDF electronic files.
2. Each drawing sheet to be separate electronic file.
3. Name each file with the sheet identification number and title, and add a 3-digit prefix that sequences the files in the order in which each sheet appeared in the original contract drawings (e.g. "043_A-603 Door and Frame Elevations.pdf").
4. For added drawings, provide sequencing of file names in logical and contextual order similar to original contract drawings.
5. Create digital hyperlinked bookmarks for each sheet that provides a single bookmarked navigation panel for accessing sheets by clicking bookmark (bookmarked table of contents).
6. Identification Information:
   a. Electronically annotate in red the following in a prominent and consistent location on cover sheet of each drawings set volume:
      1) Same information as indicated for Paper Copy Format.
7. Electronically annotate in red the following in a prominent and consistent location on each page (including pages with no mark-ups):
   a. Designation "PROJECT RECORD CONTRACT DRAWINGS".
8. Label electronic digital media device with same information as indicated for Paper Copy Format.

2.3 RECORD SHOP DRAWINGS SUBMITTAL

A. Paper Copy Format:
1. 3-Ring Binder Format: Drawing sets size 8-1/2 x 11 inches and 17 x 11 inches.

a. Bind in 3-ring hard binder. Binder sized to hold 8-1/2 x 11 inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers. For 17 x 11 inch sheets, fold each sheet at 8-1/2 inches and back fold at 12-3/4 inches to facilitate unfolding view of content.
b. Organize drawing sets in sequence by Specification Section Number.
c. Insert durable divider tab sheet at beginning of each set. Each extended tab to indicate Specification Number. Binder holes are to be reinforced to prevent pull-out.
d. Insert identification information in cover sleeve and spine sleeve.
    1) Designation "PROJECT RECORD SHOP DRAWINGS".
    2) Project Name and Number.
    3) Name of Construction Manager.
    4) Signature and Date.
e. First page in each binder is to be the overall record shop drawings directory.
    1) Provide overall directory tiled “Directory for Project Record Shop Drawings”. List each set of shop drawings sequenced by Specification Section Number - Title and Subtitle.
    2) Include a column indicating “3-Ring Binders” or “Bound Sets” for each item. The intent is to direct the viewer to the appropriate archived format location.

2. Bound Sets Format: Drawing sets larger than indicated for 3-Ring Binder Format.
    a. Bind each set with durable paper cover sheet and folded heavy paper spine.
    b. Include identification information on cover sheets:
        1) Same information as indicated for 3-Ring Binder Format.
        2) Add a copy of the overall record shop drawings directory.

B. Electronic Scanned Files Format:
1. Scan marked-up Record Prints as PDF electronic files.
2. Each set of shop drawings to be separate electronic file with one or more sheets.
3. Name each file with the corresponding Specification Section Number - Title_Subtitle. (e.g. “07 32 00 - Roofing_Insulation.pdf”).
4. Provide a file with overall directory titled “Directory for Project Record Shop Drawings”, listing each set of shop drawings sequenced by Specification Section Number - Title_Subtitle. Name of directory file to be “00 00 00 - Directory for Project Record Shop Drawings.pdf”. Title at top of directory page to be two lines. First line to indicate project name and number. Second line to be “Directory for Project Record Shop Drawings”. Create digital hyperlinked bookmarks for each directory item that is linked to the corresponding shop drawing file.
5. Identification Information:
    a. Electronically annotate in red the following in a prominent and consistent location of each drawing sheet (including sheets with no mark-ups):
        1) Same information as indicated for 3-Ring Binder Format.
    b. Label electronic digital media device with same information as indicated for 3-Ring Binder Format.

2.4 RECORD PRINTS - SPECIFICATIONS (Project Manual)

A. Maintain one set of marked-up paper copies of the original Specifications, incorporating new and revised drawings and notes as modifications are issued. Construction Manager’s personnel to be proficient at recording graphic information in production of marked-up Record Prints.

B. Preparation: Mark Record Prints to show the actual product installation where installation varies from that shown originally. Require individual or entity who obtained record data,

whether individual or entity is installer, subcontractor, or similar entity, to provide information for Construction Manager to apply to corresponding marked-up Record Prints.

1. Give particular attention to information on concealed products and installation that would be difficult to identify and record later.
2. Accurately record information in an acceptable and legible manner.
3. Record data daily after obtaining it.
4. Mark Table of Contents to include deletions, additions, and other modifications.
5. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options, finishes and colors selected.
6. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

C. Mark the Record Prints completely and accurately.

D. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

2.5 RECORD SPECIFICATIONS (Project Manual) SUBMITTAL

A. Paper Copy Format:
   1. Bind each set of marked-up Record Prints into volume sets in like manner as the original specifications.
   2. Include identification information on cover pages.
      a. Designation "PROJECT RECORD SPECIFICATIONS".
      b. Name of Construction Manager.
      c. Signature and Date.

B. Electronic Scanned Files Format:
   1. Scan marked-up Record Prints as PDF electronic files.
   2. Each specification volume to be separate electronic file.
   3. Name each file “Record Specifications - Volume #.pdf”.
   4. Create digital hyperlinked bookmarks for each specification section that matches marked-up Table of Contents.
   5. Identification Information:
      a. Electronically annotate in red the following in a prominent and consistent location on cover page of each specifications volume:
         1) Same information as indicated for Paper Copy Format.
      b. Electronically annotate in red the following in a prominent and consistent location on each page (including pages with no mark-ups):
         1) Designation "PROJECT RECORD SPECIFICATIONS".
      c. Label electronic digital media device with same information as indicated for Paper Copy Format.

2.6 RECORD PRINTS - PRODUCT DATA AND SAMPLES

A. Maintain one set of marked-up paper copies of the approved Product Data and Samples, incorporating notes and modifications as approved. Construction Manager’s personnel to be proficient at recording graphic information in production of marked-up Record Prints. Record Prints for Samples are paper copies (including photos as needed) of approved submitted Samples for the purpose of documenting approvals and recording changes. Physical samples are to be maintained by Construction Manager until disposition is confirmed by Construction Manager with Architect and Owner during required Closeout Meeting.

B. Preparation: Mark Record Prints to show the actual product installation where installation varies substantially from that shown in approved Product Data and Sample submittals. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to provide information for Construction Manager to apply to corresponding marked-up Record Prints.
   1. Give particular attention to information on concealed products and installation that would be difficult to identify and record later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Accurately record information in an acceptable and legible manner.
   4. Record data daily after obtaining it.

C. Mark the Record Prints completely and accurately.

D. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

2.7 RECORD PRODUCT DATA AND SAMPLES SUBMITTAL

A. Paper Copy Format:
   1. Bind in 3-ring hard binder. Binder sized to hold 8-1/2 x 11 inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers. For 17 x 11 inch sheets, fold each sheet at 8-1/2 inches and back fold at 12-3/4 inches to facilitate unfolding view of content. For oversized sheets, insert heavy-duty 3-ring type clear plastic pocket holders for inserting documents. Use multiple pocket holders in succession to avoid over-stuffing pocket holders.
   2. Organize product data and samples sets in sequence by Specification Section Number.
   3. Insert durable divider tab sheet at beginning of each product data set. Each extended tab to indicate Specification Number. Binder holes are to be reinforced to prevent pull-out.
   4. Insert identification information in cover sleeve and spine sleeve.
      a. Designation "PROJECT RECORD PRODUCT DATA AND SAMPLES".
      b. Project Name and Number.
      c. Name of Construction Manager.
      d. Signature and Date.
   5. First page in each binder to be overall directory tiled “Directory for Project Record Product Data and Samples”. List each set of product data and samples sequenced by Specification Section Number - Title_Subtitle. Coordinate directory items with divider tab sheets.

B. Electronic Scanned Files Format:
   1. Scan marked-up Record Prints as PDF electronic files.
   2. Each set of product data to be separate electronic file with one or more pages.
   3. Name each file with the corresponding Specification Section Number - Title_Subtitle. (e.g. “07 32 00 - Roofing - Insulation.pdf”).
   4. Provide a file with overall directory titled “Directory for Project Record Product Data and Samples”, listing each set of product data and samples sequenced by Specification Section Number - Title_Subtitle. Name of directory file to be “00 00 00 - Directory for Project Record Product Data and Samples.pdf”. Title at top of directory page to be two lines. First line to indicate project name and number. Second line to be “Directory for Project Record Product Data and Samples”. Create digital hyperlinked bookmarks for each directory item that is linked to the corresponding product data file.
   5. Identification Information:

a. Electronically annotate in red the following in a prominent and consistent location of each product data and samples page (including pages with no mark-ups):
   1) Same information as indicated for 3-Ring Binder Format.
b. Label electronic digital media device with same information as indicated for 3-Ring Binder Format.

2.8 RECORD CERTIFICATIONS SUBMITTAL

A. Content: Documentation includes, but is not limited to, the following.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Health Department Inspection and Acceptance: Obtain written acceptance for areas of construction receiving or required to receive such inspection.
   3. Fire Marshal Inspection and Acceptance: Obtain written acceptance for areas of construction receiving or required to receive such inspection.
   4. Certificate of Insurance: For continuing coverage. Include documentation of changeover requirements.
   5. Changeover information related to Owner's occupancy, use, operation and maintenance of HVAC and other building systems, and other utilities. Include record of startup, testing and preventative maintenance performed for systems and equipment.
   6. Stairs and Ramps Compliance Certification. Refer to PART 3 - EXECUTION in this Section, article Stairs and Ramps Compliance Certification.
   7. Spare Parts and Maintenance Products Delivery Certification.
   8. Permanent Locks, Keys and Security: Certification signed/dated by both Construction Manager and Owner indicating completion of final changeover of permanent locks and delivery of keys and pertinent documentation to Owner.
   9. Record of inspection and walkthrough with Owner and local emergency responders.
      a. Schedule and conduct inspection and walkthrough with Owner and local emergency responders. Provide record of the event.
   10. Record of termination and removal of temporary facilities.
      a. Terminate and remove temporary facilities from Project site, including mockups, construction equipment, and similar elements.
   11. Record of completion of final cleaning requirements.
      a. Complete final cleaning requirements, including touchup painting.
   12. Damage or Settlement Surveys.
   13. Final Property Survey.
   14. Testing and Balancing HVAC and Controls.
   15. For projects with LEED or other Sustainable Design requirements, submit LEED and other Sustainable Design Submittals required in Division 01 for sustainable design and reporting requirements.
   16. Miscellaneous Records: Includes submission of required project records, certifications and documentation associated with various construction activities or indicated in Divisions 01 through 49 Sections that are not related to other named closeout submittal types.

B. Paper Copy Format:
   1. Bind in 3-ring hard binder. Binder sized to hold 8-1/2 x 11 inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers. For 17 x 11 inch sheets, fold each sheet at 8-1/2 inches and back fold at 12-3/4 inches to facilitate unfolding view of content.
   2. Provide multiple volume binders of quantity if data quantity dictates.

3. Organize categories of documents by numbered logical sequence.
4. Insert durable divider tab sheet at beginning of each document type. Extended tabs to be type for text insertion. Binder holes to be reinforced to prevent pull-out.
5. Insert identification information in cover sleeve and spine sleeve.
   a. Designation "PROJECT RECORD CERTIFICATIONS". Add volume # if more than one volume is needed.
   b. Project Name and Number.
   c. Name of Construction Manager.
   d. Signature and Date.
6. First page in each binder to be overall directory titled “Directory for Project Record Certifications”. List each document type and sub-document sequentially with title and subtitle. Coordinate directory items with divider tab sheets.

C. Electronic Scanned Files Format:
1. Scan documents as PDF electronic files.
2. Each document to be separate electronic file with one or more pages.
3. Name each file with the corresponding Specification Section Number - Title_Subtitle. (e.g. “31 31 16 - Termite Control - Application Records.pdf”).
4. Provide a file with overall directory titled “Directory for Project Record Certifications”, listing document type sequenced by Specification Section Number - Title_Subtitle. Name of directory file to be “00 00 00 - Directory for Project Record Certifications.pdf”. Title at top of directory page to be two lines. First line to indicate project name and number. Second line to be “Directory for Project Record Certifications”. Create digital hyperlinked bookmarks for each directory item that is linked to the corresponding product data file.
5. Identification Information: Label electronic digital media device with same information as indicated for 3-Ring Binder Format.

2.9 RECORD PROJECT WARRANTIES MANUAL SUBMITTAL

A. Content: All required Warranties, Bonds, Maintenance Service Agreements, Certifications, and similar documents.

B. Paper Copy of Project Warranties Manual:
1. Organize documents into an orderly sequence based on the table of contents of Project Manual and Specification Section Numbers.
2. Bind content in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch paper. Entire cover and spine to have integral clear plastic sleeve with open top for insertion of printed identification information.
3. First page to be title page with identification information.
4. Second page to be Table of Contents listing each document. Main headings in table of contents to be Specification Section Number and Title. Inset below each main heading the identification of the document and number in sequence as follows:
   a. Number prefix to be Section Number (without spaces), followed by two-digit sequence number.
   b. Examples: 044200-01; 044200-02; etc. 081416-01; 081416-02; etc.
   c. Divider tab insert numbers to match table of content numbers.
5. Provide heavy bond divider tabs with plastic-covered insert tabs for each separate document.
6. In front of each document, insert a page with the following content:
   a. Specification Number and Title.
   b. Description of the product, equipment, or construction element to which the document is related.
   c. Name, address, and telephone number of Installer.

7. Identify each binder on the front and spine with script as follows:
    a. PROJECT WARRANTIES MANUAL
    b. Project name and ID number(s).
    c. Construction Manager name, address, and telephone number.
8. For Final Submittal of Project Warranties Manual:
    a. Construction Manager is responsible for acquiring all information and signatures to affect full execution of documents, including from Owner when required, prior to final submittal.
    b. All commencement dates are to be the Date of Project Acceptance, unless previously agreed upon otherwise in writing by Owner and Construction Manager. Such written agreement must be included with documentation.
    c. Documents to be finalized original documents with all information filled in including commencement and expiration dates and certification signatures and dates by all parties.

C. Electronic Copy of Project Warranties Manual:
1. PDF single file format on digital media device; labeled with identification information.
2. Content to be the same and organized in like manner as described for Paper Copy of Project Warranties Manual.
3. Digital file to include bookmarked panel with digitally hyperlinked bookmarks duplicating the Table of Contents for digital navigation to contents.

PART 3 EXECUTION

3.1 STAIRS AND RAMPS COMPLIANCE CERTIFICATION

A. Provide survey services to survey and certify that all interior and site constructed stairs and ramps are compliant with current applicable building codes and the Americans With Disabilities Act (ADA). Engage a professional registered surveyor or engineer to conduct survey, document survey data, and certify that survey data indicates compliance as indicated.
1. Documentation data is to include drawing indicating locations of stairs and ramps surveyed with locations keyed to survey data.
2. Surveyor or engineer to be qualified and experienced to provide the required service and is to be registered in the State in which project is located.
3. Documentation data and compliance certification to be sealed by the professional registered surveyor or engineer.

B. Correct construction found to be noncompliant with requirements indicated. When complete re-engage professional service provider to complete compliance certification.

C. Closeout Submittal: Submit the sealed Stairs and Ramps Compliance Certification as indicated in this Section for Records Certifications Submittals.

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes Construction Manager administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and Training Manual - Record of demonstration and training.

1.3 DEFINITIONS

A. Digital Media Device: Digital media drive device, readable with current Microsoft operating system software. Digital files are to allow for reviewer comments and markup to be added.

1.4 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products.
   2. Attendance List: For each training module, provide list of Owner’s intended participants.

1.5 CLOSEOUT SUBMITTALS

A. General Requirements:
   1. Submit records and documentation of required demonstration and training program/modules and actual training events for Owner. Comply with the requirements indicated in the SUBMITTAL - DEMONSTRATION AND TRAINING MANUAL article in this Section.

B. Initial Demonstration And Training Manual Submittal:
   1. Paper Copy Format: Submit one photocopy of Manual.
   2. Electronic Copy Format: Submit two (2) on digital media devices.
   3. Submittal time to be as indicated in Section 01 77 00 - Closeout Procedures.

C. Final Demonstration And Training Manual Submittal:
   1. Paper Copy Format: Submit one final Manual and one photocopy Manual.
   2. Electronic Copy Format: Submit two (2) on digital media devices.
   3. Submittal time to be as indicated in Section 01 77 00 - Closeout Procedures.

1.6 QUALITY ASSURANCE

A. Pre-Instruction Meeting: A minimum of seven (7) days prior to commencing training sessions, conduct meeting at Project site. Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss work items, locations and facilities requiring instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, facilities needed to avoid delays, and training attendees.
   3. Review required content of instruction for training modules.
   4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
   5. Review training documentation requirements.

1.7 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate with Owner to acquire list of Owner’s intended participants for each training module.

C. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals.

E. Do not submit instruction program until operation and maintenance data has been submitted, reviewed and approved by Architect. Refer to Section 01 78 23 - Operation and Maintenance Data.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 INSTRUCTION PROGRAM

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

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each Training Module, include instruction for the following as applicable to the system, equipment, or component:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Performance and design criteria if Contractor has delegated design responsibility.
      c. Operating standards.
      d. Regulatory requirements.
      e. Equipment function.
      f. Operating characteristics.

g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.

e. Review of spare parts needed for operation and maintenance.

3.2 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module information. Assemble training modules into a training manual to be provided to the training attendees.

B. Prior to time established to begin instruction, set up instructional equipment at instruction location.

3.3 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.4 SUBMITTAL - DEMONSTRATION AND TRAINING MANUAL

A. Content: Records and documentation of required demonstration and training programs/modules and actual training events for Owner.

B. Paper Copy of Demonstration And Training Manual:
   1. Organize documents into an orderly sequence based on each Training Module and in order of the subject matter Specification Section Numbers.
   2. Bind content in 8-1/2 by 11 inch heavy-duty, three-ring, vinyl-covered, loose-leaf binders(s); thickness as necessary to accommodate contents; and clear plastic sleeved DVD ring binder storage page(s) for DVD content inclusion. Entire cover and spine to have integral clear plastic sleeve with open top for insertion of printed Manual identification information.
   3. Manual first page to be title page with identification information.
      a. Manual Tile: DEMONSTRATION AND TRAINING MANUAL.
      b. Name of Project and Project Number.
      c. Name of Architect.
      d. Name of Construction Manager (if any).
      e. Name of Contractor.
      f. Name of Subcontractor.
   4. Manual second page to be Table of Contents listing each Training Module. Main headings in table of contents to be Specification Section Number and Title. Inset below each main heading the identification of each Training Module.
   5. Manual second page to be Table of Contents listing each Training Module. Main headings in table of contents to be Specification Section Number and Title. Inset below each main heading the identification of each Training Module.
      a. INSTRUCTION PROGRAM - OVERVIEW
         1) (Subheading to follow, if any)

2) (Subheading to follow, if any)

b. TRAINING MODULE - (Section Number and Title for each module)

1) (Subheading to follow, if any)

2) (Subheading to follow, if any)

6. Provide heavy bond divider tabs with plastic-covered insert tabs for each separate Training Module set of records.
7. Individual Training Module records: Order of insertion to be as indicated.
   a. In front of each Training Module, insert a page with the following content:
      1) Specification Section Number and Title.
      2) Description of the Training Module and bullet list of product, equipment or construction element to which the documentation is related.
      3) Name, address, and telephone number of Installer and Instructor.
   b. Documentation of Owner attendees that attended training session.
   c. Documentation of Training Module developed as part of the Instructional Program.
   d. Documentation of actual training session, including additional information disseminated or generated during training session.
   e. If training video(s) was viewed during the training session, indicate so by video title(s) and include the labeled digital media device.
   f. If video record of the training session is required, or produced without requirement, include the labeled digital media device.

C. Electronic Copy of Demonstration And Training Manual:
1. PDF single file format on digital media device; labeled with identification information.
2. Content to be the same and organized in like manner as described for Paper Copy of Demonstration And Training Manual.
3. Digital file to include bookmarked panel with digitally hyperlinked bookmarks duplicating the Table of Contents for digital navigation to contents.
4. Include video recordings as separate files on Manual media digital device; hyperlinked to references in the Manual; playable by mouse click on hyperlinked references.

D. Closeout Submittal: Manual in accordance with requirements indicated in Section 01 77 00 - Closeout Procedures.

END OF SECTION

SECTION 03 30 00

CAST –IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete for the following:
1. Slabs on deck.
2. Slabs on grade.
3. Walls.
4. Footings.
5. Fill for metal pan stairs
6. Mechanical equipment pads and housekeeping pads.
7. Control, expansion, and contraction joint devices.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
2. ACI 305 - Hot Weather Concreting.
3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
4. ACI 308.1 - Standard Specification for Curing Concrete.
5. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
3. ASTM C33 - Standard Specification for Concrete Aggregates.
4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
8. ASTM C150 - Standard Specification for Portland Cement.
9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.

14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 PERFORMANCE REQUIREMENTS

A. Vapor Barrier Permeance: testing results from ASTM F 1249 or ASTM E 96 must state a water vapor transmission rate (WVTR) of less than 0.01 perms.)

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on joint devices, attachment accessories and admixtures.

C. Design Data:
1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
a. Hot and cold weather concrete work.
b. Air entrained concrete work.
2. Identify mix ingredients and proportions, including admixtures.
3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Closeout procedures.

B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 318.

B. Conform to ACI 305 when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

1.7 COORDINATION

A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, and as follows:
1. Type I, except where other type is specifically permitted or required.
a. Type I may be replaced by Type III (high early strength) for concrete placed during cold weather.

B. Fly Ash: ASTM C 618, Type C or F.
1. Maximum allowable loss on ignition: 4.0 percent.

C. Water: Potable.

D. Aggregates:
1. Normal weight concrete: ASTM C 33, uniformly graded as follows:
a. Class: Moderate weathering region, but not less than 3M

b. Nominal Maximum Aggregate Size:
1) Slabs on Grade: 1-inch.
2) Footings and Walls: 3/4-inch.

2. Lightweight Aggregate: ASTM C330, 3/4-inch nominal maximum aggregate size.

E. Admixtures - General: Admixtures which result in more than 0.1 percent of soluble chloride ions by weight of cement are prohibited.

F. Air-Entraining Admixture: ASTM C 260 and certified by manufacturer for compatibility with other mix components.

G. Water-Reducing Admixture: ASTM C 494, Type A.

H. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

I. Water-Reducing and Accelerating Admixtures: ASTM C 494, Type E.

2.2 REINFORCEMENT

A. Deformed Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.

B. Welded Plain Wire Fabric: ASTM A185; in flat sheets.

2.3 REINFORCEMENT ACCESSORY MATERIALS

A. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.

B. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic tipped steel type; size and shape to meet Project conditions.

2.4 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Vapor Barrier
1. Vapor barrier must have all of the following qualities:
a. Permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7.1.
b. Other performance criteria:
1) Strength: ASTM E 1745 Class B.
2) Thickness: 10 mils
c. Manufactured from prime virgin resins.
2. Seam Tape: Manufacturer's recommended low permeance tape composed of a high-density polyethylene film and a rubber based, pressure-sensitive adhesive.
3. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
a. Stego Wrap 10-Mil Class A Vapor Retarder by Stego Industries, LLC

B. Nonshrink Grout: ASTM C 1107.

1. Type: Provide nonmetallic type only.
2. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    a. Nonmetallic type:
        1) "Masterflow 928"; Master Builders, Inc.
        2) "Sonogrout 14k"; Sonneborn Building Products Division/ChemRex, Inc.
        3) "Euco N-S Grout"; The Euclid Chemical Company.
        4) "Supreme"; Cormix Construction Chemicals.
        5) "Crystex"; L & M Construction Chemicals, Inc.
        6) "Sure-Grip High Performance Grout"; Dayton Superior Corporation.
        7) "Horn Non-Corrosive Non-Shrink Grout"; A. C. Horn, Inc.
        8) "Five Star Grout"; Five Star Products, Inc.

C. Burlap: AASHTO M 182, Class 2 jute or kenaf cloth.

D. Moisture-Retaining Cover: ASTM C 171, and as follows:
1. Curing paper.
2. Polyethylene film.
3. White burlap-polyethylene sheeting.

E. Liquid Curing Compounds:
1. Manufacturers: Provide products complying with requirements of the contract documents and made by one of the following:
    a. Master Builders, Inc.
    b. Anti Hydro International, Inc.
    c. The Euclid Chemical Company.
    d. A. C. Horn, Inc.
    e. Dayton Superior Corporation.
    f. W. R. Meadows, Inc.
    g. The Burke Company.
    h. Sonneborn Building Products Division/ChemRex, Inc.
    i. L & M Construction Chemicals, Inc.
    j. Setcon Industries, Inc.
    k. Cormix, Inc.
2. Material - curing compounds: Comply with ASTM C 309, Type 1.
    a. Non-yellowing formulation where subject to ultraviolet light.
    b. Where compounds are proposed for use on surfaces to which finishes, coatings, or coverings subsequently will be applied, compound shall possess demonstrated compatibility with finish, coating, or covering, and use shall be subject to approval of the architect.
    c. Curing and sealing compound: Where indicated, provide curing and sealing formulation with long-lasting finish that is resistant to chemicals, oil, grease, deicing salts, and abrasion.
3. Solvents: Water-based products where used on interior surfaces.

F. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.
1. Products: Subject to compliance with requirements, provide one of the following:

a. Volclay Waterstop-RX;
b. Colloid Environmental Technologies Co.
c. Conseal CS-231; Concrete Sealants Inc.
d. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
e. Hydrotite; Greenstreak.
f. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
g. Adeka Ultra Seal; Mitsubishi International Corporation.
h. Superstop; Progress Unlimited Inc.

G. Underlayment Compound: Self-leveling cementitious compound designed for pumping.
1. Products: Provide one of the following:
a. "Flo-Top"; The Euclid Chemical Company.
b. "Thoro Underlayment Self-Leveling"; Thoro System Products Division/ICI Americas.

H. Expansion Joint Filler:
1. Interior - Nonextruding bituminous type: ASTM D 1751.
2. Exterior - Sponge rubber type: ASTM D 1752, Type I.

2.5 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 25 percent, for concrete exposed to weather.

C. Limit water-soluble, chloride-ion content in hardened concrete, measured by percent by weight of cement, as follows:
1. Concrete slabs exposed to weather. 0.30.
2. Concrete protected from weather: 1.00.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete and concrete with a water-cementitious materials ratio below 0.50.

2.6 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Slump Limit: 4 inches, plus or minus 1 inch.

B. Foundation Walls, Piers: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Slump Limit: 4 inches, plus or minus 1 inch.

C. Slabs-on-Grade, protected from weather: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd. for 1 inch maximum aggregate size or 540 lb/cu. yd. for ¾ inch maximum aggregate size.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

D. Slabs-on-Grade, exposed to weather: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd. for 1 inch maximum aggregate size; 540 lb/cu. yd. for ¾ inch maximum aggregate size.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch or 3/4-inch nominal maximum aggregate size.
5. Water-Cementitious ratio: 0.40.

E. Suspended Slabs on metal deck: Proportion structural lightweight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum aggregate size: ¾ inch.
3. Calculated Equilibrium Unit Weight: 115 lb/cu. ft., plus or minus 3 lb/cu. ft. as determined by ASTM C567.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.7 CONTROL OF MIX IN THE FIELD

A. Slump: A tolerance of up to 1 inch above approved design mix slump will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.

B. Total Air Content: A tolerance of plus or minus 1-1/2 percent of approved design mix air content will be allowed for field measurements.

C. Do not use batches that exceed tolerances.

2.8 CONCRETE MIXING

A. Transit Mixers: Mix concrete materials in transit mixers, complying with requirements of ASTM C 94.
   1. At ambient temperatures of 85 to 90 degrees F, reduce mixing and delivery time to 75 minutes.
   2. At ambient temperatures above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 31 00 - Administrative Requirements: Coordination and project conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 and ACI 318.

B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

D. Install vapor barrier under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by taping edges and ends.

E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.

F. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.

H. Install joint covers in longest practical length, when adjacent construction activity is complete.

I. Apply sealants in joint devices in accordance with Section 07920.

J. Deposit concrete at final position. Prevent segregation of mix.

K. Place concrete in continuous operation for each panel or section determined by predetermined joints.

L. No free falls in excess of 3 feet shall be permitted. For falls in excess of 3 feet, chutes or elephant trunks shall be employed.

M. Concrete shall be thoroughly compacted during placing and thoroughly worked around reinforcing and embedded fixtures and into the corners of the form. Vibration shall be employed to aid the compaction of the concrete under experienced supervision. Forms shall be designed to withstand their action. Supplement vibration by spading. No forking and/or raking shall be permitted. At least one spare vibrator shall be on hand for emergency use.

N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

O. Place concrete continuously between predetermined expansion, control, and construction joints.

P. Do not interrupt successive placement; do not permit cold joints to occur.

Q. No concrete that has partially hardened, become contaminated by foreign materials, or has been re-tempered shall be deposited.

R. Place floor slabs in saw cut pattern indicated.

S. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

T. Screed floors and slabs on grade level, maintaining surface flatness as indicated.

U. Provide control joints in concrete terrazzo flooring per NTMA recommendations and as follows: Provide control joints at no more than 6’-0” on center. Provide control joints at all corner locations. Coordinate joint locations with Architectural documents.

3.4 FINISHING FORMED SURFACES

A. Repairs, General: Repair surface defects, including tie holes, immediately after removing formwork.

1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen

patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.

2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.

B. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins or other raised areas exceeding 1/4 inch height.

C. Exposed Form Finish: Repair and patch defective areas, with fins or other projections completely removed and smoothed.

1. Surfaces requiring CSC4 finish per ACI 347.3R-14
   a. Exposed concrete columns at entry canopy.
2. Smooth rubbed finish: Apply to surfaces indicated no later than 24 hours after form removal.
   a. Wet concrete surfaces to be finished and rub with Carborundum brick or other abrasive until uniform color and texture are achieved.
   b. Do not apply separate grout mixture.
3. Contiguous unformed surfaces: Strike smooth and float to a similar texture tops of walls, horizontal offsets, and other unformed surfaces adjacent to or contiguous with formed surfaces. Continue final finish of formed surfaces across unformed surfaces, unless otherwise specifically indicated.

3.5 FINISHING SLABS

A. Finishing Operations - General:

1. Do not directly apply water to slab surface or dust with cement.
2. Use hand or powered equipment only as recommended in ACI 302.1R.
3. Screeding: Strikeoff to required grade and within surface tolerances indicated. Verify conformance to surface tolerances. Correct deficiencies while concrete is still plastic.
4. Bull Floating: Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate. Recheck and correct surface tolerances.
5. Do not perform subsequent finishing until excess moisture or bleed water has disappeared and concrete will support either foot pressure with less than 1/4-inch indentation or weight of power floats without damaging flatness.
6. Final floating: Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture. Recheck and correct surface tolerances.
7. Troweling: Trowel immediately following final floating. Apply first troweling with power trowel except in confined areas, and apply subsequent trowelings with hand trowels. Wait between trowelings to allow concrete to harden. Do not over trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over it. Consolidate concrete surface by final troweling operation. Completed surface shall be free of trowel marks, uniform in texture and appearance, and within surface tolerance specified.
   a. Grind smooth surface defects which would telegraph through final floor covering system.

B. Coordinate appearance and texture of required final finishes with the architect before application.

C. Float Finish: As specified above.

D. Broomed Float Finish: After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16 inch deep, without tearing surface.

E. Trowel Finish: As specified above.

F. Trowel and Fine Broom Finish: Follow trowel finishing operation immediately with fine brooming to achieve slightly scarified surface.

G. Slab Surface Tolerances:
1. Achieve flat, level planes except where grades are indicated. Slope uniformly to drains.
2. Floated finishes: Depressions between high spots shall not exceed 1/4 inch under a 10-foot straightedge.
3. Troweled finishes: Achieve level surface plane so that depressions between high spots do not exceed the following dimension, using a 10-foot straightedge:
   a. 1/8 inch non-cumulative in any direction and equivalent to F_F50 (floor flatness), F_L30 (floor levelness) at areas to receive wood flooring and special sports flooring as noted in Division 9.
   b. 3/16 inch all others receiving troweled finishes.

H. Slab Finish Schedule: Apply finishes in the following typical locations and as otherwise shown on the drawings:
1. Float finish:
   a. Surfaces to receive thickset stone flooring
2. Broomed float:
   a. Sidewalks.
   b. Exterior slabs not otherwise scheduled.
3. Trowel finish:
   a. Exposed interior floors not otherwise scheduled.
   b. Surfaces to receive resilient tile.
   c. Surfaces to receive carpet.
4. Trowel and fine broom:
   a. Surfaces to receive thinset tile.

I. Repair of Slab Surfaces: Test slab surfaces for smoothness and to verify surface plane to tolerance specified. Repair defects as follows:
1. High areas: Correct by grinding after concrete has cured for not less than 14 days.
2. Low areas: Immediately after completion of surface finishing operations, cut out low areas and replace with fresh concrete. Finish repaired areas to blend with adjacent concrete. Proprietary patching compounds may be used when approved by the architect.
3. Crazed or cracked areas: Cut out defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts. Dampen

exposed concrete and apply bonding compound. Mix, place, compact, and finish patching concrete to match adjacent concrete.

4. Isolated cracks and holes: Groove top of cracks and cut out holes not over 1 inch in diameter. Dampen cleaned concrete surfaces and apply bonding compound; place dry pack or proprietary repair compound acceptable to architect while bonding compound is still active:
   a. Dry-pack mix: One part portland cement to 2-1/2 parts fine aggregate and enough water as required for handling and placing.
   b. Install patching mixture and consolidate thoroughly, striking off level with and matching surrounding surface. Do not allow patched areas to dry out prematurely.
5. Underlayment: Leveling of slabs for subsequent application of floor finishes may be achieved by use of specified underlayment material, at contractor's option.

J. Surface Sealer: Apply to all interior concrete slabs to remain exposed.
1. Allow concrete to cure for 30 days prior to application of sealer.
2. Use clear solvent base, 100% solid epoxy sealer similar to Tamms Duraltex 1705. Apply two coats. Follow manufacturers recommendation for surface preparation.

3.6 CONCRETE CURING AND PROTECTION

A. General:
1. Prevent premature drying of freshly placed concrete, and protect from excessively cold or hot temperatures until concrete has cured.
2. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.

B. Normal Curing Period:
1. Not less than 7 days for standard cements and mixes.
2. Not less than 4 days for high early strength concrete using Type III cement.

C. Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.
1. Keep wooden or metal forms moist when exposed to heat of the sun.
2. If forms are removed prior to completion of curing process, continue curing by one of the applicable methods specified.

D. Surfaces Not in Contact with Forms:
1. Start initial curing as soon as free water has disappeared, but before surface is dry.
2. Keep continuously moist for not less than 7 days by uninterrupted use of any of the following:
   a. Water ponding.
   b. Water-saturated sand.
   c. Water-fog spray.
   d. Saturated burlap: Provide 4-inch minimum overlap at joints.
3. Begin final curing procedures immediately following initial curing and before concrete has dried.

a. Moisture-retaining cover: Lap not less than 3 inches at edges and ends, and seal with waterproof tape or adhesive. Repair holes or tears during curing period with same tape or adhesive. Maintain covering in intimate contact with concrete surface. Secure to avoid displacement.
   1) Extend covering past slab edges at least twice the thickness of slab.
   2) Do not use plastic sheeting on surfaces which will be exposed to view when in service.
b. Curing compound: Apply at rate stated by manufacturer to conform with moisture-retention requirements specified, using second, immediate application at right angles to first, if necessary, and reapply if damaged by rain.
c. Curing and sealing compound: Apply at rate stated by manufacturer to conform with moisture-retention requirements specified, using second, immediate application at right angles to first, if necessary, and reapply if damaged by rain. Apply additional coat near substantial completion to act as sealer.
d. Use curing compounds only in locations permitted or required, and where use will not interfere with other finishes, coatings, or coverings to be applied.

4. Continue final curing to end of curing period.

E. Avoid rapid drying at end of curing period.

F. During and following curing period, protect concrete from temperature changes of adjacent air in excess of 5 degrees F per hour and 50 degrees F per 24 hours. Progressively adjust protective measures to provide uniform temperature changes over entire concrete surface.

3.7 MISCELLANEOUS CONCRETE ITEMS

A. Fill-in: Fill in holes and openings left in concrete structures for passage of work by other trades after such work is in place. Place such fill-in concrete to blend with existing construction, using same mix and curing methods.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as indicated on drawings. Set anchor bolts at correct elevations, complying with diagrams or templates of equipment manufacturer.
1. Grout base plates and foundations as indicated with nonshrink grout.
2. Use nonmetallic grout for exposed conditions, unless otherwise indicated.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Screed, tamp, and finish concrete surfaces as scheduled.

D. Reinforced Masonry: Provide concrete grout for reinforced masonry where indicated on drawings and as scheduled.

3.8 CONCRETE REPAIRS

A. Perform cosmetic repairs of concrete surfaces as specified under concrete application.

B. Perform structural repairs with prior approval of the architect for method and procedure, using epoxy bonding systems. The architect's approval is required for repair methods using materials other than those specified.

3.9 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Composite Sampling, and Making and Curing of Specimens: ASTM C 172 and ASTM C 31.
   1. Take samples at point of discharge.
   2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same frequency at discharge from line. Results obtained at discharge from line shall be used for acceptance of concrete.

B. Slump: ASTM C 143. One test per strength test and additional tests if concrete consistency changes.
   1. Modify sampling to comply with ASTM C 94.

C. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air-entrained concrete.

D. Air Content of Lightweight Concrete: ASTM C 173. One test per strength test performed on air-entrained concrete.

E. Approximate Air-Dry Weight of Lightweight Concrete: ASTM C 567. Determine fresh unit weight once per strength test and report approximate air-dry weight of concrete represented.

F. Concrete Temperature:
   1. Test hourly when air temperature is 40 degrees F or below.
   2. Test hourly when air temperature is 90 degrees F or above.
   3. Test each time a set of strength test specimens is made.

G. Compressive Strength Tests: ASTM C 39.
   1. Compression test specimens: Mold and cure one set of 4 standard cylinders for each compressive strength test required.
   2. Testing for acceptance of potential strength of as-delivered concrete:
      a. Obtain samples on a statistically sound, random basis.
      b. Minimum frequency:
         1) One set per 100 cubic yards or fraction thereof for each day's pour of each concrete class.
         2) One set per 3500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.
         3) When less than 5 cubic yards is placed in one day, the architect may, at architect's option, waive laboratory testing of specimens if adequate evidence of satisfactory strength is provided. (Molding and curing of these specimens is not waived.)
         4) When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project,

conduct testing from not less than 5 randomly selected batches, or from each batch if fewer than 5.

c. Test one specimen per set at 7 days for information unless an earlier age is required.

d. Test 2 specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen; if both show such evidence, discard the test result and inform the architect.

e. Retain one specimen from each set for later testing, if required.

f. Strength potential of as-delivered concrete will be considered acceptable if all of the following criteria are met:

1) No individual test result falls below specified compressive strength by more than 500 psi.

2) Not more than 10 percent of individual test results fall below specified compressive strength f'(c).

3) Average of any 3 consecutive strength test results equals or exceeds specified compressive strength f'(c).

3. Removal of forms or supports: Mold additional specimens and field-cure with concrete represented; test to determine strength of concrete at proposed time of form or support removal.

H. Test Results: Testing agency shall report test results in writing to architect and contractor within 24 hours of test.

1. Test reports shall contain the following data:
   a. Project name, number, and other identification.
   b. Name of concrete testing agency.
   c. Date and time of sampling.
   d. Concrete type and class.
   e. Location of concrete batch in the completed work.
   f. All information required by respective ASTM test methods.
2. Nondestructive testing devices such as impact hammer or sonoscope may be used at architect's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.
3. The testing agency shall make additional tests of in-place concrete as directed by the architect when test results indicate that specified strength and other concrete characteristics have not been attained.
   a. Testing agency may conduct tests of cored cylinders complying with ASTM C 42, or tests as directed.
   b. Cost of additional testing shall be borne by the contractor when unacceptable concrete has been verified.

END OF SECTION 03 30 00

SECTION 034100

PRESTRESSED HOLLOW-CORE CONCRETE PLANK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies all labor and material for the manufacture, delivery and erection of prestressed hollow core planks as specified herein and shown on the Drawings.

B. Related Sections include the following:
1. Section 03 30 00, Section "Cast-in-Place Concrete" for reinforcing steel at anchorages.
2. Section 05 12 00 - Structural Steel Framing: Supporting steel lintels, headers.
3. Section 05 50 00 - Metal Fabrications: Supporting steel lintels, headers.

1.2 APPLICABLE PUBLICATIONS

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A416/A416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
5. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
6. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

C. American Welding Society:
1. AWS B2.1 - Specification for Welding Procedure and Performance Qualification
2. AWS D1.1 - Structural Welding Code - Steel.
3. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Precast/Prestressed Concrete Institute:

1. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products.
2. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete.
3. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete.
4. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete.
5. PCI MNL-126 - PCI Manual for the Design of Hollow-Core Slabs.

1.3 QUALIFICATIONS

A. Manufacturer shall be a firm specializing in providing prestressed concrete products and services of the types specified, and shall have a minimum of five years successful experience in the fabrication of prestressed concrete units of quality and scope required on this project.

B. Furnish precast prestressed units in accordance with PCI 116.

C. The precast concrete manufacturing plant shall be a member of PCI and participate in its Plant Certification program prior to submittal of bid.

D. Professional Engineer: a registered Professional Engineer in the State of South Carolina experienced in the design of precast prestressed concrete.

1.4 PRODUCT DESIGN

A. Loading for design

1. Initial handling and erection stresses.
2. All dead and live loads indicated on the Drawings.
3. All other loads specified for hollow-core slab units where applicable.

B. Maximum Allowable Deflection of Roof Planks: 1/360 span.

C. Maximum Allowable Deflection of Floor Planks: 1/360 span.

D. Design calculations shall be performed by a Professional Engineer experienced in precast prestressed concrete design.

E. Design in accordance with ACI 318.

F. Design deviations will be permitted only after the Architect’s approval of the manufacturer’s proposed design, supported by complete design calculations and drawings. Design deviations shall provide an installation equivalent to the basic intent without incurring additional cost to the Owner.

G. Fire resistance of units shall be designed in accordance with the International Building Code.

H. The General Contractor shall furnish sizes and locations of all required penetrations for work of other trades.

1.5 TESTING

A. Manufacturer shall make and test concrete compression specimens representative of the work in accordance with PCI MNL-116.

1.6 SUBMITTALS

A. Concrete mix design.

B. Shop drawings and calculations sealed and signed by a Professional Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C-150, Type I or III.Aggregates: ASTM C33 or shown by special test or actual service to produce concrete of adequate strength and durability.

B. Fly Ash: ASTM C618.Water: Potable or free from materials in amounts harmful to steel embedded in concrete.

C. Prestressing Steel: High tensile seven wire strand (270 ksi) tested according to ASTM A416. Wire shall be free of contaminants which would prevent bond to concrete.

D. Concrete Mixes

1. 28 day concrete compressive strength minimum of 5000 psi.
2. Use of calcium chloride ions or other salts is not permitted.

E. Plastic Bearing Pads: Multimonomer plastic strips shall be non-leaching and support construction loads with no visible overall expansion.

F. Grout: Fine grout mixed in proportion of one part portland cement and three parts sand with an approximate slump of 11 inches.

2.2 FABRICATION

A. Prestressed concrete slabs: Machine extruded in one single operation on long production lines on smooth rigid forms in 4’-0” nominal widths.

B. Openings

1. Openings requiring hanger-type supplementary steel members shall be by prestressed concrete manufacturer.
2. All other holes or openings shall be cut in field by trade requiring the openings.
3. In no case shall any hole be cut without approval of prestressed concrete manufacturer.

C. Finish

1. Standard Finish: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Small surface imperfections, normal color variations and form marks, and minor chips and spalls are acceptable.

D. Patching

1. Patching will be acceptable providing the structural adequacy of the hollow core unit is not impaired.

2.3 TOLERANCES

A. Provide units with tolerance within the limits recommended by PCI MNL-126.

PART 3 - EXECUTION

3.1 ERECTION

A. Prestressed concrete units shall be erected into final position under the supervision of the manufacturer or an erector experienced in installation of the types of units specified herein.

B. Site Access: The General Contractor shall be responsible for providing suitable access to the building, proper drainage, and firm level bearing for the hauling and erection equipment to operate under their own power.

C. Preparation: The General contractor shall be responsible for:

1. Providing true level bearing surfaces on all field placed bearing walls and other field placed supporting members.
2. All pipes, stacks, conduits and other such items shall be stubbed off at level lower than the bearing plane of the prestressed concrete products until after the latter are set.

D. Alignment: Erection tolerances shall be in conformance with PCI MNL-126 except where shop drawings indicate specific deviations.

3.2 ERECTION TOLERANCES

A. Erect to the following tolerances:
1. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.
2. Maximum Offset from Indicated Alignment between Members: 1/4 inch.
3. Maximum Variation from Dimensions Indicated on Reviewed Shop Drawings: Plus or minus 1/8 inch.

B. Exposed Joint Dimension: 3/8 inch plus or minus 1/4 inch.

3.3 GROUTING

A. Prestressed concrete units shall be aligned and leveled prior to grouting keyway joints in accordance with requirements and tolerances of PCI MNL-126. This operation is to be performed prior to units being loaded or ends restrained.

B. Keyways between units shall be cleared and filled solidly with grout. Grout that may have seeped through to surfaces in areas below shall be removed before hardening.

END OF SECTION 03 41 00

SECTION 04 05 03

MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mortar for masonry.
   2. Grout for masonry.

B. Related Sections:
   1. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.
   2. Section 04 72 00 - Cast Stone Masonry: Installation of mortar.
   3. Section 08 11 13 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
   2. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024a.
   3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
   4. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
   5. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
   6. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revisions.
   7. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2023.
   8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
   9. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
   10. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
   11. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
   12. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2020.
   13. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2022.
   14. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023b.
   15. ASTM D1148 - Standard Test Method for Rubber Deterioration-Discoloration from Ultraviolet (UV) or UV/Visible Radiation and Heat Exposure of Light-Colored Surfaces; 2013; Reapproval 2018.
   16. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.
   17. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2022.

B. The Masonry Society (TMS):
   1. TMS 402/602 - Building Code Requirements and Specification For Masonry Structures; 2022, with Errata.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

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. Samples for Initial Selections: Three manufacturer's complete sets of color samples illustrating the finishes, textures, and colors available. Coordinated mortar finish, texture, and color requirements indicated on Drawings and in other Sections requiring masonry work. Submit for Architect's initial selections.
   1. Standard Masonry Mortar: Sample sets of manufacturer's full range.
   2. Colored Masonry Mortar:
      a. Sample sets of manufacturer's full range.

D. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish, texture, and color; 3/8 x 4 inches in size. Samples to be same product to be used for the work. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

E. Test Reports:
   1. Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
   2. Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except when exceeded by requirements of the contract documents.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

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

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

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

C. Maintain materials and surrounding air temperature to minimum 40 degrees F and maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS

A. Mortar: At Contractor's option, mortar may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.

B. Masonry Cement ASTM C91 IS NOT PERMITTED.

C. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Structural Masonry: Type S.
   2. Non-Structural Masonry: Type S.
   3. Repointing Masonry:
      a. Match existing type, strength, composition, and color at cured stage.

D. Mortar Colors:
   1. Standard Masonry Mortar: Standard Gray.
      a. Sand Base: Buff.
      b. Location: All masonry not indicated to be other color.
   2. Colored Masonry Mortar:
      a. Color Range:
         1) Full Range: As selected by Architect from manufacture's full range.
            a) Colors indicated on Drawings and in Sections requiring masonry work.
      b. Locations:
         1) As indicated on Drawings.

E. Grout Mix Designs:
   1. Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; provide ready-mixed type in accordance with ASTM C94/C94M.
      a. Fine grout.
   2. Non-Structural Masonry: 2,000 psi strength at 28 days; 8-11 inches slump; provide ready-mixed type in accordance with ASTM C94/C94M.
      a. Fine grout.

2.2 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: As indicated for Mortar Mix Design in MORTAR AND GROUT APPLICATIONS article in this Section.
   2. Color: As required to produce approved mortar color sample(s).

B. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Type: Fine.

C. Portland Cement: ASTM C150/C150M.
   1. Type: Type I - Normal; ASTM C150/C150M.
   2. Color: As required to produce approved mortar color sample(s).

D. Hydrated Lime: ASTM C207, Type S.

E. Mortar Aggregate: ASTM C144, standard masonry type.
   1. Color: As required to produce approved mortar color sample(s).

F. Grout Aggregate: ASTM C404.

G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color: As required to produce approved mortar color samples(s).

H. Water: Clean and potable.

I. Bonding Agent: Latex type.

2.3 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. Colored Mortar: Proportion selected pigments and other ingredients to match approved mortar color sample(s), without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.

D. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

E. Do not use anti-freeze compounds to lower the freezing point of mortar.

F. If water is lost by evaporation, re-temper only within two hours of mixing.

2.4 GROUT MIXING

A. Ready-mixed type grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Request inspection of spaces to be grouted.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.

B. Brace masonry to resist wet grout pressure.

C. Remove excess mortar from grout spaces.

D. Ensure that reinforcement is secured in required positions.

E. Apply bonding agent to existing concrete surfaces where masonry units are set on concrete surfaces.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install mortar and grout to requirements of Section 04 20 00 - Unit Masonry and other section(s) in which masonry is specified.

C. Work grout into masonry cores and cavities to eliminate voids.

D. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

E. Do not displace reinforcement while placing grout.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and inspection services.

B. An independent testing agency will perform field tests.

C. Test and evaluate mortar in accordance with ASTM C780 procedures for aggregate ratio and water content, air content, consistency, and compressive strength.
   1. Test frequency: Every 5,000 sf of completed wall area.

D. Test and evaluate grout in accordance with ASTM C1019 procedures for compressive strength, and in accordance with ASTM C143/C143M for slump.
   1. Test frequency: Every 5,000 sf of completed wall area.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete Masonry Units.
   2. Brick Masonry Units.
   3. Reinforcement and Anchorage.
   4. Accessories.

B. Related Requirements:
   1. Section 01 21 00 - Allowances: Allowance(s) for brick.
   2. Section 03 45 00 - Precast Architectural Concrete.
   3. Section 04 05 03 - Masonry Mortaring and Grouting.
   4. Section 04 72 00 - Cast Stone Masonry.
   5. Division 05 - Metals: Structural steel, steel joists, metal fabrications, trusses, and metal framing requirements for metal anchors, bearing plates, and lintels to be placed by this Section.
   6. Section 07 21 19 - Foamed-In-Place Insulation: Insulation for masonry wall cavities.
   7. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for reglets for flashings to be placed by this Section.
   8. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.
   9. Section 07 90 00 - Joint Protection: Rod and sealant at control and expansion joints.
   10. Section 07 95 13 - Expansion Joint Cover Assemblies.
   11. Division 07 - Thermal and Moisture Protection: Dampproofing and waterproofing for masonry surfaces.
   12. Division 08 - Openings: Opening frames installed in or anchored to masonry work.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 216.1 - Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies; 2014, Errata 2021.

B. ASTM International (ASTM):
   1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
   2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
   3. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
   4. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.
   5. 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; 2023.
   6. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
   7. ASTM C40/C40M - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete; 2020.

8. ASTM C55 - Standard Specification for Concrete Building Brick; 2023.
9. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2023.
10. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023a.
11. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
12. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.
13. ASTM C142/C142M - Standard Test Method for Clay Lumps and Friable Particles in Aggregates; 2017, Reapproval 2023.
14. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2023.
15. ASTM C641 - Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates; 2023.
16. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.
17. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023b.
18. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017, Reapproval 2023.
19. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2020.
20. ASTM D2287 - Standard Classification System and Basis for Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds; 2019.
21. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
22. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
23. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.

C. Brick Industry Association (BIA):
1. BIA Technical Note 20 - Cleaning Brickwork; 2018.

D. Canadian Standards Association (CSA Group) (CSA):
1. CSA A82 - Fired Masonry Brick Made from Clay or Shale; 2018.

E. The Masonry Society (TMS):
1. TMS 402/602 - Building Code Requirements and Specification For Masonry Structures; 2022, with Errata.

F. Underwriters Laboratories Inc. (UL):
1. UL (FRD) - Fire Resistance Directory; Current Edition.
2. UL 263 - UL Standard for Safety Fire Tests of Building Construction and Materials; Current Edition.
3. UL 618 - UL Standard for Safety Concrete Masonry Units; Current Edition.
4. UL 723 - UL Standard for Safety Test for Surface Burning Characteristics of Building Materials; Current Edition.

1.3 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section.

1.4 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate masonry work with related work to include, but not limited to:
   1. Installation of anchors for windows, doors fixtures and other work requiring anchors to masonry work. door anchors.
   2. Electrical items and other built-in work.
   3. Mechanical ducts and dampers.
   4. Plumbing work items. Copper piping to be isolated from contact with cementitious materials as per code requirements.
   5. Foamed-in-place insulation and all waterproofing and air barrier design elements.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Product Data:
   1. Submit data for masonry units and fabricated wire reinforcement, wall ties, anchors, and other accessories.
   2. Indicate initial rate of absorption for clay and shale brick.

C. Samples for Initial Selections: Two manufacturer's complete sets of color samples illustrating the full range of finishes, textures, and colors available; 4 x 4 x 1 inches in size. Include samples of full range of mortar and sealant colors for all unit masonry work. Submit for Architect’s initial selections.
   1. Masonry Unit Types requiring sample submittals include the following types:
      a. Face Brick.
      b. Decorative Concrete Masonry Units.
      c. Polished Face Decorative Concrete Masonry Units.

D. Samples for Verification: From the Architect’s initial selections, prepare and submit three samples for each selected finish, texture, and color; samples to be same product material type indicated for final Work; each masonry unit sample 12 x 12 x 1 inches; each mortar and sealant sample 3/8 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

E. Manufacturer’s Certificate:
   1. Certify products meet or exceed specified requirements.
   2. Certify Aggregate used in Fire-Rated Concrete Masonry Units (CMU) is compliant with UL Fire Resistance Design Ratings requirements or alternate methods of determining fire resistance as allowed by Section 703.3 of the International Building Code.

1.6 QUALIFICATIONS

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section with minimum five (5) years of documented experience.

B. Installer Qualifications: Company specializing in performing Work of this Section with minimum three (3) years documented experience.

1.7 MOCKUP

A. Section 01 40 00 - Quality Requirements: Mockup requirements.

B. Exterior Wall Mockup Construction: Construction is to include all wall assembly components from exterior to interior of building. Contractor is to coordinate the various trade contractors to provide their work types in a sequenced and timely manner.

1. Refer to Mockup details in Drawings.
2. Locate mockup construction as directed by Architect.
3. Mockup Construction Removal: Request and acquire approval from Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Inspect products for damage during deliveries on site.

C. Store products in accordance with manufacturer's recommendation and to avoid damage.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Cold Weather Requirements: In accordance with TMS 402/602 when ambient temperature or temperature of masonry units is less than 40 degrees F.

C. Hot Weather Requirements: In accordance with TMS 402/602 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with provisions of TMS 402/602, except when exceeded by requirements on Drawings or other Contract Documents.
   1. Maintain one copy of each document on project site.

B. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated on Drawings.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E119 or UL 263, and as acceptable to authorities having jurisdiction.
      a. Alternate methods for determining fire resistance are to be as allowed by Section 703.3 of the International Building Code.

2.2 MANUFACTURERS

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

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

C. Source Limitations for Masonry Accessories: Obtain each type of masonry accessory from single manufacturer for each product required.

2.3 MASONRY UNITS - GENERAL

A. Special Shapes: Applies to all required masonry unit types.
   1. Provide special shape units for 90 degree and 135 degree corners and lintels.

2. Provide solid units where Drawings indicate unit setting position or special shape would otherwise result in exposure of unit cores, frogs, voids, or unfinished surfaces.
3. Provide special shape units where Drawings indicate sculpted unit design (i.e. bullnose, angled, chamfered, ogee, coped water tables, sills, offsets, accents, etc.).

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. CMU Chips and Surface Deficiencies: In addition to the referenced standards regarding subject, also comply with the following more stringent requirements:
1. Do not install CMU with exposed chipped edges or corners greater than 1/2 inch and any exposed face damage or deviations greater than 1/4 inch diameter. All chips or deviations must be repaired to a surface consistent with the unblemished CMU surface and to the satisfaction of the Architect.

2.1 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and with exposed surfaces matching finish and color of exposed faces of adjacent units of same type.
1. Unit Size and Shape: Unless indicated otherwise on Drawings, modular face size to be 7-5/8 x 15-5/8 inches and depths as indicated on Drawings.
a. Bond: 1/2 Bond (Running Bond), unless indicated otherwise on Drawings.
b. Coursing: One unit and one mortar joint to equal 8 inches.
c. Mortar Joints Tooling: Refer to INSTALLATION in this Section.
2. Provide special shape units configured for corners, lintels, headers, control joint edges and for special conditions indicated on Drawings.
3. Provide bullnose units as follows:
a. Wall outside corners.
1) Exception: Provide angle-corner units for first exposed course at outside corners scheduled to receive wall base finish. Grind exposed upper portion of angle-corner unit to create a smooth transition to match the bullnose units above.
b. Wall caps, unless other cap material finish is indicated.
c. Windowsills, unless other sill material finish is indicated.

B. Fire-Rated Hollow Load Bearing and Non-Load Bearing Concrete Masonry Units (CMU):
1. ASTM C90; light weight; UL 618; ACI 216.1-14.
2. Compressive Strength: As indicated on Drawings, but not less than 2,000 psi.
3. Where indicated on Drawings, provide the following:
a. Vertical single scored face.

C. Hollow Load Bearing Concrete Masonry Units (CMU):
1. ASTM C90; lightweight in accordance with ASTM C331 with the following modifications:
a. Organic Impurities (Color) - ASTM C40/C40M: Less than Organic Plate #1.
b. Clay Lumps (%) - ASTM C142/C142M: Less than 2%.
c. Stain Test (Index) - ASTM C641: No stain.
2. Compressive Strength: As indicated on Drawings, but not less than 2,000 psi.
3. Where indicated on Drawings, provide the following:
a. Vertical single scored face.

D. Solid Load-Bearing Concrete Masonry Units (CMU):
1. ASTM C90; lightweight in accordance with ASTM C331 with the following modifications:
a. Organic Impurities (Color) - ASTM C40/C40M: Less than Organic Plate #1.

b. Clay Lumps (%) - ASTM C142/C142M: Less than 2%.
c. Stain Test (Index) - ASTM C641: No stain.

2. Compressive Strength: As indicated on Drawings, but not less than 2,000 psi.
3. Where indicated on Drawings, provide the following:
   a. Vertical single scored face.

E. Hollow Non-Load Bearing Concrete Masonry Units (CMU):
1. ASTM C129; lightweight.
2. Compressive Strength: As indicated on Drawings, but not less than 2,000 psi.
3. Where indicated on Drawings, provide the following:
   a. Vertical single scored face.

F. Concrete Brick Units: ASTM C55; for use in concealed from view utility applications.
1. Compressive Strength: As indicated on Drawings, but not less than 2,000 psi.
   a. If concrete brick units are used in an assembly with other concrete masonry units, match compressive strength of other concrete masonry units.
   b.

G. Cast Stone Masonry: Refer to Section 04 72 00 - Cast Stone Masonry.

2.2 BRICK MASONRY UNITS

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units of same type:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
5. For Soldier Course applications, provide shapes that produce coursing pattern and unit size as indicated on Drawings.

B. Face Brick Modular Size: ASTM C216, Type FBS, Grade SW.
1. Size: 2-1/4 x 3-5/8 x 7-5/8 inches.
2. Unit Compressive Strength: 3,000 psi minimum, unless indicated otherwise on Drawings.
   a. Measured in accordance with ASTM C67/C67M.
   b. As determined by average of five (5) brick method; and no individual brick less than 2,500 psi.
3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67/C67M.
4. Efflorescence Rating: Rating to be “not effloresced” in accordance with ASTM C67/C67M or rating to be “slightly effloresced” in accordance with CSA A82.
5. Bond: 1/2 Bond (Running Bond); unless indicated otherwise on Drawings.
6. Coursing: Three units and three mortar joints to equal 8 inches.
7. Mortar Joint Tooling: Refer to INSTALLATION in this Section.
8. Basis of Design: Subject to compliance with requirements, provide face brick with physical and visual characteristics comparable to the following Basis of Design units, and as approved by Architect:
   a. Face Brick - BRK1.
      1) Basis of Design and Color:

a) Palmetto: Ivorystone Wirecut

b. Face Brick Color - BRK2.

1) Basis of Design and Color:

C. Red WirecutBuilding (Common) Brick: ASTM C62, Grade SW; solid units; for use in concealed from view utility applications.

1. Compressive Strength: 3,000 psi minimum, unless indicated otherwise on Drawings.
   a. Measured in accordance with ASTM C67/C67M.
   b. As determined by average of five (5) brick method; and no individual brick less than 2,500 psi.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67/C67M.
3. Efflorescence Rating: Rating to be “not effloresced” in accordance with ASTM C67/C67M or rating to be “slightly effloresced” in accordance with CSA A82.

2.3 ACCESSORIES

A. Manufacturers: Reinforcement and anchorage materials.

1. Hohmann & Barnard, Inc.
2. Wire-Bond.
3. Blok-Lok Limited.

B. Mortar and Grout: As specified in Section 04 05 03 - Masonry Mortaring and Grouting.

C. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength, deformed billet bars, uncoated finish.

D. Reinforcing Steel Rebar Positioners (Z-shaped wire bridges cell of block while bent ends rest on block shell:

1. Basis of Design: Hohmann & Barnard, Inc - HB RB Rebar Positioner.
2. Wire (Carbon Steel): Cold-drawn steel wire conforming to ASTM A1064/A1064M.
3. Wire Diameter: 9 gauge (.148 inch).
4. Tensile Strength: 80,000 psi.
5. Yield Point - 70,000 psi minimum.
6. Hot-Dip Galvanized after fabrication: ASTM A153/A153M (1.5 oz/ft).

E. Single Wythe Joint Reinforcement: Ladder type; ASTM A951/A951M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

1. Basis of Design: Hohmann & Barnard, Inc - HB 220 Ladder-Mesh.

F. Multiple Wythe Joint Reinforcement: Ladder type; ASTM A951/A951M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

1. Basis of Design: Hohmann & Barnard, Inc - HB 220 Ladder-Mesh.

G. Strap Anchors: Zee bent steel shape. 1-1/2 x 16 inches size x 1/4 inch thick. Hot dip galvanized after fabrication to ASTM A153/A153, Class B.

1. Basis of Design: Hohmann & Barnard, Inc - HB 344 Rigid Partition Anchor.

H. Cavity Wall Joint Reinforcing / Wall Ties: Ladder type, 0.1875 inch side rods with 0.148 inch cross rods; eye and pintle type anchors, 0.188 inch wire with compressed pintle legs; seismic clip to continuous rod in veneer, 0.1875 inch rod. All, ASTM A951/A951M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B.

1. Basis of Design: Hohmann & Barnard, Inc. - HB 265 S.I.S Ladder -2X Hook Anchor and Seismic Interlock System.

2. Where coursing of masonry veneer and structural masonry is not dimensionally aligned, provide joint reinforcing and wall tie system that allows for variations in alignment, up to 2-1/4 inch.
3. Soldier Course Masonry Veneer: Due to the vertical joint condition, anchor system must turn vertical to accommodate joint.
    a. Base Plate: ASTM A1008/A1008M carbon steel plate, 16 gauge thick x 2 inches wide with 1 inch bend. Hot dip galvanized to ASTM A153/A153M, Class B.
    b. Wire Tie: ASTM A1064/A1064M carbon steel, 0.1875 inch wire. Hot dip galvanized to ASTM A153/A153M, Class B.
    c. Basis of Design: Hohmann & Barnard, Inc. - HB BL-5407.

I. Wall Ties: ASTM A1064/A1064M; steel wire 0.1875 inch diameter, eye and pintle type. ASTM A153/A153M, Class B hot dip galvanized after fabrication.

J. Wall Ties (For Attachment to Metal Studs): Two-piece type; ASTM A1008/A1008M, 14 gage steel anchors; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.

K. Wall Ties (For Attachment to Structural Steel): Two-piece type; 0.25 inch continuous steel weld-on anchors, 8 feet total length, with 3/8 inch offsets spaced 8 inches OC.; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.

L. Wall Ties (For Attachment to Concrete Walls): Two piece type; ASTM A1008/A1008M, 18 gauge steel imbedded dovetail anchors, 10 feet total length, with foam insert; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.

M. Through-Wall Flashing and Counter Flashing: Self adhering stainless steel fabric flashing; width of roll to suit application; with preformed end dams, and inside and outside corners.
1. Thickness:
    a. Membrane - 0.040 inch (40 mil).
    b. Stainless steel - 0.003 inch (3 mil); Type 304.
2. Tensile Strength - ASTM D412C: 100.000 psi, minimum.
3. Puncture Resistance - ASTM E154: 2,500 psi, minimum.
4. Peel Strength of Adhesive Bonds - ASTM D903: Not less than 103 lbs/ft.
5. Fire Resistance - ASTM E84: Pass.
6. Mold Resistance - ASTM D3273: Pass.
7. Basis of Design: Hohmann & Barnard, Inc. - Mighty-Flash, SA Flashing.

N. Termination Bar at Top of Through-Wall Flashing: Type 304, stainless steel type, 1 inch x 8 feet x 1/8 inch thick.
1. At all locations where top edge of through-wall flashing is not indicated to be imbedded into back-up masonry wall, install continuous Termination Bar along top edge using stainless steel fasteners at 8 inches OC., preventing pull-out. Apply sealant continuously along top edge of termination bar and flashing assembly to seal against water penetration behind top of through-wall flashing assembly.
2. Basis of Design: Hohmann & Barnard, Inc.

O. Metal Flashing Drip Edge Plate: Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge (0.0179 inch) thick, factory formed hemmed drip edge configuration; finish 2D (dull).
1. Basis of Design: Hohmann & Barnard, Inc. - HB Drip Edge Plate.
2. Length: Not less than 8 feet long.
3. Width: As indicated on Drawings, but not less than 3 inches wide.
4. Provide factory preformed Inside Corners, Outside Corners and End Dams.

P. Preformed Control and Expansion Joints: Extruded polyvinyl chloride material conforming with ASTM D2287. Furnish with corner and tee accessories. Fuse joints.
   1. Tensile Strength - ASTM D412: 2200 psi.
   2. Ultimate Elongation - ASTM D412: 350 percent.
   3. Shore A Hardness - ASTM D2240: 85 (+ or – 5).
   4. Low Temp Brittleness - ASTM D746: -35 degrees C.

Q. Joint Filler: Closed cell rubber (polychloroprene) oversized 50 percent to joint width; self-expanding; width indicated by maximum lengths.

R. Cavity Drainage Material:
   1. Open polyethylene or polypropylene mesh; thickness as required to fill cavity space; 10 inches high with 7 inches deep dovetail notches at top; designed to allow cavity drainage and prevent collection and damming effect of mortar droppings in cavity.

S. Weeps: Preformed corrugated polypropylene cell vents; conforming to ASTM D2240, ASTM D790B, ASTM D638, and ASTM D1238B standards.
   1. Basis of Design: Hohmann & Barnard, Inc. - HB Quadro Vent.
   2. Size: 2-1/2 x 3-1/2 inches size, 3/8 inch thick.
   3. Color: Clear.

T. Cavity Vents: Same material as weeps.

U. Masonry Cleaning Solution: Non-acidic and not harmful to masonry or adjacent materials.
   1. Manufacturers:
      a. EaCo Chem., Inc. - NMD 80 New Masonry Detergent.
      b. PROSOCO - Sure Klean Vana Trol.
   2. Basis of Design: PROSOCO - Sure Klean Vana Trol.

V. Steel Lintels, Windowsill Supports, and Other Steel Supports: Refer to Section 05 50 00 - Metal Fabrications. Size and configuration as indicated on Drawings. All exterior steel components to be hot dip galvanized per Section 05 50 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify items provided by other Sections of work are properly sized and located.

D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment used during installation.

C. Direct and coordinate placement of metal anchors supplied to other Sections.

D. Provide protection coverings to protect adjacent and surrounding work from damage and mortar and grouting splatters/droppings.

E. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

F. Wet clay and shale brick before laying when initial rate of absorption is greater than 30 grams when tested in accordance with ASTM C67/C67M.

3.3 INSTALLATION

A. Protection Against Water Infiltration: Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

B. Establish lines, levels, and coursing indicated. Protect from displacement.

C. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.

D. Placing and Bonding:
   1. Lay solid masonry units in full bed of mortar, with full head joints.
   2. Lay hollow masonry units with face shell bedding on head and bed joints.
   3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
   4. Remove excess mortar as work progresses.
   5. Interlock intersections and external corners.
   6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar, and replace.
   7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
   8. Isolate masonry from vertical structural framing members with movement joint.
   9. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.

E. Mortar Joints Finishing:
   1. General:
      a. Mortar joints to be of consistent execution with consistent depth and width. Strike vertical joints first, then strike horizontal joints. This provides a continuous horizontal joint (uninterrupted by vertical joints) and is the required appearance.
      b. Mortar joints at bullnose corners are to be continuously tooled around corner and to be consistent in appearance with the straight-run joints.
      c. Clean inside corner joints free of excess mortar and finish.
   2. Concave Tooling: Use convex steel tool of diameter 1/4 inch greater than joint width.
      a. Application: All locations unless indicated otherwise in this Section or on Drawings.

F. Weeps: Furnish weeps in outer wythe at 24 inches OC. horizontally above through-wall flashing, above shelf angles and lintels and at bottom of walls.

G. Cavity Wall: Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.
   1. Install cavity drain material continuously at bottom of each cavity above through-wall flashing.
   2. At foundation and below grade locations, don’t allow debris or soil to collect and remain in the cavity prior to installing the cavity materials as indicated on Drawings. Ensure that the cavity is free of any debris or soil prior to installing cavity materials as indicated on Drawings.

H. Joint Reinforcement and Anchorage - Single Wythe Masonry:
   1. Install horizontal joint reinforcement 16 inches OC.
   2. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

3. Place joint reinforcement continuous in first joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Reinforce joint corners and intersections with strap anchors 16 inches OC.

I. Joint Reinforcement and Anchorage - Multiple Wythe Unit Masonry:
1. Install horizontal joint reinforcement 16 inches OC.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first and second joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

J. Joint Reinforcement and Anchorage - Masonry Veneer (where no cavity indicated on Drawings) (Interior walls only; exterior walls must have cavity for drainage.):
1. Install horizontal joint reinforcement 16 inches OC.
2. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Embed wall ties in masonry backing to bond veneer at maximum 16 inches OC vertically and 16 inches OC horizontally. Place wall ties at maximum 8 inches OC vertically within 8 inches of jamb of wall openings.
6. Reinforce joint corners and intersections with strap anchors 16 inches OC.

K. Joint Reinforcement and Anchorages - Cavity Wall Masonry:
1. Install horizontal joint reinforcement 16 inches OC.
2. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Attach to structural steel members. Embed anchorages in every second block joint.
6. Reinforce joint corners and intersections with strap anchors 16 inches OC.

L. Masonry Through-Wall Flashings:
1. Solid substrate to be continuous below and behind flashing material.
2. Install metal flashing drip edge plate with sealed lap joints and preformed corners and end dams in accordance with manufactures recommendations. Adhere through-wall flashing continuously along top of drip edge plate as indicated on Drawings and with adhesive compatible with both surface types.
3. Whether or not specifically indicated, install masonry through-wall flashing to divert water to exterior at all locations where downward flow of water would otherwise be interrupted.
4. Extend through-wall flashings horizontally through outer wythe at foundation walls, above ledge or shelf angles and lintels, under parapet caps and at bottom of walls, and terminate bottom and top edges as indicated on Drawings.
    a. Unless indicated otherwise on Drawings, extend vertical flashing portion a minimum of 8 inches above lower flashing portion that diverts water to exterior.
        1) Self-Adhering Flashing (when indicated):
            a) Terminate top edge with continuous termination bar and sealant.
            b) Terminate bottom edge at no more than 1/4 inch from exterior face of masonry. For steel support lintels and ledges, terminate bottom edge of flashing at steel support edge.
        2) Non-Self-Adhering Flashing (when indicated):

a) Terminate top edge by embedding top edge into masonry joint with a minimum of 1-1/2 inches embedment and seal.
(1) Exception: Only if indicated on Drawings in specific construction locations, top edge to be terminated with termination bar and sealant.
b) Terminate bottom edge at no more than 1/4 inch from exterior face of masonry. For steel support lintels and ledges, terminate bottom edge at steel support edge.

5. Lap end joints minimum 6 inches and seal watertight with sealant recommended by flashing manufacturer.
6. Form and configure flashing as to drain moisture along its drainage path to the exterior of the wall, preventing moisture migration into the wall and cavity.
7. Turn flashing, fold, and seal at corners, bends, and interruptions. Use preformed end dams, and inside and outside corners when indicated.

M. Lintels:
1. Install loose steel and reinforced unit masonry lintels over openings as indicated.
2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
3. Do not splice reinforcing bars.
4. Support and secure reinforcing bars from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Allow masonry lintels to attain specified strength before removing temporary supports.
7. Maintain minimum 8 inches bearing on each side of opening.

N. Grouted Components:
1. Reinforce bond beam as indicated on Drawings.
2. Lap splices for reinforcing bars to be as required by code and Drawings and as related to the bar diameters.
3. Support and secure reinforcing bars from displacement.
4. Place and consolidate grout fill without displacing reinforcing.
5. At bearing locations, fill masonry cores with grout for minimum 12 inches both sides of opening.

O. Reinforced Masonry:
1. Lay masonry units with core vertically aligned and clear of mortar and unobstructed.
2. Place reinforcement bars as indicated on Drawings.
3. Splice reinforcement in accordance with Section 03 20 00.
4. Support and secure reinforcement from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Place grout in accordance with TMS 402/602 Specification for Masonry Structures.

P. Control and Expansion Joints:
1. Install control and expansion joints at locations indicated on Drawings and not to exceed the following maximum spacing:
a. Exterior Walls: 24 feet on center and within 24 inches on one side of each interior and exterior corner.
b. Interior Walls: 24 feet on center.
c. At changes in wall height.
2. Do not continue horizontal joint reinforcement through expansion joints.
3. Install preformed control and expansion joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
4. Size control joint in accordance with Section 07 90 00 for sealant performance.
5. Form expansion joint by omitting mortar and cutting unit to form open space.

Q. Built-In Work:
   1. As work progresses, install built-in metal door and glazed frames, window frames, anchor bolts, plates, and other items to be built-in the work and furnished by other Sections.
   2. Install built-in items plumb and level.
   3. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
   4. Do not build into masonry construction organic materials or other materials that are subject to deterioration.

3.4 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, sleeves, and other construction requirements indicated. Coordinate with other Sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

C. Core drill masonry walls for pipe and sleeve penetrations, regardless of size. Do not break out masonry for penetration access.

D. All ductwork and large sleeve penetrations wider than 16 inches must have at least 4 inches solid masonry on both sides, supporting steel lintel or bond beam over opening.

3.5 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.

C. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.

D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

G. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

I. Maximum Variation for Steel Reinforcement:
   1. Install reinforcement within the tolerances specified in TMS 402/602 for foundation walls.
   2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
   3. Plus or minus 1 inch when distance is between 8 and 24 inches.
   4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
   5. Plus or minus 2 inches from location along face of wall.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove excess mortar and mortar smears as work progresses.

C. Replace defective mortar. Match adjacent work.

D. After mortar is thoroughly set and cured, clean masonry in accordance with manufacturer's recommendations and as follows:
   1. Remove large mortar particles with wooden paddles & non-metallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
   4. In accordance with BIA Technical Note 20, use bucket and brush hand cleaning method to clean brick masonry made from clay or shale, except use detergent as masonry cleaner.
   5. Do not use high pressure washer to clean masonry. Low pressure washer, less than 50 psi, or water hose may be used to clean masonry.

E. Progress Payments for completed work will not be made until brick is cleaned of all excessive mortar and mortar stains.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

C. Protect masonry and other items built into masonry walls from spatter, droppings, and staining that can be caused by other work activities such as mortaring and grouting.
   1. Aggressive protection efforts to be provided for interior and exterior base of walls and windowsills.

D. Protection Against Water Infiltration: Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

END OF SECTION

SECTION 04 72 00

CAST STONE MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sills for windows.
   2. Caps for monumental sign wall.
   3. Other cast stone items indicated on Drawings.

B. Related Requirements:
   1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar for setting cast stone.
   2. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.
   3.
   4. Section 05 50 00 - Metal Fabrications: Loose lintels and supports for cast stone units.
   5. Section 07 90 00 - Joint Protection: Sealing joints indicated to be left open for sealant.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 318 - Building Code Requirements for Structural Concrete (ACI 318-19) Commentary on Building Code Requirements for Structural Concrete (ACI 318R-19); 2019, Errata 2022.

B. ASTM International (ASTM):
   1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
   2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2022.
   3. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
   4. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.
   5. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2019, with editorial change 2020.
   6. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
   7. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
   8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
   9. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
   10. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
   11. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision 2022.
   12. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2021.
   13. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

14. ASTM C1195 - Standard Test Method for Absorption of Architectural Cast Stone; 2021.
15. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023.

C. The Masonry Society (TMS):
1. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate cast stone work with masonry backup and veneer, framed backup, and installation of anchors for frames in openings.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures: Requirements, for submittal procedures.

B. Product Data: Test results of cast stone components made previously by the manufacturer.

C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

D. Samples for Initial Selections: Two manufacturer's complete sets of color samples illustrating the full range of finishes, textures, and colors available; 4 x 4 x 1 inches in size. Include samples of full range of mortar and sealant colors. Submit for Architect’s initial selections.

E. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish, texture, and color; samples to be same product material type indicated for final Work; each cast stone sample 12 x 12 x 1 inches; each mortar and sealant sample 3/8 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Test Reports: Indicate concrete mix design compressive strength and water absorption.

G. Manufacturer’s Installation Instructions: Submit instructions for anchor attachment, cast stone cleaning, and special Project installation conditions.

H. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with TMS 402/602 Building Code Requirements and Specifications for Masonry Structures.

B. Perform Work in accordance with Cast Stone Institute Technical Manual.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.
1. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
2. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute or the Architectural Precast Association.
3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience.

1.7 MOCKUP

A. Section 01 40 00 - Quality Requirements: Mockup requirements.

B. Provide full size cast stone components for installation in mock-up of exterior wall.
   1. Approved mockup will become standard for appearance and workmanship.
   2. Remove mock-up not incorporated into the work and dispose of debris.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

C. Number each piece individually to match shop drawings and schedule.

D. Store cast stone components and installation materials in accordance with manufacturer's instructions.

E. Store cast stone components on pallets with non-staining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

F. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

G. Store mortar materials where contamination will not occur.

H. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

I. Cast stone units are not to be packaged and shipped prior to completion of curing, and prior to drying from cleaning of cement film process.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Cold Weather Requirements: In accordance with TMS 402/602 when ambient temperature or temperature of masonry units is less than 40 degrees F.

C. Hot Weather Requirements: In accordance with TMS 402/602 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Cast Stone:
   1. Any current producer member of the Architectural Precast Association or the Cast Stone Institute.

2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
   1. Compressive Strength: ASTM C39/C39M; minimum 5,000 psi at 28 days.
   2. Absorption: ASTM C1195; maximum 6 percent for cold water and 10 percent for boiling water at 28 days.
   3. Freeze-Thaw Resistance: Demonstrated by field experience.
   4. Surface Texture: Fine grained texture, with no bug holes, air voids, or other surface blemishes visible from distance of 10 feet.
   5. Remove cement film from exposed surfaces before packaging for shipment.
   6. Color:
      a. To be selected by Architect from manufacturer's full range.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible and as indicated on Drawings.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
   1. Pieces more than 24 inches in any dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

D. Materials:
   1. Portland Cement: ASTM C150/C150M.
      a. For Precast Units:
         1) Type I - Normal, white or gray as required to match Architect 's selected sample.
         2) Type III - High Early Strength, for use in cold weather, white or gray as required to match Architect 's selected sample.
      b. For Units: Type I or II, white.
   2. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
   3. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
   4. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
   5. Admixtures: ASTM C494/C494M.
   6. Water: Potable.
   7. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.
      a. Galvanized in accordance with ASTM A767/A767M, Class I.
      b. Epoxy coated in accordance with ASTM A775/A775M.
   8. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
   9. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
   10. Flashings: As specified in Section 04 20 00 and as indicated on Drawings.
   11. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.

12. Mortar: Portland cement-lime, as specified in Section 04 05 11; do not use masonry cement.
13. Mortar: As specified in Section 04 20 00.
14. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.3 FABRICATION

A. Size: As indicated on Drawings, square edges unless indicated otherwise on Drawings.

B. Use rigid molds, constructed to maintain cast stone units uniform in shape, size, and finish.

C. Form units to length required for joint layout indicated on Drawings. Field cutting to length is not permitted.

D. Reinforce units in accordance with ASTM C1364 for safe handling and as indicated on shop drawings to resist structural loads.

E. Form corners to profiles indicated on Drawings.

F. Form drip slot in bottom surface of exterior units projecting 3/4 inch or more beyond face of wall. Locate slot 3/8 inch back from nose of projection. Size slot not less than 3/8 inch wide and 3/8 inch deep and continuous for full width of projection.

G. Curing: Cure units to develop concrete quality, and to minimize appearance blemishes including non-uniformity, staining, or surface cracking.

H. Clean exposed-to-view surfaces to remove cement film and achieve uniform appearance.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Examine construction to receive cast stone components.

C. Do not begin installation until unacceptable conditions have been corrected.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Provide for erection procedures and induced loads during erection. Furnish temporary bracing during installation. Maintain temporary bracing in place until final support is provided.

C. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.

D. Mechanically anchor cast stone units indicated; set remainder in mortar.

E. Erect units without damage to shape or finish. Replace or repair damaged panels.

F. Erect units level and plumb within allowable tolerances.

G. Align and maintain uniform horizontal and vertical joints as erection progresses.

H. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.

I. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated. Allow for final joint finish material application.
   3. Fill vertical joints with mortar but allowing for final joint finish material application.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
   5. Do not shift or tap cast stone units after mortar has achieved initial set. Where adjustment is required, remove mortar, and replace.

J. Joints: Where Drawings indicate specific locations for joints, comply with locations indicated.
   1. Exposed joint widths to be 3/8 inch unless otherwise indicated on Drawings.
   2. Rake and clear mortar joints to 3/4 inch depth from unit face for application of joint finish material.
   3. Remove excess mortar from face of stone before application of joint finish material.
   4. Seal perimeter and intermediate joints in accordance with Section 07 90 00 with non-staining, silicone type sealant.
   5. Tool joint finish material to finish profile as indicated on Drawings.

K. Repairs and Replacement of Damaged Units:
   1. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
   2. Repair with matching repair materials provided by the manufacturer and in accordance with manufacturer's instructions.
   3. Architect's judgement regarding acceptability of repair results is final.
   4. Remove and replace units that are not repaired to the approval of Architect.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.

C. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.

D. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.

E. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Clean Work in accordance with manufacturer’s instructions.

C. Keep cast stone components clean as work progresses.

D. Clean completed exposed cast stone after mortar is thoroughly set and cured.

E. Wet surfaces with water before applying cleaner.

F. Apply cleaner to cast stone in accordance with manufacturer's instructions.

G. Remove cleaner promptly by rinsing thoroughly with clear water.

H. Do not use acidic cleaners.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect completed work from damage.

C. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Structural shapes.
2. Channels and angles.
3. Hollow structural sections.
4. Structural pipe.
5. Fabricated trusses.
6. Structural plates and bars.
7. Fasteners, connectors, and anchors.
8. Base plate grout.

B. Related Sections:
1. Section 05 31 00 - Steel Deck.

1.2 REFERENCES

A. American Institute of Steel Construction:
1. AISC Code of Standard Practice for Steel Buildings and Bridges.
2. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
3. AISC Load and Resistance Factor Design Specification for Single-Angle Members.
4. AISC Seismic Provisions for Structural Steel Buildings.
5. AISC Specification for Allowable Stress Design of Single-Angle Members.
6. AISC Specification for the Design of Steel Hollow Structural Sections.
7. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.

B. American Society of Civil Engineers:
1. ASCE 19 - Standard Applications of Steel Cables for Buildings.

C. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

6. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
8. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
9. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
10. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
11. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
12. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
14. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
15. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
16. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
17. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
18. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
19. ASTM A618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
20. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
21. ASTM A847 - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
22. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
23. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
24. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
25. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
26. ASTM E94 - Standard Guide for Radiographic Examination.
27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
30. ASTM F436 - Standard Specification for Hardened Steel Washers.
31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
33. ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

D. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

E. Research Council on Structural Connections:
1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

F. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Paint.
3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
4. SSPC SP 3 - Power Tool Cleaning.
5. SSPC SP 6 - Commercial Blast Cleaning.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:
1. Indicate profiles, sizes, spacing, location of structural members, openings, attachments and fasteners.
2. Connections. Engage a fabricator who utilizes a North Carolina registered Professional Engineer to prepare calculations, shop drawings and other structural data for structural steel connections.
3. Cambers.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis.

D. Manufacturer’s Mill Certificate: Certify products meet or exceed specified requirements.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
1. AISC Code of Standard Practice for Steel Buildings and Bridges.
2. AISC Code of Standard Practice for Steel Buildings and Bridges. Section 10.
3. AISC Seismic Provisions for Structural Steel Buildings.
4. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in performing Work of this section with minimum 5 years experience with the following current AISC Certification:
   1. Standard Steel Building Structures (STD).

B. Erector: Company specializing in performing Work of this section with minimum 5 years experience.

C. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

1.6 COORDINATION

A. Section 01 40 00 - Quality Requirements.

B. Coordinate work with the following:
   1. Section 05 50 00 for miscellaneous steel supports other than structural steel.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural W-Shapes: ASTM A992.

B. Structural M-Shapes: ASTM A36.

C. Structural T-Shapes: Cut from structural W-shapes.

D. Channels and Angles: ASTM A36.

E. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade B.

F. Structural Pipe: ASTM A53, Grade B.

G. Structural Plates and Bars: ASTM A36.

2.2 FASTENERS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish, Interior Framing: Plain, uncoated.
   2. Finish, Exterior Framing: Mechanically deposited zinc coating, ASTM B 695, Class 50.

B. Nuts: ASTM A563 heavy hex type.
   1. Finish: Unfinished.

C. Washers: ASTM F436; Type 1, circular
   1. Finish: Unfinished.

D. Shear Connectors: ASTM A108; Grade 1015 or 1020, headed, unfinished and in accordance with AWS D1.1; Type B.

E. Threaded Anchor Rods: ASTM F 1554, Grade 36 or Grade 55, as indicated on Drawings.
1. Configuration: Straight.
2. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
5. Finish, Interior Framing: Plain.
6. Finish, Exterior Framing: Hot-dip zinc coating, ASTM A 153/A 153M, Class C or mechanically deposited zinc coating, ASTM B 695, Class 50.

F. Forged Structural Steel Hardware:
1. Clevises and Turnbuckles: ASTM A108; Grade 1085.
2. Eye Nuts and Eye Bolts: ASTM A108; Grade 1030.
3. Sleeve Nuts: ASTM A108; Grade 1018.
4. Rod Ends, Yoke Ends and Pins, Cotter Pins, and Coupling Nuts: Carbon steel.

2.3 WELDING MATERIALS

A. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 ACCESSORIES

A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days.

B. Shop and Touch-Up Primer:
1. Concealed Structural Steel: Fabricators dark color rust-inhibiting primer.
2. Steel to receive sprayed fire proofing: Leave steel plain.
3. Exposed Structural Steel: Refer to Division 9 for shop-applied primer compatible with intumescent paint.
4. Exposed Galvanized Structural Steel to receive Intumescent Paint: Refer to Division 9 for shop-applied primer compatible with epoxy paint.
5. Exposed Galvanized Structural Steel to receive Epoxy Paint: Refer to Division 9 for shop-applied primer compatible with intumescent paint.

2.5 FABRICATION

A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

B. Fabricate connections for bolt, nut, and washer connectors.

C. Develop required camber for members.

2.6 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP 3 "Power Tool Cleaning" for all concealed work and SSPC SP 6 "Commercial Blast Cleaning" for all work exposed to view.

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded or in contact with concrete.

C. Galvanizing for Structural Steel Members: ASTM A123; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.

D. Galvanizing for Fasteners, Connectors, and Anchors:
1. Hot-Dipped Galvanizing: ASTM A153.

2.7 SOURCE QUALITY CONTROL AND TESTS

A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.

B. Shop test bolted and welded connections as specified for field quality control tests.

C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify bearing surfaces are at correct elevation.

B. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.

B. Field weld components and shear connectors indicated on Drawings.

C. Field connect members with threaded fasteners; tighten to snug tight for bearing type connections.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

A. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.

B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.

C. Moist cure grout.

D. Remove forms after grout is set. Trim grout edges to from smooth surface, splayed 45 degrees.

3.5 FIELD QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.
   1. Testing agency will conduct and interpret tests and state in each report whether tested work complied with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements at no additional cost to the Owner.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
   1. Direct-tension indicator gaps will be verified to comply with ASTM F 592, Table 2.

E. In addition to visual inspection, field welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
   1. Liquid Penetrant Inspection: ASTM E165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
   4. Ultrasonic inspection: ASTM E 164.

F. In addition to visual inspection, field welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
   1. Bend test will be performed when visual inspections reveal either less than a continuous 360 degree flash or welding repairs to any shear connector.
   2. Tests will be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1

G. Contractor shall furnish all necessary staging, platforms, ladders, or other items necessary to facilitate the testing laboratory in testing and inspecting the work.

H. The testing laboratory shall inspect 15% of the field full penetration welds, except at truss splices where 100% shall be inspected. All tested welds shall pass.

I. The testing laboratory shall inspect 50% of the fillet welds and spot check gauge and length of all welds.

3.6 CLEANING

A. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
   1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

B. Touch up all hot dipped galvanized steel with high zinc dust content paint.
   1. For re-galvanizing welds and steel, comply with SSPC-Paint 20.

END OF SECTION 051200

SECTION 05 21 00

STEEL JOISTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. K-series and LH-series open web steel joists.
   2. Bracing.

B. Related Sections:
   1. Section 051200 - Structural Steel.
   2. Section 053100 - Steel Decking.

1.2 REFERENCES

A. FS TT-P-664D -- Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant; 1988.

B. SJI Technical Digest No. 9 -- Handling and Erection of Steel Joists and Joist Girders; Steel Joist Institute; July 1987.Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders; Steel Joist Institute (SJI); 1990.

C. Steel Structures Painting Manual, Volume 2, Systems and Specifications; Steel Structures Painting Council (SSPC); 1991.

1.3 SYSTEM DESCRIPTION

A. Provide joist system which is designed and fabricated to comply with requirements of the contract documents and which strictly conforms to material, manufacturing, and erection requirements of the Steel Joist Institute's (SJI) "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (referred to hereinafter as SJI "Specifications").
   1. Wind uplift: Design joists and connections to comply with wind uplift requirements indicated.

1.4 SUBMITTALS

A. Product Data: Submit for each distinct type of joist required and for accessories.

B. Shop Drawings: Drawings for fabrication and erection of joists; include plans, elevations, and large scale details of typical sections, special connections, joining, and accessories.
   1. Show location and spacing of joists; indicate mark number and type.
   2. Show bridging.

C. Quality Control Submittals: Submit the following:
   1. SJI certification of joist characteristics.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Strictly conform to requirements of SJI Technical Digest No. 9.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Conform to requirements of SJI "Specifications."

B. Steel Primer Joists: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.

C. Accessories: Provide accessories required for erection of steel joists, complying with SJI "Specifications" and with contract documents.

2.2 JOIST FABRICATION

A. General: All materials shall be clean and straight.

B. Bridging is schematically shown on drawings. Detail and fabricate bridging in complete accordance with SJI requirements.

C. Joists:
   1. Top chord extensions: Provide extensions where indicated. Extension members shall be designed as cantilever beams, with their reactions carried back at least to the first panel point of the joists.
   2. Bottom chords: Form bottom chord members of joists using angles.
   3. Bottom chord extensions: Where indicated, provide extended bottom chords or separate extension units properly designed to support ceilings attached directly to joist bottom chords. Maximum clearance between wall finish and end of extension: 1/2 inch, unless indicated otherwise.
   4. Special end connections: Provide special end connections where joists bear less than 2-1/2 inches over steel supports. Connections shall provide positive attachment to the support.
   5. Surface preparation for shop priming: SSPC-SP 2: Hand tool cleaning.
   6. Shop priming: Apply primer in accordance with paint manufacturer's recommendations.

PART 3 - EXECUTION

3.1 ERECTION

A. Do not begin joist erection until structural support components have been installed and are in suitable condition to receive joists.

B. Do not overload or exceed carrying capacity of any joist during construction period.

C. Accurately position and space joists before permanent attachment to structural supports.

D. Provide safe, stable structure throughout construction period. Do not remove bridging after construction is completed, unless specifically authorized to do so by the architect.
   1. Install bridging in accordance with SJI requirements.
   2. Bridging installation shall proceed concurrently with joist erection and shall be completed before joists are subjected to construction loads.

E. Joist Anchorage:
   1. Anchor joists to structural support members as indicated on drawings.

END OF SECTION 052100

SECTION 05 31 00

STEEL DECK

PART 1 - GENERAL

1.1 SCOPE

A. This work shall consist of furnishing all plant, labor, materials, equipment, and apparatus for the installation of all steel roof decking and composite floor decking with accessories indicated, specified, and/or reasonably implied for a complete, first-quality job.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 30 00 – Cast-in-Place Concrete

B. Section 05 12 00 - Structural Steel

1.3 REFERENCE SPECIFICATIONS

A. "Specification for the Design of Light Gage Cold-Formed Steel Structure Members" of the American Institute of Steel Construction.

B. "Code of Recommended Standard Practice" of the Steel Deck Institute.

C. Specifications and commentary for composite steel floor deck of the Steel Deck Institute.

D. Specifications and commentary for steel roof deck of the Steel Deck Institute.

E. Structural Welding Code - Sheet steel of the American Welding Society.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Qualifications of Welding: Use qualified processes and welding operators in conformance with AWS "Welder Qualification" procedures.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated

D. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency

E. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

F. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

G. Welding Inspection: All decking welds shall be inspected by the Architect prior to covering. Notify the Architect in writing forty-eight (48) hours prior to completing welds for each major area.

1.5 SUBMITTALS

A. Shop and Erection Drawings shall be submitted for all metal decking to the Architect for approval. Drawings shall indicate layout, types of specified materials and accessories, gauges to be supplied, anchorage details, all conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Drawings shall include layout for all shear studs to be applied through deck units. Manufacture or fabricating of any materials or the performing of any work prior to the approval of shop drawings will be entirely at the risk of the Contractor.

B. Product Data: For each type of deck, accessory, and product indicated

C. The Contractor shall submit the manufacturer's specifications, load tables, and installation instructions for each type specified.

D. Welding certificates.

E. Field quality-control test and inspection reports.

1.6 DELIVERY, STORAGE AND HANDLING

A. Steel deck units shall be protected against damage in transit to the jobsite.

B. If site storage is necessary, steel deck units shall be stacked on wood blocking clear of the ground and tilted slightly to insure against the entrapment of water.

C. The steel deck units shall be hoisted to each individual floor as required and rough spread.

PART 2 - PRODUCTS

2.1 ROOF DECK

A. Roof Deck (1 ½ inch deep): Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
   1. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33.
   2. Galvanizing: ASTM A 525, G60.
   3. Deck Profile: Type B.
   4. Profile Depth: 1-1/2-inches.
   5. Design Uncoated-Steel Thickness: as indicated in drawings.
   6. Span Condition: Triple span or more.
   7. Side Laps: Overlapped.

B. Acoustical Roof Deck (3 inch deep): Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
   1. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33.
   2. Galvanizing: ASTM A 525, G60.
   3. Deck Profile: Type NA.
   4. Profile Depth: 3-inches.
   5. Design Uncoated-Steel Thickness: as indicated in drawings.
   6. Span Condition: Triple span or more.
   7. Side Laps: Overlapped.

2.2 COMPOSITE FLOOR DECK

A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
   1. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, G60 zinc coating.
   2. Profile Depth: 3”
   3. Design Uncoated-Steel Thickness: 16 gauge.
   4. Span Condition: Triple span or more unless noted on drawings.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Weld Washers: Mild steel, uncoated, sized as recommended by manufacturer of steel deck units.

C. Mechanical Fasteners: Stainless steel, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

D. Side-Lap Fasteners: Stainless steel, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

H. Repair Paint: Manufacturer's paint to match coating in the effected location.

I. Galvanizing Repair Paint: High zinc-dust content paint formulated specifically for repair of damaged galvanized surfaces. Prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

J. Holes for openings: Deck shall be cut by the Contractor to fit large framed openings which are located by dimension on the structural design drawings. Holes required by other trades shall be supplied at the expense of those trades. The trade involved shall notify the Architect/Engineer regarding the size, location and number of holes so that the structural adequacy of the steel deck units and/or composite slab can be checked. Holes shall be cut in floor deck units only after concrete has been placed and 75% of design strength attained.

3.3 FLOOR DECK INSTALLATION

A. Erect metal deck in accordance with SDI 29 Manual.

B. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

C. Fasten deck to steel and precast concrete support members at ends and intermediate supports as indicated on the drawings.

D. Weld in accordance with AWS D1.1.

E. Mechanically clinch male/female side laps as indicated on the drawings..

F. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x ¼ inch steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and mechanically attach to deck at each flute.

G. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Mechanically attach 12 inches o.c. maximum.

H. Install wet concrete stops at floor edge upturned to top surface of slab, to contain wet concrete. Install stops of sufficient strength to remain stationary without distortion.

I. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

J. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

K. Welding washers shall be used on all deck units with metal thickness less than 0.028 inches (22 gage). Welding washers shall be a minimum thickness of 0.0598 inches and have a nominal 3/8 inch diameter hole.

L. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

3.4 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members as indicated on the drawings

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on the drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints (1.5 inch deck): Lapped 2 inches minimum.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
   1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

E. Flashing: The steel deck manufacturer shall furnish sheet metal flashings to close openings between deck units and columns, deck units and girders, and openings which occur where deck abut. These flashings shall be welded in position by the steel deck installer.

F. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12" with at least one weld at each corner.

G. Closure Strips: Provide flexible closure strips at open uncovered ends and edges of roof decking also in voids between decking and other construction. Install with adhesive in accordance with manufacturer's instructions.

H. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint. Touch-up finish coat is also required for High Corrosive Environments as noted in this specification. Coordinate proper finish coat with Division 9.

I. At High Corrosive Environments, any portions of screws or other mechanical fasteners that penetrate the coating on bottom of steel must be touched up with appropriate primer as well as finish coat. Coordinate with Division 9.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Additional testing will be performed to determine compliance of corrected work with specified requirements.

D. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

E. Remove and replace work that does not comply with specified requirements.

F. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Division 9 Section “Interior Painting."

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION O5 40 00
COLD FORMED STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Exterior non-load-bearing wall framing.
2. Roof trusses.
3. Roof rafter framing.
4. Ceiling joist framing.

B. Related Sections include the following:

1. Division 5 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
   b. Roof Trusses: Vertical deflection of 1/360 of the span.
   c. Scissor Roof Trusses: Horizontal deflection of 1 inch at reactions.
   d. Roof Rafter Framing: Vertical deflection of 1/360 of the vertically projected span.
   e. Ceiling Joist Framing: Vertical deflection of 1/360 of the span.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

   a. Upward and downward movement of 1/2 inch.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

F. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer registered in the State of North Carolina and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

F. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Studco.
2. AllSteel Products, Inc.
3. California Expanded Metal Products Company.
4. Clark Steel Framing.
5. Consolidated Fabricators Corp.; Building Products Division.
6. Craco Metals Manufacturing, LLC.
7. Custom Stud, Inc.
8. Dale/Incor.
9. Design Shapes in Steel.
10. Dietrich Metal Framing; a Worthington Industries Company.
11. Formetal Co. Inc. (The).
12. Innovative Steel Systems.
13. MarinoWare; a division of Ware Industries.

14. Quail Run Building Materials, Inc.
15. SCAFCO Corporation.
16. Southeastern Stud & Components, Inc.
17. Steel Construction Systems.
18. Steeler, Inc.
19. Super Stud Building Products, Inc.
20. United Metal Products, Inc.

2.2 MATERIALS

A. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: ST33H or as required by structural performance.
2. Coating: G60 or equivalent.

B. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A653, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50, Class 1 or 2.
2. Coating: G90.

2.3 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard-shape steel sections.

2.4 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum base-metal thickness: 0.0329 inch.
2. Flange width: 1-5/8 inches, minimum.

B. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section joist track, with unstiffened flanges; unpunched; of web depths indicated; and as follows:

1. Minimum base-metal thickness: 0.0329 inch.
2. Flange width: 1-5/8 inches, minimum.

2.5 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum base-metal thickness: 0.0329 inch.
2. Flange width: 1-5/8 inches, minimum.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel; carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

A. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and 30-minute working time.

B. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 7 Section "Building Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Shop Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support, using one of the following:

1. Install single-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging of the types listed below in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

a. Install solid blocking at 96-inch centers.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

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

3.5 TRUSS INSTALLATION

A. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.

B. Truss Spacing: As indicated.

C. Do not alter, cut, or remove framing members or connections of trusses.

D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

E. Erect trusses without damaging framing members or connections.

F. Align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

G. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to LGSEA's Technical Note 551e, "Design Guide for Permanent Bracing of Cold-Formed Steel Trusses".

3.6 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

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

END OF SECTION 05 40 00

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes shop fabricated metal items:
   1. Lintels.
   2. Ledge and shelf angles.
   3. Bollards.
   4. Ladders.
   5. Structural supports for miscellaneous attachments.
   6. Anchor bolts for sill plates.

B. Related Requirements:
   1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.
   2. Section 04 20 00 - Unit Masonry: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in masonry.
   3. Section 05 12 00 - Structural Steel: Structural steel column anchor bolts.
   4. Section 05 21 00 - Steel Joist: Structural joist bearing plates, including anchorage.
   5. Section 05 31 00 - Steel Deck: Bearing plates for metal deck bearing, including anchorage.
   6. Section 05 52 00 - Metal Railings.
   7. Section 09 90 00 - Painting and Coating: Field applied paint finish.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. American National Standards Institute (ANSI):
   1. ANSI A14.3 - Ladders - Fixed - Safety Requirements; 2014, Reaffirmed 2018.

C. ASTM International (ASTM):
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
   2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
   3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
   4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
   5. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
   6. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.
   7. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts; 2021a.
   8. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
   9. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.

10. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, Editorial Revisions 2018.
11. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings; 2018, Editorial Revisions 2018.
12. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
13. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.
14. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.
15. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
16. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
17. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel; 2021.
18. ASTM F436/F436M - Standard Specification for Hardened Steel Washers; 2019.
19. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.
20. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

D. American Welding Society (AWS):
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
2. AWS B2.1/B2.1M - Specification For Welding Procedure And Performance Qualification; 7th Edition; 2021.
3. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, Errata 2023.
4. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, Errata 2020.

E. California Department of Public Health (CDPH):
1. CDPH Standard Method VOC V1.2 - Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers - Version 1.2; 2017.

F. International Accreditation Service (IAS):
1. IAS AC172 - Accreditation Criteria For Fabricator Inspection Programs For Structural Steel; 2019.

G. National Ornamental & Miscellaneous Metals Association (NOMMA):
1. NOMMA Guideline 1 - Joint Finishes.

H. The Society for Protective Coatings (SSPC):
1. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
2. SSPC Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
3. SSPC SP 2 - Hand Tool Cleaning; 2018.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Where anchors or support brackets to structure penetrate finish and moisture protection materials, coordinate fabrication of those finish and moisture protection materials to provide for weather sealed finish condition (e.g., exterior mounted ladders, etc.).

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

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. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Designer's Qualification Statement: Licensed Engineer.

D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

E. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M.

1.5 QUALITY ASSURANCE

A. Finish joints in accordance with NOMMA Guideline 1.

B. Perform Work in accordance with applicable codes and standards in the State in which the project is located.

C. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Design under direct supervision of Professional Engineer experienced in design of this Work and licensed in 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 twelve (12) months before start of scheduled welding work.

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

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept metal fabrications on site in labeled shipments. Inspect for damage.

C. Protect metal fabrications from damage by exposure to weather.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel:
   1. Structural W-Shapes: ASTM A992/A992M.
   2. Structural Shapes: ASTM A36/A36M.
   3. Channels and Angles: ASTM A36/A36M.
   4. Steel Plate: ASTM A36/A36M.
   5. Hollow Structural Sections: ASTM A500/A500M, Grade B.
   6. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40.
   7. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality, galvanized.
   8. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/563M nuts and ASTM F436/F436M washers.

9. Structural Bolts, Nuts and Washers: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M, Class B.
10. Welding Materials: AWS D1.1; type required for materials being welded.
11. Shop Primer: SSPC Paint 15, Type 1, red oxide.
12. Touch-Up Primer:
    a. Shop Primer: Match shop primer.
    b. Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
    c. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with CDPH Standard Method VOC V1.2.

B. Aluminum:
1. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
2. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.
3. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
4. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
5. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
6. Aluminum -Alloy Die Castings: ASTM B85/B85M.
7. Bolts, Nuts, and Washers:
    a. Stainless steel.
8. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.2 LINTELS

A. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow 8 inches minimum bearing on both sides of opening.
1. Exterior Locations: Finish to ASTM A123/A123M, hot dip galvanized after fabrication.
2. Interior Locations: Finish to be primer paint, two coats.

2.3 LEDGE AND SHELF ANGLES

A. Ledge and Shelf Angles Not Attached to Structural Framing: For support of masonry; galvanized.
1. Exterior Locations: Finish to ASTM A123/A123M, hot dip galvanized after fabrication.
2. Interior Locations: Finish to be primer paint, two coats.

2.4 BOLLARDS

A. Bollards: 6 inch diameter steel pipe, galvanized after fabrication; 3,000 psi concrete filled; smooth dome shaped concrete cap; length and base securement as indicated on Drawings.
1. Paint: DOT yellow color; one coat primer; two coats top coat, gloss (including cap).
2. Acceptable Alternative Concrete Dome Shaped Cap:
    a. Precast 5,000 psi concrete reinforced with micro fibers.
    b. Class A form smooth dome shape finish.
    c. Diameter: Equal to outside diameter of steel pipe bollard.
    d. Galvanized anchor bolt cast into center of base of cap (for setting into bollard uncured concrete fill).

2.5 LADDERS

A. Ladder type as indicated on Drawings.
1. Aluminum Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.

a. Components: Manufacturer's standard side rails, rungs, treads, handrails. returns, platforms, and safety devices complying with the requirements of the MATERIALS article of this section.
b. Materials: Aluminum; ASTM B221 (ASTM B221M), 6063 alloy, T52 temper.
c. Mounting: Space rungs 7 inches from wall surface; with metal mounting brackets and attachments. Mounting brackets attached as indicated on Drawings, but not greater than 36 inches apart.
d. Finish:
1) Clear anodized coating in compliance with AAMA 611, Class 1.

2. Aluminum Ship Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
a. Components: Unless indicated otherwise on Drawings, manufacturer's standard rails, rungs, treads, handrails. returns, platforms, and safety devices complying with the requirements of the MATERIALS article of this section.
b. Materials: Aluminum; ASTM B221 (ASTM B221M), 6063 alloy, T52 temper.
c. Incline: 70 degrees, unless indicated otherwise on Drawings.
d. Finish:
1) Clear anodized coating in compliance with AAMA 611, Class 1.

2.6 STRUCTURAL SUPPORTS

A. Other Structural Supports: Steel sections, shape and size as indicated on Drawings required to support applied loads with maximum deflection of 1/240 of the span; prime paint, one coat.

2.7 ANCHOR BOLTS

A. Anchor Rods: ASTM A307; Grade A.
1. Shape: Hooked and straight.
2. Furnish with nut and washer; unfinished.

2.8 FABRICATION

A. Verify field measurements prior to fabrication.

B. Fit and shop assemble items in largest practical sections, for delivery to site.

C. Fabricate items with joints tightly fitted and secured.

D. Continuously seal joined members by continuous welds.

E. 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.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Railing Assemblies, wall rails, and attachments to resist force of 75 lbs at any point without damage or permanent set.

2.9 FACTORY APPLIED FINISHES

A. Finishes as follows unless indicated otherwise on Drawings or in component description in this Section.

B. Steel - Interior Use:

1. Shop Prime Paint items with two coats except where galvanizing is specified.
    a. Prepare surfaces to be primed in accordance with SSPC SP 2.
    b. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
    c. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

C. Steel - Exterior Use:
1. Galvanizing: ASTM A123/A123M; minimum 1.7 oz/sq ft coating thickness; hot dip galvanized after fabrication.
2. Galvanizing for Fasteners, Connectors, and Anchors: Hot dip galvanized to ASTM A153/A153M, Class B, unless specifically indicated as Mechanical Galvanized.
    a. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

D. Aluminum:
1. Exterior Aluminum Surfaces: Class I natural anodized.
2. Interior Aluminum Surfaces: Class I natural anodized.
3. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.10 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

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify field conditions are acceptable and are ready to receive Work.

C. Verify field measurements are as required for installation.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Clean and strip primed steel items to bare metal where site welding is required.

D. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

D. Field weld components indicated on shop drawings.

E. Perform steel field welding in accordance with AWS D1.1 - Structural Welding Code.

F. Perform aluminum field welding in accordance with AWS D1.2 - Structural Welding Code.

G. Obtain approval of Architect prior to site cutting or unscheduled adjustments.

H. After erection, touch up welds, abrasions, and damaged finishes:
   1. Steel - Apply prime paint or galvanizing repair paint to match shop finishes.
   2. Aluminum – Repair finish to match shop finishes.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/4 inch per story or for every 12 feet in height whichever is greater, non-cumulative.

C. Maximum Offset from Alignment: 1/4 inch.

D. Maximum Out-of-Position: 1/4 inch.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Monitor quality of installation and testing.

B. Welding: Inspect steel welds in accordance with AWS D1.1.

C. Welding: Inspect aluminum welds in accordance with AWS D1.2.

END OF SECTION

SECTION 05 51 00

METAL STAIRS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal stairs with concrete treads.
   2. Handrails and guardrails.

B. Related Requirements:
   1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of metal anchors specified in this section in concrete and for placement of concrete fill in stair pans and landings.
   2. Section 04 20 00 - Unit Masonry: Placement of related metal components in masonry.
   3. Section 05 50 00 - Metal Fabrications.
   4. Section 09 65 00 - Resilient Flooring: Applied finishes to stair construction.
   5. Division 09 - Finishes: Painting and coating finish.
   6. Division 09 - Finishes as related to flooring and adjacent finishes.

1.2 REFERENCES

A. Americans with Disabilities Act (ADA):
   1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; Current Edition.

B. American Architectural Manufacturers Association (AAMA):
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
   2. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

C. American Institute of Steel Construction (AISC):
   1. AISC 207 - Certification Standard For Steel Fabrication and Erection, and Manufacturing of Metal Components; 2016.

D. American Society of Civil Engineers (ASCE):
   1. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

E. ASTM International (ASTM):
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
   3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
   4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs; 60 000 PSI Tensile Strength; 2021.
   5. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes; 2022a.
   6. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
   7. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

8. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.
9. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts; 2021a.
10. ASTM A653/A653M - Standard Specification for Steel Sheet; Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
11. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
12. ASTM A743/A743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 2021.
13. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates; 2015, Reapproval 2021.
14. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.
15. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.
16. 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; 2023.
17. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use; 2019.

F. American Welding Society (AWS):
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
2. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, Errata 2023.
3. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, Errata 2020.
4. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017, Amendment 2021.

G. National Ornamental & Miscellaneous Metals Association (NOMMA):
1. NOMMA Guideline 1 - Joint Finishes.

H. The Society for Protective Coatings (SSPC):
1. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Field Measurements: Verify field measurements prior to fabrication.

C. Coordinate design, fabrication, and installation with thicknesses of final finishes to be installed by others that directly affect the final uniformity tolerances required by applicable codes. Account for finish materials that interface with, abuts to, or is applied to surfaces of installed stair and railing assemblies. Such materials may include adjacent flooring finishes, tread/nosing finishes, and stair landing finishes. When not coordinated carefully, such finishes could result in noncompliance with code required uniformity tolerances.

1.4 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section. Review the work requirements, project conditions, sequencing, application procedures, quality control, testing and inspection and production schedule.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include Professional Engineer's seal and signature on each sheet of shop drawings.
      a. Design Data: Submit design data.

C. Samples:
   1. Submit 6 inches wide sample of formed metal integral tread/riser/nosing.
   2. Submit 6 inches long sample of metal tubing for each size/shape specified.

D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualifications.

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 207.

1.6 QUALIFICATIONS

A. Structural Designer Qualifications: 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 the following standards and dated no more than 12 months before start of scheduled welding work:
   1. AWS D1.1/D1.1M - Steel Welding.
   2. AWS D1.2/D1.2M - Aluminum Welding.
   3. AWS D1.6/D1.6M - Stainless Steel Welding.

C. Fabricator Qualifications:
   1. Company specializing in manufacturing products specified in this section, with not less than ten (10) years of documented experience.
   2. Fabricator is to be certified in accordance with AISC 207.

PART 2 PRODUCTS

2.1 METAL STAIRS AND RAILINGS - GENERAL

A. Provide stair and railing assemblies of the design indicated, complete with landing platforms, vertical and horizontal supports, guardrails, handrailing, and fabricated accurately for anchorage to each other and to building structure.
   1. Structural Design: Provide complete stair and railing assemblies designed by Professional Engineer and complying with the most stringent requirements of local, state, and federal codes and regulations. Design is to include seismic performance compliance in accordance with ASCE 7.
      a. Where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
   2. All components and features of stair and railing assemblies are to comply with applicable local codes and accessibility requirements of ADA Standards.
   3. Configuration and Dimensions: As indicated on Drawings and field verified.

4. Fit and shop assemble components in largest practical sections, for delivery to site.
5. Fabricate components with joints tightly fitted and secured.
6. Continuously seal joined pieces by intermittent welds and polyester plastic body filler.
7. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
8. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
9. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.
10. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
11. Separate dissimilar metals using paint coatings.
12. Perform welding work in accordance with AWS D1.1/D1.1M, AWS D1.2/D1.2M, and AWS D1.6/D1.6M.

B. Metal Joinery Aesthetic Quality Level: This provision relates only to aesthetic appearance of joints and DOES NOT diminish or change structural requirements regarding the design and fabrication of structurally sound joints.
   1. Architectural Level: All joints to be inconspicuous whether welded or mechanical. Includes underside of stairs and components exposed to view.
      a. Welded Joints: Exposed to view welded joints to be continuously welded and ground smooth and flush with no evidence of weld. NOMMA Guideline 1-Joint Finish 1.
      b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
      c. Exposed Edges and Corners: Eased to small uniform radius.
      d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

C. Fasteners: Same material and finish as materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, unless indicated otherwise; provide all anchors and fasteners required.

2.2 METAL STAIRS WITH CONCRETE TREADS

A. Metal Joinery Aesthetic Quality Level: Refer to METAL STAIRS AND RAILINGS - GENERAL article in this Section.
   1. Architectural Level.

B. Shop Finishing: To be as follows unless indicated otherwise on Drawings.
   1. All Locations: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M, G90/Z275 coating.
      a. Field Finish:
         1) No additional coatings over galvanized steel.

C. Treads/Risers: Steel sheet integrally formed as tread, solid riser, and nosing. Steel sheet thickness as designed by Professional Engineer, but no less than 12 gauge steel sheet.
   1. Concrete Filled Tread Pan: Assembly is to form tread pans to be filled with concrete. Tread pan and concrete depth to be as designed by Professional Engineer, but not less than 2 inches.
   2. Attachment to Stringers: Carrier angles welded to treads, risers, and stringers. Carrier angles to be full length of tread and riser.
   3. Concrete Finish: As required for tread finish material application indicated on Drawings.

4. Riser/Nosing Metal Profile:
    a. Profile to be as indicated on Drawings.

D. Stringers: Rolled steel channel shape unless indicated otherwise on Drawings.
1. Stringer Depth: As designed by Professional Engineer, but not less than 12 inches.
2. End Closures: Steel sheet welded at ends; thickness to be 1/4 inch.

E. Landings: Steel sheet and concrete fill thickness as designed by Professional Engineer, but no less than 12 gauge steel sheet and 3 inches concrete fill with embedded reinforcement wire. Reinforce underside of steel sheet with steel angles to attain design load requirements.

F. Handrails and Guardrails:
1. Metal posts, railings, and infill to be of shape, size, and configurations indicated on Drawings.
2. Material and Finish:
    a. To match construction of stair assembly.

2.3 MATERIALS

A. Steel Components:
1. Structural W-Shapes: ASTM A992/A992M.
2. Channels, Angles, Bars, and Plates: ASTM A36/A36M.
3. Diamond Pattern Floor Plate: ASTM A786/A786M.
4. Tubing of Square, Round and Rectangular Hollow Shapes: ASTM A500/A500M or ASTM A501/A501M.
5. Galvanized Members: Hot-dip galvanized in accordance with ASTM A123/A123M, G90/Z275 coating.
6. Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
    a. Hot-Rolled Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
    b. Cold-Rolled Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
    c. Where indicated, use hot-dip galvanized complying with ASTM A653/A653M, G90/Z275 coating:
        1) Metal stairs indicated to be galvanized steel.
7. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
8. Steel Hardware:
    a. Steel Bolts: ASTM A307, Grade A.
    b. Steel Nuts: ASTM A563/A563M, Grade A.
    c. Steel Washers: ASTM F844, Grade A.
    d. Where indicated, use hot-dip galvanized complying with ASTM A153/A153M:
        1) Metal stairs indicated to be galvanized steel.
        2) Fasteners in contact with concrete or masonry construction.
    e. Where indicated, use flush countersunk hardware.

B. Stainless Steel Components:
1. Tubing: ASTM A554, Grade MT 304 at interior locations and 316L at exterior locations.
2. Pipe: ASTM A312/A312M, Grade TP 304 at interior locations and 316L at exterior locations.
3. Plate and Sheet: ASTM A666, Type 304 at interior locations and 316L at exterior locations.
4. Welding Materials: AWS D1.6/D1.6M; type required for materials being welded.
5. Stainless Steel Castings: ASTM A743/A743M, Grade CF 8, or CF 20.

C. Concrete for Treads and Landings:
   1. Portland cement Type I, 3000 psi 28 day strength, 2 to 3 inch slump.
   2. Reinforcement: Welded wire mesh type.

D. Shop Applied Primer and Touch-Up Primer:
   1. Ungalvanized Steel: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
   2. Galvanized Steel: Provide primer formulated to be compatible with surface galvanized type and specified paint top coats.

2.4 FINISHES

A. Steel Finishes:
   1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
   2. Shop Applied Primer: Use specified shop applied primer and touch-up primer.
      a. For ungalvanized and galvanized stairs indicated to be field painted, prepare surface to be shop primed in accordance with SSPC requirements of shop primer specified.
      b. Coats: One coat.
   3. Field Applied Painting: Refer to Division 09 - Finishes for painting and coating.

B. Stainless Steel Finishes: No. 4 satin brushed finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

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

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. When field welding is required, clean and strip primed steel items to bare metal.

D. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.3 INSTALLATION

A. Section 01 73 00 - Execution.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

E. Provide welded field joints as indicated on Drawings and per Professional Engineer's design. Perform field welding in accordance with AWS D1.1/D1.1M - Steel, AWS D1.2/D1.2M - Aluminum, and AWS D1.6/1.6M - Stainless Steel.

F. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

G. Obtain approval prior to site cutting or creating adjustments not scheduled.

H. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

I. Apply finish paint system: Field-applied finish paint; refer to Division 09 - Finishes for painting and coating.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/8 inch per story, non-cumulative.

C. Maximum Offset from True Alignment: 1/8 inch.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work using materials and procedures that do not damage the finishes.

B. Do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed components and finishes from damage after installation.

C. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
   1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION

SECTION 05 52 00

METAL RAILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. This Section applies to metal railing requirements that are not indicated in other Sections of the Work.
   2. Metal railings at stairs, ramps, vertical edges, and as indicated on Drawings. Includes interior and exterior locations, balustrades, and guardrails,

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete. Floor mounting handrailings and guardrails.
   2. Section 04 20 00 - Unit Masonry. Wall mounting handrailings and guardrails.
   3. Section 05 50 10 - Metal Fabrications.

1.2 REFERENCES

A. Americans with Disabilities Act (ADA):
   1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; Current Edition.

B. American Institute of Steel Construction (AISC):
   1. AISC 207 - Certification Standard For Steel Fabrication and Erection, and Manufacturing of Metal Components; 2016.

C. ASTM International (ASTM):
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
   2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
   3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
   4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
   5. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024a.
   6. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2021.
   7. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes; 2022a.
   8. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
   9. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.
   10. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
   11. ASTM A743/A743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 2021.
   12. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.

13. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

D. American Welding Society (AWS):
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
2. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, Errata 2023
3. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, Errata 2020.
4. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017, Amendment 2021.

E. California Department of Public Health (CDPH):
1. CDPH Standard Method VOC V1.2 - Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers - Version 1.2; 2017.

F. International Accreditation Service, Inc. (IAS):
1. IAS AC172 - Accreditation Criteria For Fabricator Inspection Programs For Structural Steel; 2019.

G. National Ornamental & Miscellaneous Metals Association (NOMMA):
1. NOMMA Guideline 1 - Joint Finishes.

H. The Society for Protective Coatings (SSPC):
1. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic, and Type II - Organic); 2019.

1.3 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section. Review the work requirements, application procedures, quality control, testing and inspection and production schedule.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welder's Qualification Statement.

D. Fabricator's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous twelve (12) months.

B. Fabricator Qualifications:
1. Qualified steel fabricator that is certified under AISC 207 or IAS AC172.
2. Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable accessibility requirements of ADA Standards.

B. Provide railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.

C. Design and install railing assemblies, wall mounted rails, and attachments to resist force loads without damage or permanent set when tested in accordance with ASTM E935.
   1. Distributed Force Loads: 75 pounds per linear foot (1095 N/m) applied to the top of the assembly and in any direction.
   2. Concentrated Force Loads: 200 pounds (890 N) applied at any point on the top of the assembly and in any direction.

D. Railing shapes, heights, profiles, configurations, and component members are to comply with applicable codes and as indicated on Drawings.
   1. Unless indicated otherwise on Drawings, round tube railings to be 1-1/2 inch diameter.

2.2 COMPONENTS

A. Sizes, shapes, and configurations to be as indicated on Drawings.

2.3 MATERIALS

A. Steel Components:
   1. Steel Bars, Plates, Channels, and Angles: ASTM A36/A36M.
   2. Steel Round and Rectangular Tubing:
      a. ASTM A501/A501M, hot-formed.
   3. Steel Structural Pipe:
      a. ASTM A53/A53M, Grade B, Schedule 40.
   4. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
   5. Fasteners, Bolts, Nuts and Washers:
      a. ASTM F3125/F3125M; Grade A325, Type 1, 120 ksi minimum tensile strength.

B. Stainless Steel Components:
   1. Tubing: ASTM A554, Grade MT 304 at interior locations and 316L at exterior locations.
   2. Pipe: ASTM A312/A312M, Grade TP 304 at interior locations and 316L at exterior locations.
   3. Plate and Sheet: ASTM A666, Type 304 at interior locations and 316L at exterior locations.
   4. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
   5. Welding Materials: AWS D1.6/D1.6M; type required for materials being welded.
   6. Stainless Steel Castings: ASTM A743/A743M, Grade CF 8, or CF 20.
   7. Fastener, Bolts, Nuts and Washers: Stainless steel compatible with components to be fastened.

2.4 FABRICATION

A. Verify field measurements prior to fabrication.

B. Fit and shop assemble components in largest practical sections, for delivery to site.

C. Fabricate components with joints tightly fitted and secured.

D. Continuously seal joined pieces by intermittent welds and plastic filler.

E. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 1.
   1. No evidence of weld.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.

2.5 FINISHES

A. Galvanized Railings and Components:
   1. Locations:
      a. All exterior items unless otherwise indicated.
         1) Galvanized items are to remain as galvanized finish with cold-applied galvanizing tough-up.
   2. Galvanized Steel: Hot-dip galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
   3. Galvanized Steel Fasteners, Bolts, Nuts, and Washers: Hot-dip galvanize after fabrication to ASTM A153/A153M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
   4. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type II - Organic with zinc dust at Level 2 (77 percent zinc dust, minimum).

B. Stainless Steel Components:
   1. Provide No. 4 satin brushed finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Clean and strip primed steel items to bare metal where site welding is required.

D. Supply items required to be cast into concrete and or embedded in masonry with setting templates.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install railings in compliance with ADA Standards for accessible design at applicable locations.

C. Install components with true alignment, plumb and level, accurately fitted, free from distortion or defects.

D. Install anchors, angles, struts and blocking as required for connecting stairs to structure.

E. Unless Drawings indicate anchoring and securement of railings otherwise, core-drill concrete floor to receive vertical support of railings and insert vertical supports to depths and grout securely as indicated on Drawings.

F. Secure wall-mounted railings as indicated on Drawings.

G. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.

H. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS standards applicable to the materials to be welded.

I. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

J. Mechanically fasten joints butted tight, flush, and hairline.

K. Grind welds smooth and flush.

L. Prime welds, abrasions, and otherwise damaged shop primed or galvanized coatings with indicated touch-up coating.

M. Obtain approval of Architect prior to site cutting or creating adjustments not scheduled.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.

C. Maximum Offset from True Alignment: 1/4 inch.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer’s recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof curbs and perimeter nailers.
   2. Blocking in wall and roof openings.
   3. Communications and electrical panel back boards.
   4. Fire-retardant treatment of wood.
   5. Preservative treatment of wood.

B. Related Requirements:
   1. Drawings and Specification Sections required materials in this Section and not indicated otherwise.

1.2 REFERENCES

A. American Lumber Standard Committee (ALSC):
   1. ALSC PS 20 - American Softwood Lumber Standard; 2020, Revised 2021.

B. The Engineered Wood Association (APA):
   1. APA PS 1 - Structural Plywood; 2020.
   2. APA PS 2 - Performance Standard for Wood Structural Panels; 2018, Revised 2020.

C. American Wood-Preservers Association (AWPA):
   1. AWPA U1 - Use Category System: User Specification for Treated Wood; 2023.

D. ASTM International (ASTM):
   1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023a.
   2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2023.
   3. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood; 2003, Reapproval 2017.
   4. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.
   5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. Southern Pine Inspection Bureau, Inc. (SPIB):
   1. SPIB - Standard Grading Rules for Southern Pine Lumber; 2021.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit technical data on wood products, preservative and fire retardant treatment materials, and application instructions.

1.4 QUALITY ASSURANCE

A. Grading Agency: Any grading agency acceptable to the Authority Having Jurisdiction and whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Perform Work in accordance with the following:
   1. Dimension Lumber: Comply with ALSC PS 20 and requirements of specified grading agencies.
   2. Wood Construction Panels:
      a. Plywood: Comply with APA PS 1 and requirements of specified grading agencies.
      b. Oriented Strand Board (OSB): Comply with APA PS 2 and requirements of specified grading agencies.

C. Surface Burning Characteristics:
   1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

D. Apply label from agency approved by Authority Having Jurisdiction to identify each preservative treated and fire retardant treated material.

PART 2 PRODUCTS

2.1 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB.

B. Sizes: Nominal sizes as indicated on Drawings, S4S (surfaced on 4 sides).

C. Moisture Content: S-dry or MC19 (19 percent maximum moisture content).

D. Stud Framing for sizes 2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm):
   1. Species: Southern Pine.
   2. Grade: No.2.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S (surfaced on 4 sides), No.2 or Standard Grade.
   2. Boards: Standard or No.3.

2.2 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: APA PS 1, A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; Fire Retardant Treated as indicated in this Section; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: APA PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: APA PS 1, A-D or better.
   3. Other Locations: APA PS 1, C-D Plugged or better.

2.3 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. Anchors:
    a. Toggle bolt type for anchorage to hollow masonry.
    b. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
    c. Bolt or ballistic fastener for anchorages to steel.

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 (Z550) galvanizing complying with ASTM A653/A653M.

C. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

2.4 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. 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 AWPA standards.

B. Fire Retardant Treatment:
1. Exterior Type: AWPA U1, Use Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
    a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    b. Fire retardant treatment required as follows:
        1) All exterior rough carpentry items.
2. Interior Type: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature, low hygroscopic type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
    a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    b. Fire retardant treatment required as follows:
        1) All interior rough carpentry items.

C. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.10 lb/cu ft retention.
    a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    b. Treat lumber as indicated on Drawings.
    c. Treat lumber exposed to weather.
    d. Treat lumber in contact with roofing, flashing or waterproofing.
    e. Treat lumber in contact with masonry or concrete.
    f. Treat lumber less than 18 inches above grade.
2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
    a. Kiln dry plywood after treatment to maximum moisture content of 15 percent.

b. Treat plywood as indicated on Drawings.
c. Treat plywood in contact with roofing, flashing or waterproofing.
d. Treat plywood in contact with masonry or concrete.
e. Treat plywood less than 18 inches above grade.

3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.31 lb/cu ft retention.
   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   b. Treat lumber as indicated on Drawings.
   c. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
   d. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify substrate conditions are ready to receive blocking, curbing, and framing.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Coordinate placement of blocking, curbing and framing items.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Set members level and plumb, in correct position.

C. Place horizontal members, crown side up.

D. Except where prefabricated roof curbs are indicated and unless specified otherwise in specification sections for roofing construction, construct curb members of solid wood sections and form corners by alternating lapping side members.

E. Coordinate curb installation with installation of decking and support of deck openings, and parapet construction.

F. Communications and Electrical Room Mounting Boards: Coordinate and size mounting boards 12 inches beyond size of panels, devices and wiring to be mounted.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes finish carpentry materials and work not otherwise indicated in other Sections.
   1. Finish carpentry items.
   2. Wood trim.
   3. Hardware and attachment accessories for finish carpentry items not specified in other Sections.

B. Related Requirements:
   1. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.
   2. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.
   3. Section 12 32 16 - Manufactured Plastic-Laminate-Faced Casework: Shop fabricated cabinet work.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI A135.4 - Basic Hardboard; 2020.
   2. ANSI A208.1 - Particleboard; 2022.

B. American National Standards Institute (ANSI) and Decorative Hardwood Association (formerly Hardwood Plywood and Veneer Association (HPVA)):
   1. ANSI/HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.

C. The Engineered Wood Association (APA):
   1. APA PS 1 - Structural Plywood; 2019, Revised 2020.

D. American Wood-Preservers Association (AWPA):
   1. AWPA U1 - Use Category System: User Specification for Treated Wood; 2023.

E. Architectural Woodwork Institute (AWI):
   1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, Errata 2016.
   2. AWI (QCP) - Quality Certification Program; Current Edition, www.awigcp.org.

F. ASTM International (ASTM):
   1. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
   2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
   3. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021a.

G. Builders Hardware Manufacturers Association (BHMA):
   1. BHMA A156.9 - Cabinet Hardware; 2020.

H. California Department of Public Health (CDPH):
   1. CDPH Standard Method VOC v1.2 - Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers - Version 1.2; 2017.

I. National Electrical Manufacturers Association (NEMA):
   1. NEMA LD 3 - High Pressure Decorative Laminates; 2005.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Coordination and sequencing work.

B. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components.

C. Sequence work to ensure utility connections are achieved in orderly and expeditious manner.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit the following data:
   1. Wood materials to be used in viewable construction.
   2. Veneer materials.
   3. Fire retardant and preservative treatment materials and application instructions.
   4. Finish materials.
   5. Attachment hardware, and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, and to minimum scale of 1-1/2 inch equals 1 foot.
   1. Provide the information required by AWI/AWMAC/WI (AWS).

D. Samples for Initial Selection: Two manufacturer's color samples illustrating the full range of finishes, patterns, and colors available for each finish surface type, trim and hardware indicated; submit for Architect’s initial selections.
   1. For clear coats on stained wood, samples to illustrate range of stain colors and sheens available as applied to wood species required in construction.
   2. For clear coats on non-stained wood, samples to illustrate sheens available as applied to wood species required in construction.

E. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish, pattern, and color; minimum 4 x 4 inch samples and actual trim and hardware. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Certificates:
   1. Submit copy of fabricator’s AWI (QCP) - Quality Certification Program license and Project specific letters to the Architect.
   2. Submit labels and certificates required by quality assurance and quality control programs.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating products indicated in this Section with minimum five (5) years documented experience.
   1. Accredited participant in the specified Quality Certification service/program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this Section.
   1. Provide labels or certificates indicating that the products and work comply with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
   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 the work complies with specified requirements.

C. Maintain copy of AWI/AWMAC/WI (AWS) on site available for review.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.

C. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.

D. Protect from moisture damage.

E. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Quality Standard: Products and work of this Section is to comply with the following grade in accordance with AWI/AWMAC/WI (AWS), unless otherwise indicated.
   1. Grade:
      a. Custom Grade.
   2. Moisture Content for Wood Based Products:
      a. Interior Use: 6 - 8 percent.
      b. Exterior Use: 8 - 10 percent.
   3. Quality to be suitable for transparent finish unless indicated otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by authority having jurisdiction and applicable code.

2.2 COMPONENTS

A. Softwood Lumber:
   1. Species of Wood:
      a. Southern Pine.
   2. Cut or Slicing of Wood:
      a. Rift or Quarter Sawn.

B. Hardwood Lumber:
   1. Species of Wood:
      a. Red Oak.
   2. Cut or Slicing of Wood:
      a. Rift Sawn.

C. Softwood Plywood: Refer to ACCESSORIES article in this Section for adhesive type.
   1. Core Type:
      a. Veneer core.
         1) Exterior grade for exterior use.
   2. Species of Face Veneer: APA PS 1 Grade B-B.
      a. Fir.
   3. Slicing of Face Veneer:
      a. Rotary Sliced.

D. Hardwood Plywood: Refer to ACCESSORIES article in this Section for adhesive type.

1. Core Type:
    a. Veneer core.
        1) Exterior grade for exterior use.
2. Species of Face Veneer: ANSI/HPVA HP-1 Grade A.
    a. Red Oak.
3. Slicing of Face Veneer:
    a. Rotary Sliced.
4. Matching of Individual Leaves to Each Other: Book matching.
5. Matching Across Panel Face: Balanced matching.

E. High Pressure Decorative Laminate (HPDL): NEMA LD 3.
1. High Wear Surfaces: HWS (0.060 inch thick).
2. Horizontal Surfaces: HGS (0 048 inch thick).
3. Vertical Surfaces: VGS (0.028 inch thick).
4. Cabinet Liner Surfaces: CLS (0.02 inch thick).
5. Concealed Backer Surfaces: BKL (0.02 inch thick) undecorated laminate backer for application to concealed backside of panels faced with HPDL.
6. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.
7. Colors and Finish:
    a. Vertical Surfaces:
        1) As selected by Architect from manufacturer's full range.
    b. Horizontal Surfaces:
        1) As selected by Architect from manufacturer's full range.

F. Particleboard: Medium density; moisture resistant; not less than Type M-2 exterior glue complying ANSI A208.1; sanded faces.

G. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 (tempered grade), 1/4 inch thick, smooth one sides (S1S).

H. Glass Shelves: ASTM C1048, Kind FT Fully tempered, Condition A, uncoated, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select; with horizontal tempering, arrised edges.

2.3 ACCESSORIES

A. Adhesive: Wood-to-wood adhesive used to glue for thickness, width, or lay-up of veneered construction. Application to be in accordance with the manufacturer’s instructions and the adhesive’s intended purpose.
1. Type I: Exterior or non-climate controlled interior applications.
2. Type II: Interior climate controlled applications.

B. Shelf Standards and Fitted Supports: Stainless steel; satin finish.
1. Standards to be formed channels, slotted for fitted supports spaced at 1 inch centers.

C. Shelf Brackets: Stainless steel; satin finish.
1. Fabricated with angled extension support, pre-drilled and countersunk fastener holes.

D. Mirror Attachment Accessories: Stainless steel J-profile channels; satin finish.

E. Fasteners and Adhesives:
1. Fasteners: Steel of size and type to suit application; hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
    a. Concealed Joint Fasteners: Threaded steel.
    b. Exterior Fasteners: Length required to penetrate wood substrate 1-1/2 inch.
        1) Stainless steel, Grade 304 or 316 and complying with ASTM F1667/F1667M.

2. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

F. Lumber for Shimming and Blocking: Softwood lumber.

G. Veneer Edge Band: Standard wood veneer edge band matching face veneer.

H. Wood Filler: Base type as recommended by manufacturer of finish materials and tintable to match surrounding surface finish.

I. Primer: Low VOC alkyd primer sealer type.
1. Interior Primers: Maximum volatile organic compound content in accordance with CDPH Standard Method VOC v1.2.

2.4 HARDWARE

A. Hardware: Comply with BHMA A156.9.
1. Hinges: European style, stainless steel, satin finish.
2. Pulls: Wire style.
a. Stainless steel, satin finish.
3. Drawer Slides: Full suspension style, powder coat finish.
4. Cabinet Locks: Keyed cylinder, two keys for each lock, master keyed, steel with satin finish.

2.5 WOOD TREATMENT

A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
1. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

C. Wood Preservative by Pressure Treatment (PT Type): AWPA U1 Treatment using water borne preservative with 0.25 percent retainage.

D. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.

E. Provide identification on fire retardant treated material.

F. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

G. Redry wood after pressure treatment to the indicated percent moisture content.

2.6 FABRICATION

A. Verify field measurements prior to fabrication.

B. Fabricate in accordance with PERFORMANCE REQUIREMENTS article of this Section.

C. Shop assemble work for delivery to site, permitting passage through building openings.

D. Fit exposed sheet material edges with matching veneer edging. Use one piece for full length only.

E. Cap exposed high pressure decorative laminate finish edges with material of same finish and pattern.

F. Shop prepare and identify components for book match grain matching during site erection.

G. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

H. Apply high pressure decorative laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.

I. Apply laminate backing sheet to reverse face of high pressure decorative laminate finished surfaces.

2.7 FINISHING

A. Shop finish items indicated to be shop fabricated and finished for installation at site.

B. Sand work smooth and set exposed nails and screws.

C. Apply wood filler to fill recessed nail and screw indentations.
   1. On items to receive transparent finishes, tint wood filler to matching surrounding surfaces and of types recommended by manufacturer of applied finishes.

D. Apply seal coat to concealed wood surfaces in contact with cementitious materials.

E. Back prime woodwork items to be field finished, prior to installation.

F. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade indicated in PERFORMANCE REQUIREMENTS article of this Section and as follows:
   1. Refer to Section 09 90 00 - Painting and Coating for finishes for interior wood.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install work in accordance with PERFORMANCE REQUIREMENTS of this Section.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

E. Install trim with finish nails at 12 inches on center.
   1. Set, fill and finish over fastener locations to match surrounding finish.

F. Install hardware.

G. Site Applied Wood Treatment:

1. Apply preservative treatment.
2. Brush apply one coat of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
3. Allow preservative to dry prior to erecting members.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Indicated Position: 1/16 inch.

C. Maximum Offset from Alignment with Abutting Materials: 1/32 inch.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

3.7 SCHEDULES

A. Interior:
1. Collaboration 300 Accent Pilasters: Metal stud framing with HWS plastic laminate over medium density particleboard and aluminum reveal trim.
2. Lobby 114 – Display cabinets: Masonry & Metal stud framing with HWS plastic laminate over medium density particleboard.

END OF SECTION

SECTION 07 11 00
DAMPPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Bituminous dampproofing.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry.

1.2 REFERENCE STANDARDS

A. ASTM International (ASTM):
   1. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 2011, Reapproval 2018.
   2. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013, Editorial Revisions 2019.

B. National Roofing Contractors Association (NRCA):
   1. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.4 QUALIFICATIONS

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years experience.

1.5 FIELD CONDITIONS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Henry Company: www.henry.com.
   2. Karnak Corporation: www.karnakcorp.com.
   3. Mar-Flex Systems, Inc: www.mar-flex.com/sle.
   4. W.R. Meadows, Inc: www.wrmeadows.com/sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 DAMPPROOFING PRODUCTS

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
   1. Composition - Vertical Application: ASTM D1227/D1227M Type III or ASTM D1187/D1187M Type I.
   2. Composition - Horizontal and Low-Slope Application: ASTM D1227/D1227M Type II or III.
   3. VOC Content: Not more than permitted by local, State, and federal regulations.
   4. Applied Thickness: 1/16 inch (1.5 mm), minimum, wet film. Provide thicker wet film if recommended by dampproofing manufacturer.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify existing conditions before starting work.

C. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

D. Verify that items that penetrate surfaces to receive dampproofing are securely installed.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Protect adjacent surfaces not designated to receive dampproofing.

D. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

E. Do not apply dampproofing to surfaces unacceptable to manufacturer.

F. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Perform work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

C. Install dampproofing system to surfaces and locations as indicated on Drawings.

D. Prime surfaces in accordance with manufacturer's instructions.

E. Apply dampproofing with tools or equipment as recommended by manufacturer.

F. Apply dampproofing at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F; do not exceed finish blowing temperature for four hours.

G. Apply each coat of dampproofing in continuous and uniform coat at a rate of 1 gal per 25 sq ft.

H. Seal penetrations and items projecting through dampproofing surface. Seal watertight with mastic compatible and recommended by dampproofing manufacturer.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect work from damage.

END OF SECTION

SECTION 07 13 00

SHEET WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Self-adhered modified bituminous sheet membrane system.

B. Related Requirements:
   1. Section 03 30 00 - Cast-in-Place Concrete: Concrete substrate.
   2. Section 07 21 00 - Thermal Insulation: Insulation used for protective cover.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashing.
   4. Section 07 90 00 - Joint Protection: Joint sealing of substrate required prior to installation of work of this section.
   5. Sections related to collection, piping, and drainage of ground water.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM C366/C366M - Standard Test Methods for Measurement of Thickness of Sandwich Cores; 2016, Editorial Revisions 2022.
   2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 2016, Reapproval 2021.
   3. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.
   4. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2018.
   5. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds; 1998, Reapproval 2017.
   6. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016, Reapproval 2023.
   7. ASTM D1777 - Standard Test Method for Thickness of Textile Materials;1996, Reapproval 2019.
   8. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test); 2008, Reapproval 2023.
   9. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
   10. ASTM D3776/D3776M - Standard Test Methods for Mass Per Unit Area (Weight) of Fabric; 2020.
   11. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.
   12. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a, Reapproval 2023.
   13. ASTM D4716/D4716M - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head; 2022.
   14. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles; 2010, Reapproval 2018.
   15. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems; 2018.

16. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes; 2020.
17. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, Editorial Revisions 2023.
18. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2013, Reapproval 2019.

B. National Roofing Contractors Association (NRCA):
1. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.3 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Provide data for water proofing system components and accessories. Data to include, but is not limited to, surface conditioners, primers, flexible flashings, joint cover sheet, and joint and crack sealants, with temperature range for application of waterproofing membrane. Include product data for drainage panel and protection board.

C. Shop Drawings: Indicate details for joint, corner, termination conditions, drainage panel and protection board. Include conditions of interface with other materials and construction such as drainage.

D. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's qualifications certification.

F. Installer's qualifications certification.

G. Manufacturer's Installation Instructions: Indicate special procedures.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner’s name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA (WM) - Waterproofing Manual.

B. Sheet Waterproofing System: All materials, components, and accessories are to be as recommended by manufacturer of sheet waterproofing membrane material.

1.7 QUALIFICATIONS

A. Membrane Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three (3) years of documented experience.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until liquid or mastic accessories have cured.

1.9 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Manufacturer's Warranty: Provide five (5) year warranty to correct waterproofing system work that fails to resist penetration of water. Remedial work is to include removal and replacement of materials concealing waterproofing at no extra cost to Owner.
   1. Exception: Except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.1 MEMBRANE MATERIALS

A. Self-Adhered Modified Bituminous Sheet Membrane:
   1. Manufacturers:
      a. Carlisle Coatings & Waterproofing Inc. - MiraDRI 860/861.
      b. GCP Applied Technologies - Bituthene 3000.
      c. Henry Company - Blueskin WP 200.
      d. Polyguard Products, Inc. - 650 Membrane.
      e. W.R. Meadows, Inc. - MEL-ROL Series.
      f. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Thickness: 60 mil, 0.060 inch (1.5 mm), minimum.
   3. Sheet Width: 36 inch (0.914 m) roll width, minimum.
   4. Tensile Strength:
      a. Film: 5000 pounds per square inch (34.57 MPa), minimum, measured according to ASTM D882 and at grip-separation rate of 2 inches (50 mm) per minute.
      b. Membrane: 325 pounds per square inch (2.24 MPa), minimum, measured according to ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches (50 mm) per minute.
   5. Elongation at Break: 300 percent, minimum, measured according to ASTM D412.
   6. Water Vapor Permeance: Less than 0.1 perms, measured in accordance with ASTM E96/E96M.
   7. Low Temperature Flexibility: Unaffected when tested according to ASTM D1970/D1970M at minus 15 degrees F (or less), 180 degree bend on 1 inch (25 mm) mandrel.
   8. Peel Strength: 7 pounds per inch (1226 N/m), minimum, when tested according to ASTM D903.
   9. Lap Adhesion Strength: 5 pounds per inch (875.6 N/m), minimum, when tested according to ASTM D1876.
   10. Puncture Resistance: 48 pounds minimum, measured in accordance with ASTM E154/E154M.
   11. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.

12. Hydrostatic Resistance: Resists the weight of 200 feet (61 m) when tested according to ASTM D5385/D5385M.
13. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.

B. Seaming Materials: As recommended by membrane manufacturer.

C. Membrane Sealant: As recommended by membrane manufacturer.

D. Flexible Flashings: As recommended by membrane manufacturer.

E. Termination Bars: Aluminum; compatible with membrane and adhesives.

F. Surface Conditioner: As recommended by membrane manufacturer.

G. Adhesives: As recommended by membrane manufacturer.

H. Thinner and Cleaner: As recommended by adhesive manufacturer; compatible with sheet membrane.

2.2 ACCESSORIES

A. Sealant for Cracks and Joints in Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

B. Drainage Panel: To be as recommended by waterproofing membrane manufacturer and as follows:
1. Drainage layer with geotextile filter fabric on earth side. Minimum 4 feet width roll.
2. Core: Dimpled polypropylene or high-impact polystyrene core.
   a. Thickness: 0.40 inch minimum per ASTM D1777 or ASTM C366 (method B).
   b. Compressive Strength: 11,000 psf minimum per ASTM D1621.
   c. Water Flow Rate: 17 gal/min/ft minimum per ASTM D4716/D4716M,
3. Geotextile Filter Fabric: Nonwoven polypropylene; adhered to each core dimple.
   a. Weight: 4.0 oz/sy minimum per ASTM D3776/D3776M or ASTM D5261.
   b. Tensile Strength: 100 lbs minimum per ASTM D4632/D4632M.
   c. Water Flow Rate: 140 gal/min/sf per ASTM D4491/D4491M.

C. Protection Board:
1. Extruded Polystyrene Board as specified in Section 07 21 00 - Thermal Insulation.
   a. 1 inch thick unless indicated otherwise on Drawings.

D. Cant Strips: Premolded composition material and as recommended by membrane manufacturer.

E. Flexible Flashings: Type recommended by membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify existing conditions are acceptable prior to starting this work.

C. Verify substrate surfaces are durable and free of matter detrimental to adhesion or application of waterproofing system.

D. Verify items that penetrate surfaces to receive waterproofing are securely installed.

E. Verify substrate surface slopes to drain for horizontal waterproofing applications.

F. Verify that intercepting drainage construction by others is ready to receive the work of this Section.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Protect adjacent surfaces from damage not designated to receive waterproofing.

D. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions. Vacuum substrate clean.

E. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

F. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.

G. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

H. Prepare building expansion joints at locations as indicated on drawings.

I. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer and protect conditioner from rain or frost until dry.

J. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.
   1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease, and oil.
   2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delamination, as described in the reference standard.
   3. Remove and replace areas of defective concrete as specified in Section 03 30 00.
   4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
   5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Membrane:
   1. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
   2. Coordinate and provide drainage continuity with other drainage construction elements by others and indicated on Drawings.
   3. Roll out membrane and minimize wrinkles and bubbles.
   4. Self-Adhering Membrane: Remove release paper layer and roll out onto substrate with a mechanical roller. Install to full contact bond.
   5. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.
   6. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
   7. Weather lap joints on sloped substrate in direction of drainage. Seal joints and seams.
   8. Install building expansion joints at locations as indicated on drawings.

9. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.
10. Seal membrane and flashings to adjoining surfaces.
    a. Install termination bar along edges.
    b. Install counterflashing over exposed edges.

C. Drainage Panel:
1. Coordinate and provide drainage continuity with other drainage construction elements by others and indicated on Drawings.
2. Place drainage panel directly against membrane, butt joints, place to direct drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.

D. Protection Board:
1. Place protection board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.
2. Adhere protection board to substrate with compatible adhesive.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed construction from disturbance and damage.

END OF SECTION

SECTION 07 14 16

COLD FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Surface preparation.
   2. Application of single-component, cold-applied, liquid waterproofing membrane.

B. Related Requirements:
   1. Section 03 30 00 - Cast-in-Place Concrete.
   2. Section 04 20 00 - Unit Masonry.
   3. Section 07 21 00 - Thermal Insulation.
   4. Section 07 62 00 - Sheet Metal Flashing And Trim.
   5. Section 07 90 00 - Joint Protection.

1.3 REFERENCES

A. ASTM International (ASTM):
   1. ASTM C1250 - Standard Guide for the Use of the Joint API and ASTM Adjunct for Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils: API MPMS Chapter 11.1; 2019, Editorial Changes 2020.
   2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension: 2016, Reapproval 2021.
   3. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness; 2015, Reapproval 2021.
   4. ASTM D2369 - Standard Test Method for Volatile Content of Coatings; 2020.
   5. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a. Editorial Changes 2023.

1.4 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data: For each type of product. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing the product.

B. Installer Qualifications: Installer to be experienced and have adequate number of skilled personnel who are thoroughly trained and experienced in the application of fluid applied waterproofing membranes.

C. Regulatory Requirements: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.7 MOCK-UP

A. Section 01 40 00 - Quality Requirements: Mock-up requirements.

B. Prior to installation of waterproofing membrane, apply waterproofing membrane to 100 sf of deck or wall to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Store materials in a clean, dry area in accordance with manufacturer's instructions.

D. Store at temperatures between 40 to 70 deg F (4 to 21 deg C).

E. Protect materials during handling and application to prevent damage or contamination.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Product not intended for uses subject to abuse or permanent exposure to the elements.

C. Do not apply membrane when air, material, or surface temperatures are expected to fall below 30 deg F (-1 deg C) within four hours of completed application.

D. Do not apply membrane if rainfall is forecast or imminent within 12 hours.

E. Do not apply waterproofing membrane to any surfaces containing frost.

F. Consult manufacturer for applications to green concrete.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Waterproofing Membrane:
   1. Carlisle Coatings & Waterproofing, Inc.
   2. Henry Company.
   3. Tremco Commercial Sealants & Waterproofing.
   4. W.R. Meadows, Inc.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Basis of Design: W.R. Meadows, Inc.

2.2 MATERIALS

A. Waterproofing Membrane: Single-component, cold-applied, solvent-free, non-shrink, liquid waterproofing membrane.
   1. Physical Characteristics:
      a. Solids Content by Weight: 98 percent, ASTM C1250.
      b. Tensile Strength: 100 psi, ASTM D412.
      c. Elongation at Break: 425 percent, ASTM D412.
      d. Water Vapor Transmission: 0.10 perms, ASTM E96 (Method BW).
      e. Shore 00 Hardness: 57, ASTM D2240.
      f. VOC Content: 36 g/L, ASTM D2369.
   2. Basis of Design: W.R. Meadows, Inc. - Hydralastic 836 Waterproofing Membrane.

2.3 ACCESSORIES

A. Waterproofing system components and materials to be as recommended by waterproofing membrane manufacturer.

B. Accessory Joint Tape: 6 inches (150 mm) minimum width, reinforcing fabric for corners, crack, and joint treatment.
   1. Basis of Design: W.R. Meadows, Inc. - Reinforcing Fabric HCR.

C. Reinforced Joint Tape for outside corners subject to backfill.
   1. Basis of Design: W.R. Meadows, Inc. - Precon Tape.

D. Primer: Epoxy type.
   1. Basis of Design: W.R. Meadows, Inc. - REZI-WELD LV or REZI-WELD LV STATE.

E. Detailing Membrane.
   1. Basis of Design: W.R. Meadows, Inc. - BEM.

F. Concrete Repair Materials.
   1. Basis of Design: W.R. Meadows, Inc. - Meadow-Patch 5 and Meadow-Patch 20 Concrete Repair Mortars.

G. Waterproofing Protection Course.
   1. Basis of Design: W.R. Meadows, Inc. - Perminator or Protection Course.

H. Rolled Matrix Drainage System.
   1. Basis of Design: W.R. Meadows, Inc. - Mel-Drain.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Protect adjacent surfaces not designated to receive waterproofing.

D. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

E. Do not apply waterproofing to surfaces unacceptable to manufacturer.

F. Clean concrete surfaces so they are free of all coatings, dirt, oil, paints and any other contaminants.

G. Patch all holes and voids and smooth out any surface misalignments.

H. Remove and patch all concrete form ties.

I. Priming:
   1. Apply the low viscosity epoxy with a nap roller or squeegee at a coverage rate of 150 - 200 sq.ft. per gallon (3.75 - 5.0 m2/L) providing a uniform coverage over the substrate.
   2. Allow the epoxy primer to become tack-free prior to the application of the fluid applied waterproofing membrane.

J. Treatment of Existing Cracks and All Non-Structural Joints:
   1. Identify and install detailing membrane in all cracks and all non-structural joints.
   2. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3 inches (75 mm) of membrane extending onto the wall in all directions.
   3. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.
   4. Completely cover the glass mesh with a second coat of the fluid applied membrane at 30 wet mils while the first coat is still wet, again extending 3 inches onto the wall in all directions.

K. Treatment of Inside & Outside Corners:
   1. Install detailing membrane to create a minimum 3/4 inch fillet in all inside corners.
   2. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3 inches (75 mm) of membrane extending onto the wall in all directions.
   3. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.
   4. Completely cover the glass mesh with a second coat of fluid applied membrane at 30 wet mils while the first coat is still wet, again extending 3 inches onto the wall in all directions.
   5. On outside corners subject to backfilling, install reinforced joint tape in lieu of fabric joint tape following the same procedure.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Apply waterproofing membrane system in accordance with manufacturer's instructions.

C. Gently mix membrane prior to application.

D. Apply membrane by trowel, flat-blade squeegee, or roller, at a minimum coverage rate of 25 sf per 1 U.S. gal (2.3 m2/3.78 L), providing a thickness of 60 mils wet.

E. If a two-coat application is required, apply second coat as soon as possible with no more than eight hours between coats providing a minimum total thickness of 60 mils wet.

F. Frequently inspect surface area to ensure proper adhesion and consistent thickness is achieved.

G. Work material into any fluted rib forming indentations.

H. Provide minimum cured membrane thickness of 60 mils dry.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect membrane with application of waterproofing protection course, drainage board, or other approved material.

C. Backfill immediately using care to avoid damaging waterproofing membrane system.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Board insulation at perimeter foundation walls.
      a. Exception: Where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.
   2. Batt insulation and vapor retarder in exterior framed walls, ceilings, and soffits.
   3. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior walls.

B. Related Requirements:
   1. Division 07 - Thermal and Moisture Protection: Roofing insulation requirements.
   2. Section 07 21 19 - Foamed-In-Place Insulation: Plastic foam insulation other than boards.
   3. Section 09 21 16 - Gypsum Board Assemblies: Acoustic attenuation insulation for interior construction that does not require a thermal barrier between two conditioned spaces.

1.2 REFERENCE STANDARDS

A. ASTM International (ASTM):
   1. ASTM C272/C272M - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions; 2018.
   2. ASTM C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation; 2021.
   3. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
   4. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2022.
   5. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
   6. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019, Reapproval 2022.
   7. ASTM D774/D774M - Standard Test Method for Bursting Strength of Paper; 1997, Reapproval 2007.
   8. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016, Reapproval 2023.
   9. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.
   10. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
   11. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2022a, Editorial Revisions 2023.
   12. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source; 2017, Editorial Revisions 2022.

B. GreenSeal (GS):
   1. GreenSeal GS-36 - Standard for Adhesives for Commercial Use; 2013.

C. National Fire Protection Association (NFPA):
   1. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2023.

D. South Coast Air Quality Management District (SCAQMD):
   1. SCAQMD Rule 1168 - Adhesive and Sealant Applications; Current Edition, with All Amendments.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: 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.

PART 2 PRODUCTS

2.1 BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Extruded polystyrene board; ASTM C578; and the following characteristics:
   1. Application Locations: Locations as indicated on Drawings and as follows.
      a. Foundation perimeter, except where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.
   2. Type (ASTM C578), Minimum Compressive Strength (ASTM D1621), Minimum R-value (ASTM C518, at 75 degrees F mean temperature), Maximum Water Absorption (ASTM C272/C271M, by volume, total immersion) are as follows:
      a. Type IV, 25 psi, R-value 5.0 per inch, Water Absorption 0.3 percent.
   3. Board Thickness: 3 inches unless indicated otherwise on Drawings.
   4. Flame Spread Index (FSI): Class A, 25 or less, when tested as per ASTM E84.
   5. Smoke Developed Index (SDI): 450 or less, when tested as per ASTM E84.
   6. Comply with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
   7. Board Edges: Square.
   8. Board Size: 48 x 96 inch, scored at 16 inch increments.
   9. Manufacturers:
      a. DiversiFoam Products - CertiFoam.
      b. Dow Chemical - Styrofoam.
      c. Owens Corning - Foamular XPS.
      d. Kingspan Insulation, LLC - Green Guard XPS.

2.2 BATT INSULATION MATERIALS

A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Unfaced Type: ASTM C665 Type-I (unfaced); rated flame spread / smoke development of 25 / 50, or less, when tested in accordance with ASTM E84).
      a. Application Locations: Where indicated on Drawings.
   2. Faced Type: ASTM C665 Type-III (faced); Class-A (FSK (foil-scrim-kraft facing)); Category-I (vapor retarder facing); rated flame spread / smoke development of 25 / 50, or less, when tested in accordance with ASTM E84.
      a. Application Locations: Where indicated on Drawings.

3. Thermal Resistance: Minimum R-value of 4.0 per inch thickness, when tested in accordance with ASTM C518 at 75 degrees F.
4. Combustion Characteristics: Passes when tested in accordance with ASTM E136.
5. Fungi Resistance: Passes when tested in accordance with ASTM C1338.
6. Nominal Density: Minimum 2.5 pcf when tested in accordance with ASTM C303.
7. Corrosivity to Steel: Passes when tested in accordance with ASTM C665.
8. Blanket Width: Sized to fully friction fit space between framing members.
9. Blanket Thickness: Sized to fully friction fit cavity, but not less than 3-1/2 inches.
10. Manufacturers:
    a. Johns Manville.
    b. Knauf Insulation.
    c. Owens Corning.
    d. Rockwool.

B. Vapor Retarder Sheet: Polyethylene film complying with ASTM D4397.
1. Application Locations: Where indicated on Drawings.
2. Color:
    a. Clear.
3. Thickness:
    a. 6 mils (0.006 inch) (0.1524 mm).
4. Water Vapor Permeance:
    a. For 6 mil Sheet Thickness: 0.13 perms complying with ASTM D4397.
5. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches (50 mm) wide, compatible with sheet material.

2.3 ACCESSORIES

A. Aluminum Foil Tape: Bright aluminum self-adhering type, mesh reinforced, minimum 2 inches wide, and as recommended by insulation manufacturer.

B. Tape For Rigid Insulation Boards: Joint tape material to be in accordance with insulation material manufacturers' instructions.

C. Adhesive: Type recommended by insulation manufacturer for application.
1. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
2. Interior Aerosol Adhesives: Maximum volatile organic compound content in accordance with GreenSeal GS-36.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

C. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Board Insulation at Foundation Perimeter: (Exception: Where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.)
   1. Adhere strip of polyethylene sheet over control joint with double beads of adhesive each side of joint between sheets. Extend sheet full height of joint.
   2. Apply adhesive in three continuous beads per board length. Daub adhesive tight to protrusions to ensure continuity of vapor retarder and air seal.
   3. Install boards horizontally on foundation perimeter.
      a. Place boards to maximize adhesive contact.
      b. Install in running bond pattern.
      c. Butt edges and ends tightly to adjacent boards and to protrusions.
   4. Extend boards over expansion joints, unbonded to foundation on one side of joint.
   5. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
   6. Where cavity exists between installed foundation insulation boards and back of masonry veneer and cavity is indicated to be grouted solid, protect cavity from intrusion of soil and/or other debris. Install grout in cleaned cavity within 48 hours of masonry veneer installation.

C. Batt Insulation:
   1. Install insulation in accordance with manufacturer's instructions.
   2. Install in exterior wall, soffit spaces, ceiling spaces and other locations indicated on Drawings without gaps or voids. Do not compress insulation.
   3. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
   4. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
   5. Faced Batt Insulation: Install with factory applied face facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
   6. Tape insulation batts in place.
   7. Tape and seal butt ends, lapped flanges, and minor tears or cuts in membrane.

D. Vapor Retarder Sheet:
   1. Install vapor retarder sheet in accordance with manufacturer's instructions.
   2. Metal Framing: Where indicated on Drawings only and in conjunction with batt insulation installation, place vaper retarder sheet on warm side of building spaces; lap and seal vapor retarder sheet joints over face of framing members (framing members will provide solid backing to facilitate applying appropriate pressure for tape adhesion.
   3. Extend vapor retarder sheet tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape and seal in place.
   4. Tape and seal minor tears or cuts in vapor retarder sheet.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. 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

1.1 SUMMARY

A. Section includes foamed-in-place insulation system.

B. Related Requirements:
1. Section 04 20 00 - Unit Masonry: Insulated masonry cavity walls.
2. Section 07 21 00 - Thermal Insulation.
3. Section 07 27 00 - Air Barriers

1.2 REFERENCES

A. Air Barrier Association of America (ABAA):
1. ABAA - Quality Assurance Program (ABAA - QAP).

B. American Association of Textile Chemists and Colorists (AATCC):
1. AATCC 127 - Test Method for Water Resistance: Hydrostatic Pressure; 2018 Editorial Revisions 2019.

C. ASTM International (ASTM):
1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission properties by Means of the Heat Flow Meter Apparatus; 2021.
2. ASTM C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation; 2020.
3. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019, Reapproval 2022.
4. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016, Reapproval 2023.
5. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.
6. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2017, Reapproval 2023.
7. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics; 2021.
8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
9. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2022. Editorial Revisions 2023.
10. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

D. FM Global (FM):
1. FM 4880 - Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials; 2017.

E. National Fire Protection Association (NFPA):
1. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.
2. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characters of Exterior Wall Assemblies Containing Combustible Components: 2023

F. Underwriters Laboratories Inc. (UL):

1. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction; Current Edition, Including All Revisions.
2. UL 1715 - Standard for Safety Fire Test of Interior Finish Material; Current Edition, Including All Revisions.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination, scheduling, and sequencing.

B. Coordinate the work of this Section with other adjacent and interfacing work to comply with NFPA 285 and all N.C. Building Code requirements.

C. Sequence the work to permit installation of materials in conjunction with related materials and seals.

1.4 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit product description, insulation properties, and preparation requirements.

C. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention including around windows, and other special conditions.

D. Manufacturer's Certificates:
   1. Certify products meet or exceed specified requirements.
   2. Provide test results from large-scale tests such as NFPA 286 (with acceptance criteria of Section 803.2), NPFA 285, (with confirmation of assembly adherence) FM 4880, UL 1040 or UL 1715.
      a. Such testing shall be related to the actual project material assembly configuration and be performed with the finished manufactured foam plastic assembly in the maximum thickness intended for use.

1.6 MOCKUP

A. Section 01 40 00 - Quality Requirements: Requirements for mockup.

B. Provide mockup as part of the mockup requirements for Section 04 20 00 - Unit Masonry.

C. Provide mockup of each exterior wall assembly to receive Foamed – In-Place Insulation.

1.7 QUALITY ASSURANCE

A. Apply label from agency approved by authority having jurisdiction to identify each foam plastic component.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three (3) years documented experience.

B. Installer: Company specializing in performing work of this Section, on projects of similar size, with minimum three (3) years documented experience and certified by manufacturer.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Temperature: Install work within range of ambient and substrate temperature, and moisture content recommended by the primary material manufacturer. Do not apply materials to a damp or wet substrate. Do not install materials when ambient temperature is lower than 50 degrees F unless manufacturer provides written approval.

C. Field Conditions: Do not install work in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the material manufacturer.

D. Sequencing: Do not install work before the roof assembly and other construction has been sufficiently installed to prevent water infiltration into the substrate construction and building.

E. Compatibility: Do not allow materials to come in contact with chemically incompatible materials.

F. Ultra-Violet Exposure: Do not expose foamed-in-place insulation to sunlight longer than as recommended by the material manufacturer.

1.10 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Requirements for warranties.

B. Manufacturer's Warranty: Provide manufacturer's warranty covering against faulty materials in foamed-in-place insulation system, components, and accessories provided by manufacturer. Warranty duration to be five (5) years from date of Substantial Completion.

C. Installer's Warranty: Provide installer's warranty covering against water intrusion and leaks in foamed-in-place insulation system, components, and accessories. Warranty duration to be two (2) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 GENERAL

A. Regulatory Requirements: Comply with applicable codes for flame and smoke limitations.

B. Application: Locations indicated on Drawings including, but not limited to, masonry cavity walls, and at junctions of dissimilar wall and roof materials to achieve thermal, dampproofing, and air barrier.

C. All materials are to be compatible with the foamed-in-place insulation manufacturer’s product.

2.2 FOAMED-IN-PLACE INSULATION

A. Manufacturers:
   1. BASF Corporation - Walltite MAX.
   2. Carlisle- Sealtite Pro HFO
   3. Huntsman Building Solutions - Heatlok HFO Pro.
   4. Substitutions: Section 01 60 00 - Product Requirements.
      a. All substitution requests shall include a letter from the Manufacturer noting that the project specific wall assemblies have approved testing and adheres to the specified testing requirements.

B. Basis of Design: Huntsman Building Solution – Heatlok HFO Pro

C. Foamed-In-Place Insulation: Conforming to ASTM C1029, medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Closed Cell Content: 98 percent, minimum, in accordance with ASTM D6226.
   2. Thermal Resistance: R-value of 6.7, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
   3. Density: 2.0 pcf, minimum, in accordance with ASTM D1622.
   4. Compressive Strength: 31 psi, minimum, in accordance with ASTM D1621.
   5. Water Vapor Permeance: Vapor retarder; .91 perm, maximum, at 1.0 inch thick when tested in accordance with ASTM E96/E96M, desiccant method.
   6. Air Permeance: Aire Permanence at 75 Pa @1; <0.02 L/sm^2, in accordance with ASTM E2178.
   7. Surface Burning Characteristics: Class 1, in accordance with ASTM E84.
   8. Fungal Growth: None in accordance with ASTM C1338.

2.3 POUR-IN-PLACE FOAM INSULATION – BELOW GRADE

A. Manufacturers:
   1. Handi Foam – Low Pressure Quick Cure Spray Foam
   2. BASF Corporation – Walltite LWP Series
   3. Huntsman Building Solutions – PIP Foam 250cg-Slow

B. Pour-In-Place Insulation: Conforming to ASTM E84 low pressure, medium density, tow-component spray polyurethane/urethane foam.

2.4 ACCESSORIES

A. All accessories are to be compatible with the foamed-in-place insulation manufacturer's product.

B. Primer: As recommended by insulation manufacturer.

C. Joint Filler Foam: As recommended by insulation manufacturer.

D. Joint Sealer: Single component polyurethane type and as recommended by foamed-in-place insulation manufacturer.

E. Moisture Detection Paper Strips: MDP Strips.

F. Mineral Wool: Mineral Wool Board, 4 pcf density.

G. Transition Strips: Provide transition strips where difference in spray-applied thickness is greater than 2 inches. Strips are to be fastened directly to CMU, or other substrate, and provide transition backer no less than thickness of the larger depth requirement.

H. Spray Stop/Foam Stop: Provide angle to stop foam at window and or door openings.

I. Air Barrier Flashing Sheet Seal: Refer to Section 07 27 00 - Air Barriers.
   1. Standard Application Locations: To be included as standard areas of application weather indicated in drawings or not:
      a. Window
      b. Door
      c. Scupper rough openings in sheathing
      d. Inside Corners
      e. Outside Corners
      f. Bottom of wall to waterproofing / damp proofing

g. Top of wall to wood blocking/ roofing.

J. Intumescent Coating
1. Water Based Intumescing Coating
a. Manufacturers
1) International Fireproof Technology, Inc. – CD315
2) No-Burn, Inc. – No-Burn Plus ThB
3) Fire Shell – FE10
2. Protective Top Coat
a. Manufacturers
1) Sherwin Williams - Sher-Cryl HPA Once Component Acrylic Coating (approved for both DC315/ Noburn)
2) F1 Fireshell -Top coat for FE10 (table 6 of the BASF walltite max esr)
3) X
3. Wet Mil Application: Conforming with NFPA 285 based on SPF manufacturers tested assemblies that comply with walls table in testing documents.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify Work within construction spaces or crevices are complete prior to insulation application.

C. Verify surfaces are clean, dry, and free of matter capable of inhibiting adhesion work in this Section.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Prime substrate if required by manufacturer.

D. Mask and protect adjacent surfaces from overspray or dusting.

E. Mask areas where brick abuts concrete masonry at window and door jambs and other areas where brick abuts concrete masonry.

F. Fill voids between masonry and structural steel and metal deck with mineral wool.

G. Install Air Barrier Flashing at all openings and other locations as indicated on the Drawings. Lap seams one inch. Prime substrate as recommended by manufacturer.

H. Prepare penetrations with flashings, backer rod and sealant, or manufactured trim.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Apply work in this Section in accordance with manufacturer's instructions.

C. Apply insulation by spray method to uniform monolithic density without voids and seal around objects embedded or penetrating substrate.

D. Apply to a cured thickness of not less than that indicated on Drawings and not greater than that indicated thickness plus 1/2 inch. Cured application is to comply with the specified R-value.

E. Provide minimum of 2 inches overlap onto air barrier materials as indicated on Drawings.

F. Install trim pieces for transition from full spray insulation to lesser spray thicknesses at more than 2 inches as per thickness indicated on the Drawings.

G. Where applied to voids and gaps, allow space for expansion to avoid pressure on adjacent materials that may bind operable parts.

H. Trim excess away for applied trim or remove as required for continuous sealant bead.

I. Trim excess as required to not interfere with application of cladding or other cover systems by other trades.

J. Patch damaged areas with same foam insulation product.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Monitor quality of installation and testing.

B. Inspection will include verification of insulation thickness and density.

C. Where damage occurs, which violates the insulation's thermal requirements, air seal and moisture seal, repair as needed using the specified spray polyurethane material or foam repair kit material approved by the manufacturer.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Do not permit subsequent construction work to damage the installed work of this Section.

C. Protect the work of this Section from damage.

END OF SECTION

SECTION 07 22 16.10

ROOF INSULATION FOR MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof insulation requirements for membrane roofing systems.

B. Related Requirements:
   1. Section 06 10 53 - Miscellaneous Rough Carpentry.
   2. Division 07 - Thermal and Moisture Protection: Roofing membrane, roof drainage, accessories, sheet metal flashing. and trim.

1.2 REFERENCES

A. American Society of Civil Engineers (ASCE):
   1. 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 International (ASTM):
   1. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
   2. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.
   3. ASTM C1303/C1303M - Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation; 2023.
   4. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging; 2020.
   5. ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method; 1983, Reapproval 2018.
   6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
   7. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
   8. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C; 2024.
   9. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

C. International Code Council, Inc. (ICC); International Building Code (IBC):
   1. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. National Standard of Canada (CAN) / ULC Standards (ULC):
   1. CAN/ULC-S770 - Standard Test Method For Determination Of Long-Term Thermal Resistance Of Closed-Cell Thermal Insulating Foams; Reaffirmed 2020.

E. Underwriters Laboratories Inc. (UL):
   1. UL (DIR) - Online Certifications Directory; Current Edition.
   2. UL (FRD) - Fire Resistance Directory; Current Edition.

1.3 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Meeting is to include coordination of requirements for roofing insulation and roofing membrane as a complete roofing system.

C. Convene minimum one week prior to commencing work of roofing insulation and roofing membrane as a complete roofing system. Review the work requirements, application procedures, quality control, testing and inspection and production schedule.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Submittals for roofing insulation and roofing membrane are to coincide as a complete roofing system.

C. Product Data: Provide data for all materials specified.

D. Shop Drawings: Indicating plans for fill and tapered insulation types including fastening and adhering details for each roof area.

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

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: The requirements of this Section are to be provided by the same company that provides the roofing membrane and is to be an integral part of the overall roofing system.

B. Requirements of this Section to be provided in accordance with the ICC (IBC).

C. Requirements of this Section to be provided in accordance with the respective manufacturer's requirements and as a coordinated integral part of the overall roofing system.

D. System components requiring UL certification but are not bearing UL label at point of delivery, shall be rejected.

E. System components that are damaged or wetted before, during, or after installation shall be removed from the job site no later than the next working day from the day such damage or moisture contamination is noted.

F. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years of documented experience.

G. Installer Qualifications: Company specializing in performing the work of this Section with at least five (5) years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Materials shall be delivered in the manufacturer's original sealed and labeled shrouds and in quantities to allow continuity of application.

C. Store materials in weather protected environment. Elevate materials minimum 4 inches above ground. Protect materials for moisture. Modify shipping shrouds and coverings as required to prevent condensation moisture contamination of materials.

D. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

E. Protect foam insulation from direct exposure to sunlight and moisture.

F. Remove damaged or deteriorated materials from the job site.

G. Handle materials in manner as prevent damage and contamination with moisture or foreign matter.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Do not install materials during precipitation or other unsuitable weather. Contractor assumes all responsibility for starting installation in the event there is a probability of precipitation occurring during application.

C. Do not apply roofing membrane when ambient temperature is outside of the most restrictive range recommendations of the manufacturers of materials.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Schedule applications so that no partially completed sections of roof are left exposed and without roofing membrane at end of workday.

G. Prevent roofing construction materials, dust, and debris from entering the structure.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Warranty for the requirements of this Section shall be included in and shall be an integral part of the warranty requirements indicated for the roofing membrane as an overall roofing system warranty. Refer to Division 07 for roofing membrane specification.

1.9 OVERVIEW

A. Areas 100, 200, 300, 400, & 500: Hollow Core Decking.
   1. Adhere (2) layers of 2.6 inches polyisocyanurate insulation.
   2. Adhere additional tapered polyisocyanurate insulation at locations noted on Drawings.
   3. Adhere specified cover board in foam adhesive.

B. Areas 100 & 200: Metal Decking with Standing Seam Metal Roof.
   1. Adhere (2) layers of 2.6 inches polyisocyanurate insulation.
   2. Adhere 1/2 inch cover board in foam adhesive.

C. Area 100: Acoustical Metal Decking with Adhered TPO Membrane Roof.
   1. ALL FASTENERS SHALL BE CONCEALED WITHIN DECKING. NO EXPOSED FASTENERS ARE ALLOWED.
   2. Adhere (2) layers of 2.6 inches polyisocyanurate insulation.
   3. Adhere 1/2 inch cover board in foam adhesive.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind Design: Design and install the insulation system to withstand the required wind uplift pressures as specified in Division 07 for roofing membrane.

2.2 COMPONENTS

A. Polyisocyanurate (ISO) Insulation Board: Rigid closed-cell foam panels, complying with ASTM C1289.
   1. Classifications:
      a. Type II:
         1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
         2) Compressive Strength: Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.
         3) Thermal Resistance at 1.5 Inch Thick: 8.4 (1.48) LTTR, minimum when tested at 75 degrees F (24 degrees C) in accordance with ASTM C1303/C1303M or CAN/ULC-S770.
   2. Flame Spread Index (FSI): 25 to 75, tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, tested in accordance with ASTM E84.
   4. Curing Time: 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
   5. Dimensional Stability: 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven (7) days.
   6. Board Size: Factory formed board units.
      a. Maximum, 4 x 8 feet for mechanical attachment.
      b. Maximum, 4 x 4 feet for adhered attachment.
      c. Field cutting of larger boards is not acceptable.
   7. Board Thickness: Total thickness and thermal resistance requirements to be as indicated on Drawings.
      a. Layers: Applied in not less than two (2) layers, with staggered and sealed joints.
      b. Parapet Walls: Thickness above roof level at interior face of parapet walls to be 1 inch, unless indicated otherwise on Drawings.
   8. Board Edges:
      a. Square.
   9. Tapered Board: Slope as indicated on Drawings, but not less than 1/4 inch per foot; minimum thickness of 1/2 inch.
      a. Slope for Crickets and Saddles: 1/2 inch per foot.
   10. Manufacturers:
      a. Atlas Roofing Corporation.
      b. Johns Manville.
      c. Rmax, Incorporated.
      d. Versico Roofing Systems.
      e. Substitutions: Section 01 60 00 - Product Requirements.

B. Tapered Edge Strip:
   1. For use with polyisocyanurate insulation boards.
      a. Closed-cell polyisocyanurate foam core integrally bonded to non-asphaltic, fiber-reinforced organic felt or inorganic coated-glass facers. Product to be dimensionally stable providing a "zero edge" slope transition at crickets, drain sumps, and other sloped drainage transitions. Edge strips to be 2 by 24 inches (1 inch per foot slope).
      b. Basis of Design: Atlas - Gemini Tapered Edge Strip (TES).

C. Cover Boards: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 500 psi moisture resistant treated core, non-asphaltic primer surfacing, and tested in accordance with ASTM E84 and ASTM E136.
   1. Board Size: Factory formed board units.
      a. 1/2 inch thick and 4 x 8 feet size.

2. Manufacturers:
    a. Georgia Pacific: DensDeck Prime Roof Board.
    b. National Gypsum Company: DEXcell FA (coated) Glass Mat Roof Board.
    c. USG Corporation: Securock Coated Glass-Mat Roof Board.
    d. Substitutions: Section 01 60 00 - Product Requirements.
3. Basis of Design: Georgia Pacific - DensDeck Prime Roof Board.

2.3 ACCESSORIES

A. Sound Absorbing Insulation Strips: Refer to Section 05 31 00 - Steel Decking for metal decking with acoustic flutes that provide for sound absorbing insulation strips to be installed in all deck flutes. Sound absorbing insulation strips are to be pre-formed, continuous length and full depth of each flute, and to be as recommended by the metal decking manufacturer.

B. Primer Materials: For component materials requiring substrate to be primed, use primer recommended by both the substrate manufacturer and the manufacturer of the component requiring the primer.

C. Sheathing Joint Tape: Minimum 5 inches wide, high temperature and self-adhering type, compatible with subsequent layer material, and as recommended by sheathing manufacturer.

D. Insulation Joint Tape: Minimum 6 inches wide, high temperature and self-adhering type, glass fiber reinforced type, compatible with roofing materials, and as recommended by insulation manufacturer.

E. Attachment Materials: Approved by manufacturer of material to be fastened or adhered to installed substrate.
    1. Mechanical Fasteners: For attachment of material to installed metal decking.
        a. Corrosion resistant 3 inch galvalume stress plate and corrosion resistant screw type fasteners.
        b. Length, diameter, and configuration to be as required by material type, thickness, and size. Length to provide for penetration through metal deck material by minimum of 3/4 inch and maximum of 1 inch.
    2. Adhesives: Foamed and fluid applied adhesives to be a one or two part, VOC compliant, moisture-cured polyurethane type.

PART 3 EXECUTION

3.1 GENERAL

A. The following execution requirements are minimum requirements. Where manufacturer's requirements are more stringent, follow the manufacturer's more stringent requirements.

B. Install all roofing system components in accordance with the design for wind load resistance, Contract Documents, manufacturers' recommendations, applicable code requirements, and in accordance with the recommendations of the entity providing roofing system warranty.

C. Use equipment and tools recommended by component's manufacturer.

3.2 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Inspect substrate for soundness and compliance with project requirements and recommendations of roofing system materials manufacturers.

C. Commencement of work signifies Contractor's acceptance of substrate. Any defects in roofing work resulting from such accepted substrates shall be corrected to Owner's satisfaction at no additional expense.

3.3 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section. Prepare materials to be installed and equipment used during installation.

B. Roof deck to be dry and broom cleaned of debris and foreign matter.

C. Metal Decks with Acoustic Flutes:
   1. Install preformed sound absorbing insulation strips at full depth and continuous in flutes, and in accordance with manufacturer's instructions.

D. Concrete Decks:
   1. Verify adjacent precast concrete roof members do not vary more than 1/4 inch (6 mm) in height. Verify grout keys are filled flush.
   2. Fill surface honeycomb and variations with filler recommended by deck manufacturer and as compatible with subsequent component material application.

3.4 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Primer Materials: Apply primers, when required, in accordance with recommendations of primer manufacturer, the substrate manufacturer and the manufacturer of the component requiring a primer.
   1. Substrate is to be clean, dry, and free of dust, grease, and other contaminants. Shake container well before application. Apply to surfaces using manufacturer recommended equipment and coverage requirement.
   2. Comply with both primer manufacturer's time requirements, after primer application, for subsequent application of component material over primed substrate.

C. Fill and Tapered Insulation:
   1. Comply with the requirements of this Section, the Drawings, and the instructions of the manufacturers of the insulation materials and roofing membrane.
   2. Apply only as much insulation materials as can be covered watertight by the roofing membrane on the same day.
   3. On steel decks, apply board materials with long dimension of units across deck ribs. Ends of board materials must be bearing on upper flute surface of steel deck for continuous end support.
   4. On concrete decks, prime concrete decks prior to attachment with a uniform coating of primer per manufacturer’s standard application rates.
   5. Insulation materials to be in full sheets, carefully fitted and pushed together for tight joints. Gaps exceeding 1/4 inch are not acceptable.
   6. Insulation materials that must be cut to fit are to be saw-cut or knife-cut in a straight line, not broken. Chalk lines to be used to cut insulation. Uneven or broken edges are not acceptable. Insulation shall be field trimmed to fit tightly to roof obstructions and terminations. Remove dust and debris from roof area that develops during cutting operations.
   7. Stagger joints of each additional layer of board materials by 12 inches each way to ensure that joints do not coincide with joints of preceding layers.
   8. All joints to be fully taped and sealed with minimum 6 inches wide, high temperature and self-adhering type, glass fiber reinforced type, compatible with roofing materials, and as recommended by insulation manufacturer.

9. Crickets, saddles, and tapered edge strips shall be installed before the cover board material.
10. At roof edges, install insulation system, nailers and other roof construction in a manner as to produce a flush and smooth transition for roof membrane and flashing.
11. Install insulation, tapered insulation and tapered edge strips as required to accommodate roof and flashing conditions, prevent water dams and ponding water. Ponding water at scuppers and cricket valleys is not acceptable.
12. Provide necessary modifications to prevent standing water which is defined as 1/4 inch of water or more, in an area that is 4 sf or larger, at 24 hours or more after precipitation.
13. Tapered Insulation:
    a. Install tapered insulation system to achieve elevations, thicknesses and slopes indicated on Drawings and to provide positive slope for complete roof drainage.
    b. Crickets shall be sized as shown in the Drawings. Modifications shall be provided to ensure positive slope and prevent standing water along cricket valleys and at drain sumps.
        1) Minimum length to width ratio shall be 2:1. Fabricate partial crickets with dimensions which would result in a minimum length to width ratio of 2:1 if they were extended to full size.
        2) Unless otherwise noted, fabricate all crickets from tapered stock as required to provide the specified minimum slope. For example, when roof slope is indicated as 1/4 inch per foot minimum, fabricate crickets with slope of 1/2 inch per foot minimum.
        3) Construct crickets on up slope side of all curbs to ensure positive drainage.
        4) Install tapered edge strips at cricket edges and drain sumps to provide a smooth transition to cricket valley or roof drain construction.
    c. Insulation boards may require mechanical fasteners and stress plates at slope transitions to minimize bridging.

D. Roof Drainage:
1. Drainage sumps shall be installed as indicated on Drawings.
2. Carefully lay out and install tapered insulation, sumps, drain bowls and scuppers to ensure the finished roof provides complete drainage with no standing water.
3. Fabricate sumps to provide smooth transitions between the insulation system and the drains/scuppers.
4. Sumps shall ensure complete roof drainage and prevent water dams.
5. Adjust insulation, drains and scuppers to ensure complete roof drainage and satisfactory substrates for membrane and flashings.
6. Drain sump components shall be fastened to the deck using specified insulation fasteners or adhesives.
7. Circular sumps and sumps that do not provide smooth transition or that create standing water at the drains shall be rejected and shall require removal and replacement.

E. Mechanical Attachment:
1. Mechanical fasteners and materials being fastened shall be installed in accordance with manufacturer's recommendations and in locations, quantities, and spacing as required to withstand Wind Design requirements indicated in this Section in PERFORMANCE REQUIREMENTS article.
2. Fasteners shall be installed using manufacturer’s recommended equipment and in accordance with the manufacturer’s requirements.
3. Fasteners and stress plates shall be set secure and tight against the insulation surface and shall not be over-driven.

4. Fasteners shall engage the top flange of steel deck.
5. Coordinate to avoid damage to other construction components below decking (e.g., electrical conduits, box, etc.).

F. Adhesive Attachment:
1. Adhesive and materials being adhered shall be installed in accordance with manufacturer's recommendations as required to withstand Wind Design requirements indicated in this Section in PERFORMANCE REQUIREMENTS article.
2. Component to be adhered is to be placed in full contact with adhesive and weighted into place.
3. Ensure full adhesion of materials and provide appropriate equipment and methods necessary to achieve full adhesion, including, but not limited to, temporary ballasting until adhesive sets.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed work from damage and moisture.

END OF SECTION

SECTION 07 27 00

AIR BARRIERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Air Barriers.

B. Related Requirements:
   1. Division 07 - Thermal and Moisture Protection: Exterior cladding systems.
   2. Section 07 21 19 - Foamed-In-Place Insulation.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with air barriers.
   4. Section 09 21 16 - Gypsum Board Assemblies: Exterior gypsum board sheathing.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
   2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
   3. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission of Materials; 2022a, Editorial Revisions 2023.
   4. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

B. National Fire Protection Association (NFPA):
   1. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination, scheduling, and sequencing.

B. Coordinate the work of this Section with other adjacent and interfacing work.

C. Coordinate compatibility of materials provided for the work of this Section with insulation and other materials provided under other Sections of work.

D. Sequence the work to permit installation of materials in conjunction with related materials and seals.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit data on material characteristics, performance criteria, and limitations.

C. Compatibility Certification: Include manufacturer’s certification that the materials provided are compatible with the insulation materials with which the manufacturer’s materials contact.

D. Manufacturer's Installation Instructions: Submit preparation, installation requirements and techniques, product storage and handling criteria.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

1.5 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Evaluated Air Barrier Assemblies: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacturing, and use secondary materials approved in writing by primary material manufacturer.

B. Manufacturer Qualifications: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacturing, and use secondary materials approved in writing by primary material manufacturer.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum three (3) years documented experience.

1.6 MOCK-UPS

A. Section 01 40 00 - Quality Requirements: Mock-up requirements.
   1. Install and incorporate requirements of this Section into mock-ups required for construction for the project.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Maintain temperature and humidity recommended by materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Air Barrier System: Continuous network of materials and joints providing air tightness, with adequate strength and stiffness to not deflect excessively under air pressure differences, to which it will be subjected in service. It can be comprised of single material or combination of materials to achieve performance requirements.

B. Provide continuity of air barrier materials and assemblies in conjunction with other barrier materials described in Division 07 - Thermal and Moisture Protection.

C. Static Test: Resist air leakage caused by static air pressure across exterior wall assemblies and other interruptions to integrity of building enclosure systems; to maximum air leakage rate of 0.004 cfm/sq ft when subjected to pressure differential of 1.57 lbs/sq ft when tested in accordance with ASTM E2178.

2.2 AIR BARRIER MATERIALS

A. Air Impermeable and Water Vapor Impermeable:
   1. Self-adhered sheet of rubberized asphalt bonded to thermoplastic sheet complying with ASTM D1970/D1970M.
   2. Thickness: 40 mils (0.040 inch), minimum.

3. Sheet Width: 6 inches, 12 inches, 18 inches, 24 inches, and 36 inches; coordinate width with application area.
4. Air Permeance: 0.004 cfm/sq ft (0.02 L/s/sq m), maximum; ASTM E2178 with pressure differential of 1.57 lb./sq ft.
5. Water Vapor Permeance: 0.10 perm, maximum; ASTM E96/E96M using Procedure A (desiccant method) at 73.4 degrees F.
6. Water Penetration Resistance Around Nails: Pass; ASTM D1970/D1970M (modified).
7. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 50 days weather exposure.
8. Comply with NFPA 285 requirements for wall assembly.
9. Seam and Perimeter Tape: As recommended by sheet manufacturer.
10. Manufacturers:
    a. Carlisle Coatings and Waterproofing, Inc.
    b. Henry Company.
    c. W.R. Meadows, Inc.
    d. Substitutions: See Section 01 60 00 - Product Requirements.
11. Basis of Design:
    a. Henry Company - Blueskin SA.

2.3 ACCESSORIES

A. Substrate Cleaner: Non-corrosive; type recommended by barrier product manufacturer; compatible with adjacent materials.

B. Primers and Adhesive: As recommended by barrier product manufacturer for substrate material.

C. Sealant: Moisture cure type as recommended by barrier product manufacture for construction joints subject to dynamic joint movement.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that surfaces and conditions are ready to accept the work of this section. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.

B. Remove loose or foreign matter that may otherwise impair adhesion of materials.

C. Clean and prime substrate surfaces to receive barrier materials if recommended by barrier material manufacturer.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install the Work in accordance with manufacturer’s recommendations and as indicated on Drawings.

C. Air Barriers: Install continuous airtight barrier over solid surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

D. Apply sealants and adhesives at locations recommended by barrier manufacturer. Apply within temperature range as recommended by manufacturer.

E. Self-Adhered Sheets:
1. Prepare substrate in manner recommended by sheet manufacturer. Fill and tape joints in substrate and between dissimilar materials.
2. Lap sheets shingle-fashion to shed water and seal laps airtight.
3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all material and laps are firmly adhered to substrate with no gaps or fish mouths.
4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
5. At wide joints, provide extra flexible membrane allowing joint movement.

F. Openings, Junctions, and Penetrations in Air Barriers:
1. Sheet Seal at Wall/Roof Junction: Lap sheet seal onto roof air barrier material and seal. Caulk to ensure complete air seal. Position lap seal over firm bearing.
2. Install sheet seal between window and door frames and adjacent wall seal materials with air barrier material. Apply sealant to ensure complete seal. Position lap seal over firm bearing.
3. Install sheet seal to maintain continuity across different substrates and interface with other construction and building assemblies.
4. Provide 2 inches minimum overlap of spray foam insulation over sheet seal membrane edges.
5. Provide 2 inches minimum overlap at sheet seal joint and apply in manner as to shed water.
6. Construct all end dams at sill installations to provide continuous air barrier with window openings.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Do not leave materials exposed to weather longer than recommended by manufacturer.

C. Do not permit adjacent work to damage work of this section.

END OF SECTION

SECTION 07 41 13

METAL ROOF PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Metal roofing system.
2. Roof insulation.
3. Underlayment sheet.
4. Roofing system accessories.
5. Metal flashings and trim.

B. Related Sections:
1. Section 06 10 53 - Miscellaneous Rough Carpentry.
2. Section 07 42 13 - Metal Wall Panels.
3. Section 07 62 00 - Sheet Metal Flashing and Trim.
4. Section 07 71 23 - Manufactured Gutters and Downspouts.
5. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
2. 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. American Society of Civil Engineers (ASCE):
1. 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 International (ASTM):
1. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2023.
2. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2020.
3. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
4. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.
5. ASTM C1306/C1306M - Standard Test Method for Hydrostatic Pressure Resistance of a Liquid-Applied Waterproofing Membrane; 2016, Reapproval 2023.
6. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
7. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2023.
8. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films; 2023.
9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.

10. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
11. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.
12. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005, Reapproval 2017.
13. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995, Reapproval 2018.
14. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2016, Reapproval 2022.

D. National Roofing Contractors Association (NRCA):
1. NRCA - The NRCA Roofing and Waterproofing Manual; Fifth Edition, With Interim Updates.

E. National Standard of Canada (CAN) / ULC Standards (ULC):
1. CAN/ULC-S770 - Standard Test Method For Determination Of Long-Term Thermal Resistance Of Closed-Cell Thermal Insulating Foams; Reaffirmed 2020.

F. Sheet Metal and Air Conditioning Contractors (SMACNA):
1. SMACNA - Architectural Sheet Metal Manual; 2012.

G. Underwriters Laboratories Inc. (UL):
1. UL 580 - Standard for Safety Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including all Updates.
2. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including all Updates.

1.3 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
1. Submit data on roofing system, components, and accessories. Include data regarding metal types, finishes, and characteristics.

C. Shop Drawings:
1. Indicate metal roofing panel and trim profiles, jointing patterns, jointing details, fastening methods, flashings, terminations, snow guards and installation details.
2. Engineered Design Data: Submit structural design calculations for metal roofing signed and sealed by professional engineer.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect’s initial selections.

E. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Manufacturer’s Installation Instructions: Submit instructions including special procedures for roofing penetrations, flashings, and perimeter conditions requiring special attention.

G. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA Architectural Sheet Metal Manual, and The NRCA Roofing and Waterproofing Manual, and the manufacturer’s instructions.

B. Field Quality Control:
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing. Representative is to not be in the employment of the roofing Installer.
   2. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
   3. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.

B. Installer: Company specializing in performing work of this section with minimum five (5) years documented experience and approved by manufacturer.

C. Engineered Design: Design sheet metal roofing system under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State in which the Work is constructed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

C. Store roofing panels on project site as recommended by manufacturer. Provide proper ventilation and prevent twisting, bending, abrasion, and other damage to panels.

D. Prevent contact with materials causing discoloration or staining.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Requirements for warranties.

B. Provide two (2) year General Contractor’s material and labor warranty to cover failure to prevent penetration of water.

C. Special Warranties:
   1. Special Watertightness Warranty: Manufacturer's warranty in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.
      a. Warranty Form:
         1) No Dollar Limit Form.
      b. Warranty Period: Duration from date of Substantial Completion.
         1) Twenty (20) Years.
      c. The addition of solar panels mounted with mounting clamps to roof panel standing seams shall not void the warranty.

d. Shop drawings must be provided (or reviewed) by the panel manufacturer and approved by the panel manufacturer prior to the installation of the panel system.
e. A minimum of two inspections by the technical representative of the panel system manufacturer are required. The first inspection is to be performed when the underlayment and flashing are in place and the second inspection is to be performed when the roof is complete.

2. Special Installer Warranty: Furnish a written warranty signed by the roofing panel installer, guaranteeing materials and workmanship for watertightness of the roofing system, flashings, penetrations, and against all leaks within specified warranty period.
   a. Warranty Period: Two (2) years from date of Substantial Completion.
3. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   a. Warranty Period: twenty (20) years from date of Substantial Completion.
   b. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      1) Color fading more than 5 Hunter units when tested according to ASTM D2244.
      2) Chalking more than a No. 8 rating when tested according to ASTM D4214.
      3) Cracking, chipping, peeling, or failure of paint to adhere to bare metal.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design and provide complete roofing system, including roof panels, clips, fasteners, connectors, insulation, flashings, and accessories, tested for compliance with the following minimum standards.

B. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.

C. Wind Loads: Design and size components to withstand positive and negative wind loads, including increased loads at building corners.
   1. Design Wind Load: As calculated in accordance with ASCE 7 with 100 mph basic wind speed, exposure C.

D. Wind Uplift Resistance: Class 90 wind uplift resistance of UL 580.

E. Air Infiltration: Limit air leakage through roof assembly to 0.025 cfm/sq ft of roof area, measured at reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E1680.

F. Water Leakage: None, when measured in accordance with ASTM E1646 with test pressure of 6.24 psf. Perform test immediately following air infiltration test.

G. Roof Covering Fire Test Classification: UL 790 (ASTM E108), Class A, minimum.

H. Exterior Components: Accommodate the following without damage to system, components, or deterioration of seals.
   1. Movement within system.
   2. Movement between system and perimeter framing components.
   3. Dynamic loading and release of loads.
   4. Deflection of structural support framing.

5. Expansion and contraction from temperature range of 170 degrees F over 12 hour period.

2.2 MANUFACTURED SHEET METAL ROOFING

A. Manufacturers:
1. ATAS International, Inc.
2. Berridge Manufacturing Company.
3. Centria Architectural Systems.
4. Construction Metal Products (CMP).
5. Dimensional Metals, Inc. (DMI).
6. Fabral Metal Wall and Roof Systems.
7. Innovative Metals Company, Inc. (IMETCO).
8. MCBI Metal Wall and Roof Systems.
9. McElroy Metal, Inc.
10. Metal Roofing Systems, Inc.
11. Metal Sales Manufacturing, LLC.
12. Petersen Aluminum Corporation (PAC-CLAD).
13. Substitutions: Section 01 60 00 - Product Requirements.

B. Structural Metal Roof Panels: Provide a complete engineered system designed and constructed to complying with specified requirements, remain weathertight, withstand anticipated movement of substrate and thermally induced movement of roofing system.

C. Metal Panels and Components: Factory-formed metal panels and components with factory-applied finish.
1. Base Sheet Metal:
   a. Steel Panels:
      1) SS (structural steel), Grade 50 sheet.
      2) Galvalume Coating: Aluminum-zinc alloy-coated complying with ASTM A792/A792M; minimum AZ50 (AZM150) coating.
      3) Steel Thickness: Minimum 24 gauge, 0.024 inch (0.61 mm), unless indicated otherwise on Drawings.
2. /Roof Panel Type: Single skin, uninsulated.
3. Roof Panel Profile: Standing seam, with 2.0 inch (51 mm) seam height; concealed fastener system for field seaming.
   a. Seam Type: 180 degrees double locked, field machine formed seams.
4. Roof Panel Texture:
   a. Smooth, and striated for added stiffness.
5. Roof Panel Length:
   a. As indicated on Drawings.
6. Roof Panel Width: Nominal 16 inches, unless indicated otherwise on Drawings.

D. Metal Finish: Factory applied.
1. Exposed Finish:
   a. Polyvinylidene fluoride (PVDF) multi-coat organic coatings system including at least 70 percent PVDF resin and having a minimum total dry film thickness (TDFT) of 1.2 mil (0.0012 inch) (0.030 mm) when measured in accordance with ASTM D1790.
   b. AAMA Coating System Compliance Required:
      1) AAMA 2605 - Superior performing organic coating system.
      2) Coating Manufacturers:
         a) Arkema, Inc.: Kynar 500.
         b) PPG Metal Coatings: Duranar.
         c) Sherwin-Williams Company: Fluropon.

2. Unexposed Finish: Manufacturer's standard coating, minimum 0.5 mil total dry film thickness.
3. Color and Gloss:
    a. As selected by Architect from panel manufacturer's full range.

2.3 INSULATION MATERIALS

A. Polyisocyanurate (ISO) Insulation Board: Rigid closed-cell foam panels, complying with ASTM C1289.
1. Basis of Design: Johns Manville - Energy 3.
2. Type II:
    a. Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
        1) Compressive Strength:
            a) Grade 2: 20 psi (138 kPa), minimum.
        2) : : Long Term Thermal Resistance at 1.5 Inch Thick: 8.4 (1.48) LTTR, minimum when tested at 75 degrees F (24 degrees C) in accordance with ASTM C1306/C1306M or CAN/ULC-S770.
3. Flame Spread Index (FSI): Class B - 26 to 75; per ASTM E84.
4. Smoke Developed Index (SDI): 450 or less; per ASTM E84.
5. Tensile Strength: 500 psf, minimum per ASTM C209.
6. Water Absorption: 1 percent, maximum by volume per ASTM C209.
7. Water Vapor Permeance: 1 perm, maximum per ASTM E96.
8. Board Size: Largest size applicable, but not less than 48 x 96 inches.
9. Board Thickness: As indicated on Drawings.
10. Number of Layers: As indicated on Drawings.
11. Board Edges: Square.

B. Underlayment Sheet: Self-adhering with reinforcing scrim, high temperature sheet, consisting of slip-resisting top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.
1. Thickness: 50 mils (0.05 inch), minimum.
2. Roll Width: 36 inches.
3. Thermal Stability: Stable after testing at 250 deg F; ASTM D1970/D1970M.
4. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970/D1970M.
5. Seams shall be lapped in accordance with manufacturer's recommendations.
6. Underlayment shall be approved for 90 days (minimum) of exposure to UV and weather penetrations.

C. Slip Sheet: Rosin building paper.

2.4 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Unless indicated otherwise on Drawings, provide metal roofing related flashings, trim, moldings, closure strips, preformed crickets, caps, equipment curb flashings, and similar sheet metal items of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be stainless steel material.
1. Coordinate work requirements with requirements in the following Sections:
    a. Section 07 62 00 - Sheet Metal Flashing and Trim.
    b. Section 07 71 23 - Manufactured Gutters and Downspouts.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting, and weathertight components of same metal, thickness, and finish as roof panels.

C. Fasteners: Stainless steel.

D. Insulation Board Joint Tape: Minimum 6 inches wide, high temperature and self-adhering type, glass fiber reinforced type, compatible with roofing materials, and as recommended by insulation manufacturer.

E. Sound Absorbing Insulation Strips: Application is to provide sound absorbing material within acoustic flutes of all acoustic metal roof decking. Sound absorbing insulation strips are to be pre-formed, continuous length and full depth of each flute, and to be as recommended by the metal decking manufacturer.

F. Sealant:
1. Seam Sealant: Factory applied continuous non-curing butyl sealant.
2. Exposed Sealant: Silicone type approved by component manufacturer.

G. Dissimilar Materials Separation: Separate dissimilar materials to prevent galvanic or other corrosive action by applying a permanent separator material. Separator material to be type that will remain in the concealed area of application without running, staining, or migrating onto visible finish surfaces. Separator material must be acceptable to building component manufacturer and may include material such as a zinc molybdate alkyd coating, or a bituminous coating, or self-adhering rubberized asphalt sheet, or other permanent applied material as recommended by component manufacturer.

H. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring. Snow guards shall be illustrated within the panel manufacturer's shop drawings and shall be designed to resist the sliding force of snow in accordance with the requirements of ASCE-7. Confirming calculations to be provided by the roofing panel manufacturer as part of the shop drawings submittal.
1. Seam-Mounted, Bar-Type Snow Guards: Extruded Aluminum rods or bars held in place by aluminum clamps attached to vertical ribs of standing-seam metal roof panels.
2. Color:
   a. Match roof panels in finish type and color.

2.5 FABRICATION

A. Verify field measurements prior to fabrication.

B. Form sections accurate in size, square, and free from distortion or defects.
1. Form roofing panels to width indicated.
2. Finished standing seam height to be 2 inches after on-site machine forming of 180 degrees Double-Lock seam.
   a. Seam Sealant: Factory applied continuous non-curing butyl sealant.
3. Length of roofing panels to be continuous from eaves to ridges.

C. Fabricate fascia, trim, flashing, and other metal components from same material as metal roof panels.
1. Provide exposed metal surfaces with same finish as exposed face of metal roof panels.

D. Fabricate cleats of same material as sheet, to interlock with sheet.

E. Fabricate starter strips of same material as sheet, continuous, to interlock with sheet.

F. Form pieces in longest practical lengths, but not less than specified lengths where indicated.

G. Hem exposed edges on underside 1/2 inch; miter and seam corners.

H. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

I. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

J. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Metal Deck:
   1. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to eaves.
   2. Verify deck is dry and free of snow and ice. Verify substrate joints are solidly supported and fastened.
   3. Verify wood nailers are installed and correctly located.

C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

D. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Verify that manufacturer applied factory applied continuous sealant in roofing panel seams and as may be required for other roofing system components.

D. Metal Decks with Acoustic Flutes:
   1. Install preformed sound absorbing insulation strips at full depth and continuous in flutes, and in accordance with manufacturer's instructions.

E. Dissimilar Materials Separation: Separate dissimilar materials to prevent galvanic or other corrosive action with permanent applied material as indicated in ACCESSORIES article in this Section. Where using applied coating, coat to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Overall:
   1. Install roofing system in accordance with the Contract Documents, Engineer's design, and panel manufacturer's instructions and recommendations. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
   2. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   3. 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.
   4. Install all components and accessories required for a complete roofing assembly, including, but not limited to, flashings, gutters, downspouts, trim, moldings, closure

strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

a. Coordinate work requirements with other related Section of work such as sheet metal flashing and trim, roofing specialties, roof hatches, gutters, downspouts, roof deck substrates, etc.

C. Insulation:

1. Apply no more insulation than can be covered with roofing and made weathertight in same day.
2. Place boards perpendicular to deck flutes with edges over flute surface for bearing support.
3. Lay boards with edges in contact, but without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
4. Mechanically fasten insulation to deck.
5. Stagger joints for each additional layer of board materials by 12 inches each way to ensure that joints do not coincide with joints of preceding layers.
6. Fully tape all joints of each insulation layer with minimum 6 inches wide, high temperature and self-adhering type, glass fiber reinforced type, compatible with roofing materials, and as recommended by insulation manufacturer.
7. Total insulation thickness shall be as indicated on Drawings.
8. Place fasteners in accordance with wind uplift requirements, but not less than one fastener for every two square feet of insulation board area.

D. Underlayment Sheet:

1. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer and as indicated herein. Comply with temperature restrictions of underlayment manufacturer for installation and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 90 days.
2. Apply underlayment over entire roof surface, wrinkle free, in shingle fashion to shed water.
3. Lower edge terminations and roof edge terminations to be as indicated on Drawings.
4. Install underlayment laid perpendicular to slope.
5. Weather lap side edges not less than 3-1/2 inches.
6. Weather lap end laps not less than 6 inches and staggered 24 inches between courses.
7. Turn up 4 inches onto roof penetrations and other vertical obstructions.

E. Metal Roofing Panels:

1. Install slip sheet over underlayment prior to installing roofing panels.
2. Install roofing panels with long dimension perpendicular to eaves.
3. Install roofing panels beginning at eaves. Panel to extend from eaves to ridges without traverse joints.
4. Install clips to secure roof panels without deforming roof panels.
   a. Where indicated on Drawings, install clips spaced 24 inches o.c. maximum to receive future solar panels. The addition of solar panels using solar panel hardware clamps shall not void the roofing warranty.
5. Machine form standing seam, forming a 180 degrees Double Lock seam, between adjacent roofing panels. Hand form joints where machine forming is not possible.
6. Terminate roofing panels with sheet metal trim and flashing for watertight installation. Close and conceal openings between roofing panels, panel seams, and roof substrate.
7. Seal metal joints watertight.
8. Install snow guards in locations indicated on Drawings and in accordance with roofing panel manufacturer’s written recommendations.

F. Flashing and Trim:

1. Place eave edge and rake edge metal flashings tight to fascia. Weather lap joints 2 inches and seal with plastic cement. Secure flange to substrate.
2. Form valleys with sheet metal not exceeding 10 feet in length. Lap joints 6 inches in direction of drainage. Extend valley sheet minimum 6 inches under roofing sheets.
3. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
4. Secure flashing exposed edges with continuous cleats.
5. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
6. Seal metal joints watertight.

3.4 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Do not permit traffic over unprotected roof surface.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufactured preformed metal wall panels and framing support system.

B. Related Sections:
   1. Section 07 41 13 - Metal Roof Panels.
   2. Section 07 43 13 - Metal Soffit Panels.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim.
   4. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. 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. American Society of Civil Engineers (ASCE):
   1. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Current Edition Cited by Referring Code or Reference Standard.

C. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2023.
   2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.
   3. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
   4. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.
   5. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
   6. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000, Reapproval 2023.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on panels and hanging system; include metal types, finishes, and characteristics.

C. Design Data: Submit design calculations.

D. Shop Drawings: Indicate dimensions, layout, joints, expansion joints, construction details, panel profiles, methods of anchorage, and interface with adjacent materials.

E. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied color finishes; submit for Architect's initial selections.

F. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

G. Manufacturer's Installation Instructions: Submit special procedures.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years of documented experience.

B. Installer Qualifications: Company specializing in installing the products specified in this section with minimum five (5) years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

C. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

D. Prevent contact with materials that may cause discoloration or staining of products.

1.6 WARRANTY

A. Section 01 77 00 - Closeout Procedures.

B. Furnish twenty (20) year manufacturer warranty to cover degradation of panel finish, including color fading caused by exposure to weather.

C. Furnish five (5) year installer warranty to cover defects in water tightness and integrity of seals.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design and size system components and support system to support wall panel system dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to wall plane.
   1. Wind Design Pressure:
      a. As indicated on Drawings, in accordance with ASCE 7, and in accordance with the State Building Code for the State in which the project is located.
   2. Maximum Allowable Deflection of Panel: 1/180 of span.

B. Air Leakage: 0.01 cfm/sf, maximum with static pressure differentials of 6.24 psf, in accordance with ASTM E283/E283M.

C. Water Penetration: None with static pressure differentials of 12.00 psf, with water spray of 5 gal/hr/sf, for 15 minutes, in accordance with ASTM E331.

D. Thermal Movement: Allow for thermal movement from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

2.2 METAL WALL PANELS

A. Manufacturers:
1. AEP-Span.
2. ATAS International, Inc.
3. Berridge Manufacturing Company.
4. Centria.
5. Dimensional Metal, Inc. (DMI).
6. Fabral.
7. McElroy Metal, Inc.
8. Metal Roofing Systems, Inc.
9. Petersen Aluminum Corporation (PAC).
10. Morin Corp.
11. Substitutions: Section 01 60 00 - Product Requirements.

B. Basis of Design:
Morin Corp. - Flush Wall Panels MZ-6.

2.3 COMPONENTS

A. Precoated Metal Sheet:
1. Precoated Steel Sheet:
a. Thickness:
1) 20 gauge (0.036 inch) (0.91 nn) thick minimum.
b. Continuous coil-coated on exposed surfaces with specified finish coating and on concealed surfaces with specified concealed surfaces coating.

B. Exterior Metal Panels: Factory formed.
1. Installation Direction:
a. As indicated on Drawings.
2. Panel Width:
a. As indicated on Drawings.
3. Profiles:
a. Flush.
1) Basis of Design – Morin Corp. - MZ-6
4. Color: As selected by Architect from manufacturer's full range of colors.
a. See Drawings for color locations.

C. Movement and Expansion Joints: Same material, thickness and finish as metal panel and concealed fasteners. Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.

D. Provide continuity of air barrier and vapor retarder seal at building enclosure elements.

E. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.

F. Internal and External Corners: Same material, thickness, and finish as metal panels; profile to suit system; shop cut and factory mitered to required angles; profile as indicated on Drawings, but not less than 3 inch returns.

G. Trim, Closures, Caps, Flashings, Facias and Infills: Same material, thickness, and finish as metal panels; brake formed to required profiles.

H. Fasteners to be concealed; self-tapping screws and other acceptable fasteners recommended by panel manufacturer; non-corrosion type compatible with materials being fastened and substrate. Where exposed fasteners are required, fastener heads to be factory finished to match the finish of the adjacent material finish.

I. Metal Framing Support System: Cold-formed metallic-coated steel sheet, ASTM A653/A653M, G90 (Z180).
   1. Metal thickness as indicated on Drawings, but not less than 0.06 inch/16 ga.
   2. Anchorage to be concealed, non-corrosive type and as required to comply with structural performance requirements, including specified deflection limitations; hat channel profile; appropriate to anchor panel system to building structure.

2.4 FABRICATION

A. Form sections to shape indicated on Drawings, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest practicable lengths.

2.5 FACTORY APPLIED FINISH

A. Exposed Surface Finish:
   1. AAMA 2605: Fluoropolymer coil coating system. Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil (0.0009 inch) (0.023 mm). Color and gloss as selected by Architect from manufacturer’s full range.

B. Concealed Surface Finish: Manufacturer’s standard coating, minimum 0.5 mil dry film thickness; compatible with finish system, as recommended by finish system manufacturer.

2.6 ACCESSORIES

A. Underlayment Sheet: As indicated on Drawings; compatible with panel system manufacturer's panels and requirements; designed for exterior application.

B. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.

C. Sealants to be as required by manufacturers of materials being sealed and may include:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane; as required by manufacturers of materials being sealed.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
   3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

D. Field Touch-up Paint: As recommended by panel manufacturer.

E. Dissimilar Materials Separation: Separate dissimilar materials to prevent galvanic or other corrosive action by applying a permanent separator material. Separator material to be type that will remain in the concealed area of application without running, staining, or migrating onto visible finish surfaces. Separator material must be acceptable to building component manufacturer and may include material such as a zinc molybdate alkyd coating, or a bituminous coating, or self-adhering rubberized asphalt sheet, or other permanent applied material as recommended by component manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that building framing members or structural concrete or masonry walls are ready to receive panels.

C. Verify that weather and air barriers and thermal insulation has been installed completely and correctly.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment used during installation.

C. Install Underlayment:
   1. Install underlayment as indicated on Drawings.
   2. Weather lap edges 2 inches minimum and ends 6 inches minimum.
   3. Stagger vertical joints of each layer.
   4. Fasten securely to substrate with stainless steel fasteners.

D. Install subgirts and support framing system as indicated on Drawings and as required by panel manufacturer for conditions and direction of panels. Securely fasten with stainless steel fasteners to substrate and framing members and shimmed and leveled to uniform plane. Space support framing at intervals indicated and not less than that required to achieve design for performance requirements.

E. Dissimilar Materials Separation: Separate dissimilar materials to prevent galvanic or other corrosive action with permanent applied material as indicated in ACCESSORIES article in this Section. Where using applied coating, coat to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install metal panels and support system in accordance with Performance / Design Criteria and manufacturer's instructions.

C. Protect surfaces in contact with cementitious materials and dissimilar metals with concealed bituminous paint. Allow to cure prior to installation.

D. Fasten metal panels to structural supports; aligned, level, and plumb. Space fasteners maximum 24 inches on center either horizontally or vertically to suit application.

E. Provide expansion joints where indicated.

F. Use concealed fasteners unless otherwise approved by Architect.

G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Offset from True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

C. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove site cuttings from finish surfaces.

C. Clean surfaces of installed work in accordance with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed work from damage.

END OF SECTION

SECTION 07 42 93.13

METAL SOFFIT PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufactured preformed metal soffit panels and suspension system.

B. Related Requirements:
   1. Section 07 41 13 - Metal Roof Panels.
   2. Section 07 42 13 - Metal Wall Panels.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim.
   4. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. 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. American Society of Civil Engineers (ASCE):
   1. 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 International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
   2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2023.
   3. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
   4. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on panels and hanging system; include metal types, finishes, and characteristics.

C. Design Data: Submit design calculations.

D. Shop Drawings: Indicate dimensions, layout, joints, expansion joints, construction details, panel profiles, methods of anchorage, and interface with adjacent materials.

E. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied color finishes; submit for Architect’s initial selections.

F. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

G. Manufacturer's Installation Instructions: Submit special procedures.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum five (5) years documented experience and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

C. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

D. Prevent contact with materials that may cause discoloration or staining of products.

1.6 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Furnish thirty (30) year manufacturer warranty to cover degradation of panel finish, including color fading caused by exposure to weather.

C. Furnish five (5) year installer warranty to cover defects in water tightness and integrity of seals.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design and size system components and support system to support wall panel system dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to soffit plane.
   1. Wind Design Pressure:
      a. As indicated on Drawings, in accordance with ASCE 7, and in accordance with the State Building Code for the State in which the project is located.
   2. Maximum Allowable Deflection of Panel: 1/180 of span.

B. Thermal Movement: Allow for thermal movement from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

2.2 METAL SOFFIT PANELS

A. Manufacturers:
   1. AEP-Span.
   2. ATAS International, Inc.
   3. Berridge Manufacturing Company.
   4. Dimensional Metal, Inc. (DMI).
   5. Fabral.
   6. McElroy Metal, Inc.

7. Metal Roofing Systems, Inc.
8. Petersen Aluminum Corporation (PAC).

B. Basis of Design:
1. Petersen Aluminum Corporation (PAC).

2.3 COMPONENTS

A. Precoated Metal Sheet:
1. Precoated Aluminum Sheet:
a. Comply with the following:
1) ASTM B209/B209M, aluminum alloy and temper to be as required for structural performance requirements.
b. Thickness:
1) 18 gauge (0.040 inch) (1.02 mm) thick minimum.
c. Continuous coil-coated on exposed surfaces with specified finish coating and on concealed surfaces with specified concealed surfaces coating.
2. Strippable Film: Apply to the exposed surface of finished coil to protect the finish during fabrication, shipping, and field handling. Strippable film to be removed as recommended by manufacturer.

B. Exterior Metal Panels: Factory formed.
1. Installation Direction:
a. As indicated on Drawings.
2. Panel Width:
a. 12 inches, unless indicated otherwise on Drawings.
3. Panel Depth:
a. 1 inch depth.
4. Profiles:
a. Flush.
1) Panel widths greater than 8 inches to have single V groove for stiffening.
5. Panel Edges: Concealed fastened and continuous interlocking edge.
6. Panel Venting Type:
a. Full-Vented type panels.
1) All locations unless otherwise indicated on Drawings.
7. Color: As indicated on drawings.

C. Trim, Closures, Caps, Flashings, Facias and Infills: Same material, thickness, and finish as metal panels; brake formed to required profiles.

D. Fasteners to be concealed; self-tapping screws and other acceptable fasteners recommended by panel manufacturer; non-corrosion type compatible with materials being fastened and substrate. Where exposed fasteners are required for special trim conditions, fastener heads to be factory finished to match the finish of the adjacent material finish.

E. Suspension System:
1. Steel main runners, hanger wires and hat channels; galvanized finish. Thickness and profile as required to support specified loads within specified Performance Requirements.
a. Minimum Requirements:
1) Main Runners: Cold rolled channels, galvanized finish; 16 gauge, 1-1/2 inches deep.
2) Hanger Wire: 12 gauge, galvanized, soft annealed steel wire.
3) Hat Channels: ASTM C645; 25 gauge, galvanized.

2.4 FABRICATION

A. Form sections to shapes indicated on Drawings, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest practicable lengths.

2.5 FACTORY APPLIED FINISH

A. Exposed Surface Finish:
   1. AAMA 2605: Fluoropolymer coil coating system. Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil (0.0009 inch) (0.023 mm). Color and gloss as selected by Architect from manufacturer's full range.

B. Concealed Surface Finish: Manufacturer's standard coating, minimum 0.5 mil dry film thickness; compatible with finish system, as recommended by finish system manufacturer.

2.6 ACCESSORIES

A. Sealants: Silicone type as specified in Section 07 90 00 - Joint Protection.

B. Field Touch-up Paint: As recommended by material manufacturer.

C. Separator for Dissimilar Materials: Separate dissimilar materials to prevent galvanic, chemical, and other corrosive action by applying a permanent separator material.
   1. Separator Material Requirements:
      a. Permanent type that will remain concealed in the applied location without running, staining, or migrating onto visible finish surfaces.
      b. Material approved by manufacturers of materials being separated.
   2. Separator material may include the following if it complies with the indicated separator material requirements.
      a. Zinc molybdate alkyd coating, minimum dry film thickness of 15 mil.
      b. Bituminous coating, minimum dry film thickness of 15 mil.
      c. Self-adhering rubberized asphalt sheet.
      d. Other permanent separator material complying with indicated requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify building framing members are ready to receive soffit panel system.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Dissimilar Materials: Provide permanent separation of dissimilar materials. Refer to ACCESSORIES article in this Section.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install metal panels and support system in accordance with Performance / Design Criteria and manufacturer's instructions.

C. Protect surfaces in contact with cementitious materials and dissimilar metals with concealed bituminous paint. Allow to cure prior to installation.

D. Main Runners: Suspend from building structure; parallel to soffit panels installation; spaced not greater than 48 inches o.c.

E. Hat Channels: Secure perpendicular to main runners as required for attachment of metal panels and spaced not greater than 24 inches o.c.

F. Add struts as required to resist upward pressure.

G. Fasten metal panels to suspension system; aligned and level.

H. Use concealed fasteners unless otherwise approved by Architect.

I. Seal to prevent weather penetration. Maintain neat appearance.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Offset from Indicated Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

C. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove site cuttings from finish surfaces.

C. Clean and wash prefinished surfaces with mild soap and water. Rinse with clean water.

D. Upon completion of installation, thoroughly clean prefinished surfaces in accordance with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.
   1. Protect installed Work from damage.

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC-POLYOLEFIN ROOFING (ADHERED)

PART 1 GENERAL

1.1 SUMMARY

A. Work Includes:
   1. Install a fully adhered, thermoplastic-polyolefin (TPO) membrane and flashings to provide a permanently watertight roofing system.

B. Related Requirements:
   1. Section 06 10 53 - Miscellaneous Rough Carpentry.
   2. Section 07 22 16.10 - Roof Insulation For Membrane Roofing.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim.
   4. Section 07 72 00 - Roof Accessories.
   5. Section 07 72 33 - Roof Hatches.
   6. Division 23 - Mechanical (HVAC) for Section related to roof mounted equipment.
   7. Sections related to roof mounted solar collection systems equipment to include, but not limited to, photovoltaic (PV) systems and other solar conversion collection systems equipment and panels.

1.2 REFERENCES

A. American Society of Civil Engineers (ASCE):
   1. 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 International (ASTM):
   1. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2016, Reapproval 2022.
   2. ASTM D751 - Standard Test Methods for Coated Fabrics; 2019.
   3. ASTM D6754/D6754M - Standard Specification for Ketone Ethylene Ester Based Sheet Roofing; 2023.
   4. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2021.
   5. ASTM D7635/D7635M - Standard Test Method for Measurement of Thickness of Coatings Over Fabric Reinforcement; 2018.

C. Cool Roofs Rating Council (CRRC):
   1. CRRC (DIR) - Cool Roofs Rating Council Directory; Current Edition.
   2. CRRC-1 - Roof Product Rating Program Manual; 2024.

D. Factory Mutual (FM):
   1. FM (AG) - FM Approval Guide; Current Edition.
   2. FM DS 1-28 - Wind Design; 2015, with Editorial Revisions 2024.

E. International Code Council, Inc. (ICC); International Building Code (IBC):
   1. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. Underwriters Laboratories Inc. (UL):
   1. UL (DIR) - Online Certifications Directory; Current Edition.
   2. UL (FRD) - Fire Resistance Directory; Current Edition.

1.3 \PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene one week before starting work of this Section. Review preparation and installation procedures and coordinating and scheduling required with related work.

C. Meeting is to include coordination of requirements for roofing insulation and roofing membrane as a complete roofing system.

D. Meeting Agenda: Agenda is to include organizational structure for personnel Installer, subcontractors, materials suppliers, and the Project Manager; channels and procedures for communication; construction schedule, including sequence of critical work; Contract Documents, including distribution of required copies of Contract Documents and revisions; processing of submittals; rules and regulations governing performance of the Work and procedures for safety, first aid, security, quality control, housekeeping and related matters.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for Submittals.

B. Submittals for roofing insulation, overlay, and barrier components of the roofing system are to coincide with the submittal of the roofing membrane as a complete roofing system.

C. Product Data: Submit complete data sheets, including characteristics on membrane materials, adhesives, seaming materials, flashing materials, and insulation components.

D. Shop Drawings: Submit complete set of shop drawings indicating all installation details required for the roofing system installation. Note all additional required materials, including joint and termination detail conditions, cants, and conditions of interface with other materials. Indicate membrane layout and seam locations. Shop drawings must be sealed, signed, and dated by an engineer registered in the State in which the project is located.

E. Submit documentation of approved, tested roof system indicating compliance with requirements indicated in PERFORMANCE REQUIREMENTS article in this Section.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

I. Installer's Certificate: Certify products meet or exceed specified requirements.

J. Manufacturer’s Installation Instructions:
   1. Include special precautions required for seaming membrane.
   2. If color application is required, include installation instructions.

K. Warranty sample(s).

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: The requirements of this Section are to be coordinated and executed by the same company as the requirements specified in Section 07 22 16.10 - Roofing Insulation for Membrane Roofing as an integral part of the overall roofing system.

B. Manufacturer Requirements:
   1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum ten (10) years of documented experience.
   2. Manufacturer must have a written Contractor/Installer approval program.
   3. The product must have a continuous manufacturing history with the current product formulation of no less than ten (10) years in the United States of America.

4. Membrane Manufacturer’s Technical Representative: Monthly interim inspections and reporting; punch list inspection and report; final inspection and report. Manufacturer’s technical representative is to provide a copy of reports to Owner, Architect and Roofing Designer within four (4) days of each inspection.

C. Manufacturer's Field Services: During construction and until substantial completion, manufacturer’s representative shall perform quality assurance site visits every ten working days to ensure materials are being properly installed and as required to obtain the specified warranty.
1. The first site visit shall be performed within the first three (3) days of operations.
2. Notify the Architect, Roofing Designer and Owner of all site visits. Submit reports of findings to the Architect, Roofing Designer and Owner within one week of inspection. Payment applications will be subject to rejection until applicable reports are received.
3. Inspections to be performed by an employee of the selected manufacturer that is assigned full time to their technical services department. Sales personnel will not be acceptable for this function.
4. Notify the Architect, Roofing Designer and Owner of the Manufacturer’s final inspections. A minimum of seven (7) days written notice is required. If required notification is not provided and the Architect, Roofing Designer or Owner wish to attend, the Architect, Roofing Designer and Owner may require reinspections by the Manufacturer’s inspector at no additional cost to the Owner.

D. Installer Requirements:
1. Installer Qualifications: Company specializing in performing work of this section with at least five (5) years of documented experience and approved by manufacturer.
2. This roofing system shall be installed only by an Installer authorized by the membrane manufacturer prior to bid.
3. Application of the roofing system shall be accomplished by a primary roofing Installer, Installer's roofing foreperson, and sufficient Installer technicians trained and approved by the manufacturer of the roofing membrane. Installer is to submit evidence of qualification from the manufacturer.
4. Installer of the work of this Section is to be the same as the Installer of the work of Roofing Insulation, and Sheet Metal and Trim as specified in Division 07 - Thermal and Moisture Protection.

E. Upon completion of the installation an inspection shall be made by a representative of the membrane manufacturer to review the installed roof system and list all deficiencies.

F. There are to be no deviations made from the Contract Documents without prior written approval by the Architect or Owner and the membrane manufacturer.

G. All work shall be completed by personnel trained and authorized by the membrane manufacturer.

H. Provide manufacturer written verification indicating all seams have been probed and are watertight.

1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

C. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

D. Follow manufacturer's requirements for storing membrane rolls. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

E. All adhesives shall be stored at temperatures required by the manufacturer.

F. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/ supplier.

G. All materials which are determined to be damaged by the Architect, Roofing Designer, Owner, or membrane manufacturer are to be removed from the job site and replaced at no cost to the Owner.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Roofing shall not be applied during precipitation.

B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned, and heat welded before leaving the job site that day.

C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather.
   1. The existing building and its contents shall be protected against all risks.

D. All surfaces to receive insulation, membrane, or flashings shall be dry. Should surface moisture occur, provide the necessary equipment to dry the surface prior to application of subsequent materials.

E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A protection layer of plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

H. Prior to and during application, all dirt, debris, and dust shall be removed from surfaces, either by vacuuming, sweeping, blowing with compressed air, and/or similar methods.

I. Contaminants, such as grease, fats, oils, and solvents, shall not be allowed to contact the roofing membrane.

J. The roofing membrane shall not be installed under the following conditions without consulting the membrane manufacturer's technical department for precautionary steps:
   1. The roof assembly permits interior air to pressurize the membrane underside.
   2. Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.
   3. The wall/deck intersection permits air entry into the wall flashing area.

K. Precautions shall be taken when using membrane adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Always maintain lid covering on unused cans.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Each warranty is to expressly acknowledge that issuance is after warranty provider's final inspection of installed roofing system.

C. Manufacturer's Warranty: Manufacturer agrees to provide materials and labor to promptly repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks or breaches in roofing system that allows moisture to enter the substrate below, even if visible leaks are not observed within the facility. Warranty to be non-pro-rated and without monetary limitation or deductibles. Warranty to include insulation, membrane, sheathing board, thermal barrier, roof vapor barrier, overlayment cover board, insulation fasteners, mastics, adhesives, metal copings and edge metal, metal flashings, flashings, sealants, and base flashings. Warranties requiring the Owner's signature will not be acceptable.
   1. Warranty Period:
      a. Thirty (30) years from date of Final Acceptance.

D. Installer's Warranty: Roof System Warranty to cover workmanship for all work of this Section and roof insulation components including, but not limited to, installation of roofing insulation components such as sheathing boards, vapor retarders, insulation boards, cover boards, roofing membrane, flashings, metal work, roofing accessories and attachment construction.
   1. Warranty Period: Five (5) years from date of Final Acceptance.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS

A. Roofing system to meet or exceed the following:
   1. Roof Covering External Fire Resistance Classification: UL (DIR) certified Class A.
   2. Factory Mutual Classification: Class 1 and windstorm resistance of 1-90.

B. Wind Design:
   1. Install roofing system to meet or exceed the requirements of the current adopted version of ASCE-7, and State Building Code in the State in which the project is located. Refer to Structural Drawings for design loads for this project.

2.2 ROOFING INSULATION MATERIALS

A. Insulation system materials are to be manufactured or approved by roof membrane manufacturer as integral part of overall roofing system.

B. Comply with requirements indicated in Section 07 22 16.10 - Roof Insulation For Membrane Roofing.

2.3 ROOFING MEMBRANE MATERIALS

A. Manufacturers:
   1. Carlisle SynTec Systems.
   2. Firestone Building Products.

3. GAF Corporation.
4. GenFlex Roofing Systems.
5. Johns Manville.
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Roof Membrane: Thermoplastic-polyolefin (TPO) membrane complying with ASTM D6878/D6878M; polyester reinforcement and factory applied fleece backing.
1. Sheet Total Thickness: Tested in accordance with ASTM D751.
   a. 80 mil, 0.080 inch (2 mm), minimum.
2. Sheet Thickness Above Reinforcing Fabric Scrim: Minimum 36 percent of sheet total thickness, measured in accordance with ASTM D7635/D7635M.
3. Sheet Width: 10 feet (3.048 m).
4. Sheet Color and Solar Reflectance: Minimum value when tested in accordance with ASTM C1549 and listed by CRRC (DIR). Field applied coating cannot be used to achieve indicated values.
   a. White: Initial SR value of 0.76. Three-year aged SR value of 0.68.
5. Basis of Design:
   a. GAF Corporation - EverGuard Extreme TPO.

C. Flashing:
1. Reinforced 80 mil thick, TPO membrane for walls and curbs.
2. Unsupported 80 mil. thick, TPO membrane shall be supplied for field fabricated vent stacks, pipes, drains and corners.
3. Manufacturer to be same as Roof Membrane manufacturer.

D. Fully Adhered Low-Profile Expansion Joint: Provide flat, vulcanized waterproofing joint integral with the waterproofing membrane to accommodate movements up to plus or minus 1 inch, and capable of 500 percent elongation at - 40 degrees F across its length and at all vulcanized points. All details and connections to be factory fabricated by means of vulcanization for one-piece installation.

2.4 ASSOCIATED MATERIALS

A. Adhesive: Shall be membrane manufacturer’s solvent based reactivating type.

B. T-joint Patch: Shall be membrane manufacturer’s circular patch welded over T-joints formed by overlapping thick membranes.

C. Corner Flashing: Shall be membrane manufacturer’s pre-formed inside and outside flashing corners that are heat-welded to membrane or polymer clad metal base flashings.

D. Termination Bar: Shall be manufacturer’s 1/8 inch by 1 inch, mill finish, extruded aluminum bar with pre- punched slotted holes.

E. Sealant: Shall be manufacturer’s multi-purpose sealant.

F. Fasteners:
1. Concrete and Masonry Flashing Membrane Termination Anchors:
   a. 1/4 inch diameter metal based expansion anchor with stainless steel pin of length required to penetrate substrate a minimum of 1-1/2 inches.
   b. Masonry screws to be approved by membrane manufacturer, 1/4 inch minimum diameter, corrosion resistant, with Phillips flat head. Length required to provide minimum 1.5 inches embedment into substrate.
2. Solid Concrete Deck Fasteners and Plates: Shall be nail-in, non-threaded fasteners with split bulb tip designed for securement of membrane and insulation to structural concrete roof decks, length required to penetrate deck a minimum of 1 inch with plates as approved by roof membrane manufacturer.

G. Primary Membrane Cleaner: Shall be a high quality solvent cleaner provided by membrane manufacturer and approved by Architect or Roofing Designer for use as a general membrane cleaner.

H. Pre-weld Cleaner: Shall be a high quality solvent based seam cleaner with moderate evaporation rate provided by membrane manufacturer.

I. Walkway Pad: Shall be walkway pad by membrane manufacturer. Color shall differ from the roofing membrane sheet.

J. Polymer Clad Metal: Refer to Section 07 62 00 - Sheet Metal Flashing and Trim.

PART 3 EXECUTION

3.1 SUBSTRATE PREPARATION

A. Verify that the substrate is dry, clean, smooth, and free of loose material, oil, grease, or other foreign matter. Sharp ridges and other projections and accumulations of bitumen shall be removed to ensure a smooth surface before roofing.

B. Any deteriorated substrate shall be repaired.

C. Beginning installation means acceptance of prepared substrate.

D. Provide necessary protection from adhesive vapors to prevent interaction with foamed plastic insulation.

3.2 MEMBRANE INSTALLATION

A. Install specified sheathing, barriers, insulation, and overlay components of roofing system prior to installing roofing membrane component.
   1. The installation of the substrate and components is to be inspected prior to installation of the roofing membrane. The substrate is to be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged components are to be removed and replaced prior to installation of the roofing membrane.

B. Membrane installation to be fully adhered and in compliance with the manufacturer’s requirements and as indicated in this Section.

C. Position membrane over the properly installed and prepared substrate.

D. Fold membrane back lengthwise so half the underside of the membrane is exposed.

E. Adhesive shall be applied using solvent-resistant 3/4 inch nap paint rollers. The adhesive shall be applied to the substrate and back side of the membrane at a rate according to the membrane manufacturer’s requirements. Apply the adhesive smooth and even coatings with no gaps, globs, puddles, or similar inconsistencies. Allow the adhesive to dry until it is tacky but will string or stick to a dry finger touch.
   1. The Applicator is to maintain daily record of adhesive amount used per area per day to verify conformance to the specified adhesive rate.
   2. No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

F. Roll the adhesive coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane immediately after rolling the membrane into the adhesive with a soft bristle broom to achieve maximum contact.

G. Fold back the unbounded half of the sheet lengthwise and repeat the bonding procedures. This process is repeated throughout the roof area.

H. Position adjoining sheets to allow a minimum overlap of 2 inches and hot-air weld.

I. Weld membrane cover strips at all felt-back membrane seams without a factory selvage edge.

J. Terminate membrane at all walls as indicated on Drawings.
   1. Concrete/Masonry Substrate: Membrane shall be turned up wall one inch and mechanically terminated using approved anchors eight inches on center with a termination bar.

K. Terminate membrane at all penetrations as indicated on Drawings.
   1. Membrane shall be terminated six inches on center or a minimum of four fasteners per penetration into the structural deck using fasteners and plates as approved by the membrane manufacturer for the deck substrate.

L. Membrane shall extend over roof edge a minimum of 2 inches below the perimeter wood blocking. If fleece-back membrane is utilized, trim membrane flush with outside edge of roof and hot-air weld a non-fleece back flashing membrane to extend over the roof edge.

3.3 FLASHING INSTALLATION

A. General:
   1. Provide adhesives and flashing materials that are compatible with substrate.
   2. Flashings shall be installed concurrently with the roof membrane as the job progresses.
   3. No temporary flashings shall be allowed without the prior written approval of the Architect or Roofing Designer, and Manufacturer. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at no cost to the Owner.
   4. Seams shall not be “taped” as temporary measure but shall be fully completed before the end of each day.
   5. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.
   6. Do not allow adhesive fumes are not drawn into the building.

B. Adhesive for Flashing Membrane:
   1. Over the properly installed and prepared flashing substrate, flashing adhesive shall be applied according to manufacturer's written instructions. Apply the membrane adhesive in smooth and even coats with no gaps, globs, or similar inconsistencies.
   2. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
   3. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels required by welding techniques.

C. All flashings shall be mechanically terminated at a minimum of 8 inches above the finished roofing surface using approved fasteners and counterflashing bar unless otherwise indicated on the Drawings. Flashing heights less than 8 inches shall be accepted in writing by the Manufacturer’s Technical Department.

D. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut, and hot-air welded into place. No bitumen shall be in contact with the roof membrane.

E. All flashings shall be hot-air welded at their joints and at their connections with the (roof) membrane.

F. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Manufacturer’s Technical Department for securement methods.

G. Corners shall be flashed using the membrane manufacturer's pre-formed corners.

H. Polymer Clad sheet metal incorporated into the roofing system shall be sealed off with a heat welded stripping ply. The stripping ply shall extend four inches beyond sheet metal onto roof membrane and fit closely to fit closely to edge of sheet metal.

I. Soil Pipe/Pipe Penetration:
   1. Provide field wrapped pipe penetration flashing.
   2. Apply aluminum tape to penetration if asphalt contamination is present.
   3. Extend existing pipe to obtain a minimum 8 inches finished flashing height.
   4. Cut existing pipe to obtain a maximum 12 inches finished flashing height.
   5. Horizontal flashing membrane shall be hot-air welded a minimum of four inches onto the membrane.
   6. Vertical flashing membrane shall be fully adhered to pipe penetration and extend a minimum of 1.5 inches horizontally at the base of penetration. Hot-air weld vertical flashing membrane to horizontal flashing membrane.
   7. Install stainless steel draw band and sealant or hot-air weld flashing cap to terminate top edge of pipe flashing.

3.4 HOT-AIR WELDING OF SEAM OVERLAPS

A. General:
   1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
   2. Welding equipment shall be provided by or approved by the membrane manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a membrane manufacturer's technical representative prior to welding.
   3. All membrane to be welded shall be clean and dry.

B. Hand-Welding:
   1. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
   2. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
   3. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1-1/2 inches (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

C. Machine Welding:
   1. Machine welded seams are achieved using automatic welding equipment. When using this equipment, instructions from the manufacturer shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.
   2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams:
   1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey

material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator to locations as directed by the Designer or membrane manufacturer's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

E. Provide cut edge sealant over all cut edges of reinforced membrane after seam probing has been completed.

F. Install T-joint patch at all T-seam locations.

3.5 TEMPORARY CUT-OFF

A. All flashings shall be installed concurrently, with the membrane to maintain a watertight condition as the work progresses.

B. When a break in the day's work occurs in the central area of the project install a temporary watertight seal. An 8 inches strip of flashing membrane shall be welded 4 inches to the new field membrane. The remaining 4 inches of flashing membrane shall be sealed to the deck and/or the substrate so that water will not be allowed to travel under the new or existing membrane. The edge of the membrane shall be sealed in a continuous heavy application of pourable sealer of 6 inches width. When work resumes, the contaminated membrane shall be removed and disposed of. None of these materials shall be reused in the new work.

C. If inclement weather occurs while a temporary water stop is in place, provide the labor necessary to monitor the situation to maintain a watertight condition.

D. If any water is allowed to enter under the newly completed system, the affected area shall be removed and replaced at no cost to the Owner.

3.6 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 - Quality Requirements: Manufacturer's field services.

B. Refer to QUALITY ASSURANCE article in Part 1 of this Section for requirements.

3.7 CLEANING AND PROTECTION

A. Protect the roof from construction related damages during the Work.

B. Remove trash and debris from the roof daily.

C. Metal scraps, nails, screws, and other sharp damaging debris shall be kept off the roof membrane surface during construction.

D. Remove excess adhesive, sealant, stains, and residue from the membrane and flashing surfaces.

E. Repair, or remove and replace damaged membrane, flashings, and other roofing components. Repairs shall be in accordance with the membrane manufacturer's repair instruction to comply with the specified warranty.

F. Remove temporary coverings and masking protection from adjacent work areas upon completion. Remove construction debris from the project site on a planned and regular basis.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fabrication and installation of sheet metal flashings and trim to provide permanently watertight conditions. Items include:
      a. Coping Caps.
      b. Roof Edge.
      c. Flashings.
      d. Counterflashings.
      e. Counterflashing Receivers.
      f. Fascia.
      g. Through Wall Scupper with exterior escutcheon.
      h. Other items as indicated on Drawings.
   2. Sealants for joints within sheet metal fabrications.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
   2. Section 04 72 00 - Cast Stone Masonry.
   3. Section 06 10 53 - Miscellaneous Rough Carpentry.
   4. Division 07 - Thermal and Moisture Protection: Roofing, gutters, downspouts, roof accessories, roof hatches, and joint protection.
   5. Division 08 - Opening: Metal flashings for curbs of skylights and similar openings.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
   2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
   3. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
   4. 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. American National Standards Institute (ANSI); Single Ply Roofing Industry (SPRI); Factory Mutual (FM):
   1. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.

C. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
   2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
   3. ASTM B32 - Standard Specification for Solder Metal; 2020.

4. ASTM B101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction; 2022.
5. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
6. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.
7. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2020.
8. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
9. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.
10. ASTM D1005 - Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers; 1995, Reapproval 2020.
11. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008, with Editorial Changes 2017.
12. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a, Reapproval 2021.
13. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2023.
14. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films; 2023.
15. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2012, Reapproval 2018.
16. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2012, Reapproval 2018.
17. ASTM D7091 - Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non- Ferrous Metals; 2022.

D. National Roofing Contractors Association (NRCA):
   1. NRCA (RM) - The NRCA Roofing Manual; 2024.

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
   1. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this Section and in conjunction with roofing pre-installation meeting.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal procedures.

B. Product Data: Submit product data for materials specified certifying compliance with specified requirements.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect’s initial selections.

E. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated

for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Samples of Fabrications: Fabricate and submit one sample of each of the following illustrating configuration, dimensions, finishes, joinery, bends, corners, fasteners, seals, concealed surfaces finish and include material to be used as separator for contact with dissimilar construction materials.
   1. Coping Cap Corner, assembled.
   2. Roof Edge.
   3. Counterflashing and Counterflashing Receiver, assembled.
   4. Fascia.
   5. Exposed Fasteners.
   6. Through Wall Scupper with exterior Escutcheon.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in sheet metal work with ten (10) years of documented experience.

B. Installer Qualifications: Company specializing in sheet metal work with ten (10) years of documented experience.
   1. Installer to be same as installer of the roofing system indicated in Division 07 - Thermal And Moisture Protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Store material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage. Ensure materials remain dry, covered and not in contact with the ground.

C. Prevent contact with materials that could cause discoloration or staining. Protect stored materials from damage and contamination with moisture or foreign matter.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Protect the Work from intrusion of weather elements during installation duration.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

C. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

D. Coordinate all phases of Work to provide continuity of Work without delays.

1.9 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Factory Applied Metal Finishes Warranty:

1. Provide manufacturer's metal finish warranty in which manufacturer agrees to repair finish or replace metal that shows evidence of deterioration of factory applied finish within the indicated warranty period.
2. Deterioration includes, but is not limited to the following:
   a. Color fading exceeding 5 delta E Hunter color units in accordance with ASTM D2244.
   b. Peeling, checking, or cracking of coating adhesion to metal.
   c. Chalking exceeding a No. 8 in accordance with ASTM D4214, Method A.
   d. Corrosion of substrate exceeding a No. 6 on cut edges and a No. 8 on field surfaces, when measured per ASTM D1654.
3. Warranty Period:
   a. Twenty (20) years from the project date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and is to remain watertight.

B. Factory Mutual approved for wind uplift protection.

C. Wind Design Standard: Manufacture and install copings and roof edge flashing systems tested as compliant with ANSI/SPRI/FM 4435/ES-1 requirements and capable of resisting the following design pressure:
   1. Design Pressure: As indicated on Drawings.

D. Sheet Metal Standard for Flashing and Trim: Comply with NRCA (RM) and SMACNA (ASMM) requirements for dimensions and profiles shown unless more stringent requirements are indicated in the Contract Documents.
   1. Maintain one copy of each document on site.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS

A. Manufacturers:
   1. Architectural Products Company.
   2. Hickman Edge Systems, Inc.
   3. Merchant and Evans.
   4. Metal-Era, Inc.
   5. OMG Roofing Products.
   6. PAC-CLAD; Petersen Aluminum Corporation.
   7. Perimeter Systems; a division of SAF.
   8. SAF, Southern Aluminum Finishing Company.
   9. Substitutions: Section 01 60 00 - Product Requirements.

2.3 METAL SHEET MATERIALS

A. Base Metal Thickness Table: Metal thickness minimum to be as indicated in the following table unless indicated otherwise on Drawings. Face dimensions indicated apply to the largest dimensional face of a linear or formed metal fabrication and includes the outward angled drip edge.

Face Dimension	Galvanized Steel	Aluminum	Stainless Steel
Up to 4 in. (to 100 mm)	24 ga. (0.028 in.) (0.7 mm)	0.032 in. (0.82 mm)	26 ga. (0.016 in.) (0.4 mm)
> 4 in. - 8 in. (> 100 - 200 mm)	24 ga. * (0.028 in.) (0.7 mm)	0.040 in. * (1.0 mm)	26 ga. * (0.016 in.) (0.4 mm)
> 8 in. - 10 in. (> 200 - 250 mm)	22 ga. ** (0.034 in.) (0.9 mm)	0.050 in. ** (1.3 mm)	24 ga. ** (0.023 in.) (0.6 mm)
> 10 in.–16 in. (> 250 - 400 mm)	20 ga. (0.040 in.) (1.0 mm)	0.063 in. (1.6 mm)	22ga. (0.029 in.) (0.7 mm)
> 16 in. - 24 in. (> 406 mm - 610 mm)	20 ga. (0.040 in.) (1.0 mm)	0.063 in. (1.6 mm)	22ga. (0.029 in.) (0.7 mm)
Key Notes: Minimum thickness for the following components; thicker depending on face dimension: * Minimum thickness for Roof Edge, Fascia, and Cleats. ** Minimum thickness for Coping Caps.			

B. Pre-Finished Aluminum Sheet: ASTM B209/B209M, 3003 or 3005 alloy, H12 or H14 temper with factory applied pre-finish coating system as follows:
   1. Superior Performance Organic Coating System: AAMA 2605, shop applied multiple coats, thermally cured polyvinylidene fluoride (PVDF) resin system.
      a. Three-Coat Fluoropolymer: AAMA 2605, fluoropolymer finish containing not less than 70 percent PVDF resin by weight in each color coat and clear topcoat. Prepare, pre-treat, and apply coatings.
         1) Dry Film Minimum Thickness: ASTM D7091.
            a) Primer Coat: 0.20 to 0.40 mil.
            b) Color Coat: 0.70 to 0.90 mil.
            c) Clear Coat: 0.40 to 0.50 mil.
            d) Total Thickness: 1.30 to 1.80 mils.
      b. Surface: Smooth.
      c. Color: To be selected by Architect for manufacturer’s full range.
      d. Gloss: To be selected by Architect for manufacturer’s full range.
      e. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

C. Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating.

D. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating with factory applied pre-finish coating system as follows:
   1. Polyvinylidene Fluoride (PVDF) Coating: Superior Performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   2. Silicone Modified Polyester Coating: Pigmented organic powder coating, AAMA 2603; baked enamel finish system.
   3. Acrylic Polyester Coating: Pigmented organic powder coating, AAMA 2603; baked enamel finish system.
   4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

E. Stainless Steel: ASTM A666, Type 304 alloy, soft temper.

1. Finish:
    a. No. 4 - Brushed finish.

F. Protective Film: Factory apply strippable plastic film to material surfaces to protect the finish during fabrication, shipping, handling, and installation.

2.4 POLYMER CLAD METAL

A. Polymer Clad Metal - Metal flashings and trim manufactured with roofing membrane laminated cladding; heat-weldable cladding for watertight seal to roofing membrane; 25 mil thick cladding membrane coating to match the flashing membrane composition laminated on one side. Polymer-clad metal to be manufactured by, and included in the warranty of, the roofing membrane manufacturer. Color to be selected by Architect from manufacturer's full range.

B. Polymer clad metal type to be that which is indicated for flashing and trim components.

C. Metal flashings and trim components to be fabricated with polymer clad metal include the following:
1. Items indicated on Drawings.

2.5 COPING CAPS

A. Manufactured system in section lengths not less than 10 feet (12 feet preferred); concealed anchorage; with corner units, end cap units, and concealed splice plates. All exposed components to match in material and finish.
1. Pre-finished aluminum sheet; sloped top at 1/2 inch per foot.
2. Configuration: As indicated on Drawings.
3. Corner and End Cap Units: Factory mitered.
    a. Fabricate corner and end cap units to form single fabricated units.
        1) Minimum length of corner caps to be twice the thickness of wall assembly in each direction.
        2) Minimum length of end cap units to be twice the thickness of wall assembly.
    b. Joints:
        1) Continuously welded. Apply specified finish after fabrication.
4. Joint Splice Plates: Material and finish to match coping cap; 6 inches wide minimum; factory applied neoprene sealant strip each edge to maintain waterproof assembly.
5. Face-Leg Cleats: Continuous each side; spring action linear support at mid-span of coping cap slopped top.
6. Surface: Smooth.
7. Color: To be selected by Architect from manufacturer's full range.

2.6 ROOF EDGE FASCIA

A. Manufacture system in section lengths not less than 10 feet (12 feet preferred); concealed anchorage; with corner units, and concealed splice plates. All exposed components are to match in material and finish.
1. Pre-finished aluminum sheet.
2. Configuration: As indicated on Drawings.
3. Corners Units: Factory mitered.
    a. Fabricate corner units to form single fabricated unit.
    b. Minimum length to be 24 inches in each direction.
    c. Joints:
        1) Continuously welded. Apply specified finish after fabrication.

4. Joint Splice Plates: 6 inches wide minimum; factory applied neoprene sealant strip each edge to maintain waterproof assembly.
5. Face-Leg Cleats: Continuous.
6. Surface: Smooth.
7. Color: To be selected by Architect from manufacturer's full range.

2.7 THROUGH WALL SCUPPERS

A. Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 6 inches beyond cant or tapered strip into field of roof. Continuous weld all joints. Fabricate from the following materials:
   1. Material: Aluminum; ASTM B209/B209M, 3003 or 3005 alloy, H12 or H14 temper.
   2. Fabricate scupper sleeve with polymer clad metal for watertight bond to match roofing membrane and flashing, unless indicated otherwise on Drawings.
   3. Exterior Escutcheon: Required where no downspout conductor head is indicated for drainage. Fabricate unit; without seams; profile and configuration as indicated on Drawings; pre-finished aluminum and finish as specified in this Section; metal to be 0.050 inch thick metal with hemmed edges; color to be selected by Architect from manufacturer’s full range.

2.8 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as fabricated sheet materials. Cleat thickness, width, and profile to be capable of withstanding loads and stresses required to secure and interlock with fabricated sheet materials.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

E. Fabricate vertical faces with bottom edge formed outward 1/2 inch and hemmed to form drip.

2.9 ACCESSORIES

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other accessories as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of materials to which application is made, unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design and wind loads and recommended by manufacturer of components being fastened. Exposed fasteners to be finished with matching finish system of material being fastened.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM waterproof sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

C. Fasteners for securing components to treated lumber and/or plywood are to be stainless steel, or specifically manufactured with published approvals for treated lumber applications.

D. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

E. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

F. Anchors: As required by application condition.
   1. Lead Anchors: Minimum 1/4 inch diameter lead anchor.
   2. Sleeve-Type or Wedge-Type based on application, minimum 5/8 inch diameter, Type 304 or 316 stainless steel, Expansion Anchor Bolt Assembly. Follow fastener manufacturer's published guidelines for substrate type and condition.

G. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2-inch wide and 1/8 inch thick.

H. Sealant primers: Primers to be manufactured by or approved by the sealant manufacturer. Primer types required for substrate and sealant as published by sealant manufacturer.

I. Elastomeric Sealant: For exposed joints ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight. Color to match adjacent material or

J. Butyl Sealant: For concealed joints ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

K. Plastic Cement: ASTM D4586/D4586M, Type I.

L. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D1187/D1187M.

M. Underlayment Materials:
   1. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
   2. Slip Sheet: Rosin-sized building paper, 3 lbs/100 sq. ft. minimum.

N. Primer:
   1. Aluminum and Stainless Steel: Zinc chromate primer.
   2. Galvanized Steel: Zinc chromate or galvanized iron primer.

O. Reglets (Receivers): Type and configuration as indicated on Drawings. Material and finish to match metal flashing component to be secured into reglet. Material thickness to be as required by referenced standards but not less than 0.050 inch.

P. Solder: ASTM B32; Sn50 (50/50) type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that substrates, surfaces, and conditions are ready to accept the work of this Section.

C. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

D. Verify roofing termination and base flashings are in place, sealed, and secure.

E. Verify that field measurements are as required.

F. Examine products to be installed for damage and other conditions detrimental to completion of the Work.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Install starter and edge strips, and cleats before starting installation.

D. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

E. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Comply with Drawings and referenced standards.

C. Installation is to comply with the sheet metal system and component manufacturer's published installation manuals and guidelines and all referenced standards therein.

D. Installation of sheet metal flashings incorporated into roofing system are to comply with all minimum requirements published by the membrane manufacturer and requirements indicated in the Contract Documents.

E. Coping and trim sections are to expand and contract freely while mechanically locked in place on anchor cleats.

F. Coping and trim sections are to be locked to anchor cleats by mechanical pressure from support chairs.

G. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
      a. Install to seal watertight all rough carpentry, parapet walls, curbs, and roof transitions before installing sheet metal flashing.
      b. The underlayment is to be left in place, not cut, or removed, before installing sheet metal flashing.
      c. Cover underlayment with slip sheet for separation from metal work to be installed.

H. Insert flashings into reglets to form tight fit; secure in place with lead or plastic wedges; seal flashings into reglets with sealant.

I. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted by Architect.

J. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

K. Apply plastic cement compound between metal flashings and felt flashings.

L. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

M. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for quality control of work and installation.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.5 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures.

B. Clean installed work in accordance with manufacturer’s recommendations including cleaning procedures and materials.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed construction from damage.

END OF SECTION

SECTION 07 71 23

MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Gutters.
   2. Downspouts.
   3. Downspout Boots.
   4. Conductor Heads (Collection Boxes).
   5. Splash Pads.
   6. Supports and Accessories.

B. Related Requirements:
   1. Division 07 - Thermal and Moisture Protection: Sections related to roofing construction and joint protection.
   2. Division 33 - Utilities: Sections related to stormwater utility construction.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. 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 International (ASTM):
   1. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
   2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar, 2023.
   3. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, 2021a.

C. National Roofing Contractors Association (NRCA):
   1. NRCA (RM) - The NRCA Roofing Manual; 2024.

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
   1. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
   1. Coordinate Work with construction related to or interfacing with this Work.
   2. Coordinate Work with downspout discharge pipe inlets or connections, if any.

1.4 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section and in conjunction with roofing pre-installation meeting.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, sizing, spacing, slope, calculations, and installation details.

C. Product Data: Submit data on manufactured components, materials, and finishes.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.

E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. Submit a gutter section and downspout section of minimum size 12 inches long illustrating actual metal, thickness, configuration, profile, color, and texture.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with these specifications and SMACNA (ASMM) - Architectural Sheet Metal Manual.

B. Install Work in compliance with the current NRCA (RM).

C. Install Work in compliance with the sheet metal system and component manufacturers' published installation manuals and guidelines and all referenced standards therein.

D. Work to be free of leaks in all weather conditions.

1.7 QUALIFICATIONS

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum five (5) years documented experience.

B. Installer Qualifications: Company specializing in installing the Work specified in this Section with minimum five (5) years documented experience.

C. Installer to be same as installer of the roofing system indicated in Division 07 - Thermal And Moisture Protection.
   1. Company specializing in sheet metal work with minimum five (5) years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.

C. Store materials within areas designated or approved by the Owner. Ensure materials remain dry, covered and not in contact with the ground.

D. Handle material in such manner as to preclude damage and contamination with moisture or foreign matter.

1.9 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Provide the pre-finished sheet metal manufacturer's thirty (30) year finish warranty from the date of substantial completion.

PART 2 PRODUCTS

2.1 PRE-FINISHED ALUMINUM

A. Aluminum: ASTM B209/B209M, alloy 3003, H14 temper.

1. Thickness: 0.040 inch (40-mil), unless indicated otherwise on Drawings or in this Section.
2. Finish: Primed and finished on one side with fluoropolymer coating; multiple coats to minimum 1.0 mil total dry film thickness as specified for sheet metal system, thermally cured, conforming to AAMA 2604. On reverse side, finish with wash coat compatible with finish system as recommended by finish system manufacturer; wash coat to minimum 0.3 to 0.4 mil dry film thickness. A strippable plastic film should protect the finish during fabrication and installation.
   a. Color and Sheen: To be selected by Architect from manufacturer's full range.

2.2 COMPONENTS

A. Gutters:
   1. Pre-Finished Aluminum; 0.050 inch thick; profile as indicated on Drawings.

B. Downspouts:
   1. Pre-Finished Aluminum; 0.040 inch thick; profile as indicated on Drawings.

C. Downspout Boots: Cast iron; smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
   1. Basis of Design: J.R. Hoe and Sons.
   2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
   3. Configuration and Profile:
      a. As indicated on Drawings.
   4. Finish: Manufacturer's standard factory applied powder coat finish.
      a. Color:
         1) To be selected by Architect from manufacturer's full range.
   5. Accessories: Compatible with and appropriate for installation of downspout boots.
      a. Stainless steel fasteners and building wall anchors.
      b. Neoprene gaskets and rubber coupling.

D. Downspout Boots: PVC adapter, unless indicated otherwise on Drawings.
   1. Premanufactured extruded PVC; inlet and outlet configuration sized to fit inlet and outlet piping and as indicated on Drawings; smooth interior; provide for flow volume equal to outlet piping without choke points.
   2. Finish: Paint PVC adapter and exposed PVC piping. Refer to Section 09 90 00 - Painting and Coating for paint system for PVC and Architectural Plastic; exterior.
   3. Color:
      a. Match downspout metal finish color and sheen.

E. Conductor Heads (Collection Boxes):
   1. Pre-Finished Aluminum; 0.050 inch thick; profile as indicated on Drawings.
   2. Pre-manufactured conductor heads to fit scupper drainage outlets and downspouts.
   3. Factory weld joints.
   4. Factory apply finish after fabrication.

F. Splash Pads:
   1. Size: 3H x 11W x 30L inches unless indicated otherwise on Drawings.
   2. Material:
      a. Precast concrete; minimum 3000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.

2.3 ACCESSORIES

A. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Anchoring Devices: In accordance with SMACNA requirements.
   2. Gutter Supports:

a. Brackets - Configuration, size and metal thickness as indicated on Drawings. Finish to match gutter.

3. Downspout Supports:
   a. Straps, minimum 0.050 inch thick. Finish to match downspout.

B. Fasteners: Same material and finish as gutters and downspouts.

2.4 FABRICATION

A. Form components accurately to sizes and profiles indicated on Drawings.

B. Fabricate with required connection components.

C. Form component in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Seal joints watertight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Contractor is to coordinate all work for correct sequencing of items which make up the completed building envelope systems.

C. Verify that surfaces are ready to receive work.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

D. Protect components to prevent scratches, dents, and other damages during the work and associated with the work of other trades.

E. Verify that all exposed fasteners are pre-finished to match surface finish of the component being fastened.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install products in accordance with manufacturer's instructions.

C. Sheet Metal: Join lengths with seams sealed watertight. Flash and seal gutters to downspouts and accessories.

D. Slope gutters 1/8 inch per foot minimum to drains.

E. Connect downspouts to downspout boots at elevations indicated on Drawings; but, in no case is connection to be less than 4 inches above grade. Do not seal connection watertight.

3.4 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Clean installed work and comply with manufacturer’s recommendations.

C. Clean adjacent soiled surfaces and comply with surface manufacturer's recommendations.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed construction from damage.

END OF SECTION

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Curbs and equipment rails.
   2. Piping and conduit pedestals.

B. Related Requirements:
   1. Section 06 10 53 - Miscellaneous Rough Carpentry.
   2. Division 07 - Thermal and Moisture Protection: Roofing, roof insulation, flashing, and trim requirements.
   3. Division 23 - Mechanical (HVAC) for Section related to roof mounted equipment.

1.2 REFERENCE STANDARDS

A. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Provide roof deck structural framing as needed to support and anchor roof accessories.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: 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.

C. Shop Drawings: Submit detailed drawings indicating construction interface of roof accessories with adjacent work and materials, and layout developed for this project. For equipment supports, indicate the specific equipment being supported. Show configurations, dimensioned locations and number for each type of roof accessory.
   1. Equipment Curbs and Rails: Submit shop drawings sealed and signed by a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store products under cover and elevated above grade.

1.6 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Provide five (5) year warranty to correct defective work.

C. Provide five (5) year manufacturer's warranty for materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
   1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 ksi; G90 (Z275) coating designation; 18 gage (0.048 inch) thick. Use thicker gage as required to support loads of equipment.
   2. Manufacture curb bottom and mounting flanges for installation on substrate construction as indicated on Drawings. Curb unit bottom to match slope of substrate and curb unit top to be horizontal for equipment mounting.
   3. Provide curbs with layouts and configurations as required by equipment being supported and as indicated on Drawings.
   4. Provide for anchorage requirements of the equipment to be supported.
   5. Provide unit insulated as indicated on Drawings.
   6. Height Above Finished Roof Surface: 9 inches, minimum. Total curb unit height varies based on roofing system thickness and slope of substrate.

B. mounting.
   1. Provide preservative treated wood nailers along top of rails.
   2. Height Above Finished Roof Surface: 9 inches, minimum.

C. Piping and Conduit Pedestals: Support devise sized to fit the diameter of the pipe being supported with stainless steel straps and stainless steel screws to secure strap to support and height adjustable.
   1. Manufacturers:
      a. Olympic Olyflow PipeGuard.
      b. Erico Caddy Pyramid EZ Series.
      c. Portable Pipe Hangers.
      d. Miro Industries.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Do not begin installation until substrate construction is as required.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Clean surfaces thoroughly prior to installation.

D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install in accordance with manufacturer's instructions, in manner that maintains roofing weathertight integrity.

3.4 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Clean installed work to like-new condition.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed products until completion of project.

END OF SECTION

SECTION 07 72 33

ROOF HATCHES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes prefabricated roof hatches, with integral support frames and curbs, operable hardware, counter flashing, and related components.

B. Related Requirements:
   1. Sections related to roof decking and topping construction.
   2. Section 06 10 53 - Miscellaneous Rough Carpentry.
   3. Division 07 - Thermal and Moisture Protection: Roofing, sheet metal flashing and trim, roof insulation, and accessories.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2023.
   2. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on unit construction, sizes, configuration, jointing methods, and locations when applicable, and attachment method.

C. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect’s initial selections.

D. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

E. Manufacturer’s Installation Instructions: Indicate special installation criteria and interface with adjacent components.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Installed assemblies to withstand 40 lbf/sq ft external live load with a maximum deflection of 1/150 of the span and negative (uplift) design pressure of 20 lbf/sq ft or greater.

2.2 ROOF HATCHES

A. Manufacturers:
   1. Babcock-Davis Hatchways.
   2. Bilco.

3. Dur-Red.
4. J.L. Industries.
5. Milcor.
6. O'Keeffe's Inc.
7. Substitutions: Section 01 60 00 - Product Requirements.

B. Basis of Design: Bilco - E-50TB.

C. Description: Factory-assembled and finished; metal curb, frame, and cover, complete with operating hardware and safety components; weather sealed construction and installation.
1. Style: Provide flat metal covers unless otherwise indicated.
2. Mounting Substrate: Frames and curbs suitable for mounting to roof structure and substrate deck type indicated on Drawings for each hatch location.
3. Size: Unless indicated otherwise on Drawings, provide the following:
a. For Ladder Access:
1) Single leaf; 36 by 36 inches.

D. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; configure extended bottom flange to suit mounting requirements and roof angle.
1. 3 inches thick, metal double wall insulated construction.
2. Top frame opening rim height to be level and minimum12 inches above finish roofing surface.

E. Metal Covers: Perimeter flush with frame and double wall insulated metal construction.
1. 3 inches thick, metal double wall insulated construction.
2. Gasket: Neoprene, continuous around cover perimeter.

F. Metal Material:
1. Aluminum: ASTM B209/B209M, alloy 3003, H14 temper, 11 gauge (0.0907 inch) thick, minimum.

G. Insulation Material: Mineral wool, cavity filled and with no voids.

H. Factory Finish:
1. Aluminum:
a. Factory mill finish.

I. Hardware: Manufacturer's standard finish.
1. Compression spring operator and shock absorbers.
2. Steel manual pull handle for interior operation.
3. Steel hold open arm with vinyl covered grip handle for easy release.
4. Padlock hasp.
5. Hinges: Manufacturer's recommended type for specific type of roof hatch.

J. Safety Guard Railing: Fiberglass pipe or tube fabrication, minimum 1-1/2 inches outside diameter posts, top rails, and intermediate rails; 42 inches overall height above roof surface; self-latching hinged gate protecting hatch access side.
1. Guard Openings: Maximum 21 inches.
2. Mounting Hardware: Corrosion resistant type for secure attachment to hatch frame without penetrating roof membrane and without inhibiting hatch cover operation.
3. Gate Hardware: Corrosion resistant hinges and latching mechanism.
4. Fasteners: Stainless steel.

K. Safety Post: Telescoping type with positive safety lock.

2.3 ACCESSORIES

A. Anchorage Devices: Type recommended by curb manufacturer.
1. Stainless steel materials if exposed to weather.

B. Blocking and Brackets: Type recommended by curb manufacturer.
   1. Stainless steel materials if exposed to weather.

C. Counterflashings: Same metal type and finish as roof hatch frame.

D. Protective Coating: Coating to maintain separation between dissimilar metals.
   1. Zinc molybdate alkyd.

E. Sealant: Manufacturer's recommended sealants integral with roof hatch installation, nonhardening, non-skinning, nondrying, nonmigrating butyl based sealants.

2.4 FABRICATION

A. Fabricate components free of visual distortion and free of defects. Weld corners and joints.

B. Sloped Roofs: Fabricate roof hatch curbs tapered to maintain hatch top level to horizontal.

C. Provide for condensation occurring within components and within assembly to drain to exterior above roofing.

D. Fit components for weather tight assembly.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify openings and substrate conditions are ready to receive Work of this section.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Apply protective coating on aluminum surfaces of roof hatches to be in contact with cementitious materials or dissimilar metals.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install insulated curb assembly, fastening securely to roof decking. Flash curb assembly into roof system.

C. Place and secure roof hatch frame and curb assembly. Install integral setting sealant and counterflashing as required.

D. Installation to be watertight assembly.

E. Coordinate with installation of roofing system and related flashings for weather tight installation.

F. Apply protective coating on surfaces of components in contact with cementitious materials or dissimilar metals.

G. Adjust operational components for smooth operation.

3.4 ADJUSTING

A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

B. Test for proper operation.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove excess sealant.

C. Clean surfaces and components in accordance with manufacturer's recommendation.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

3.7 DEMONSTRATION AND TRAINING

A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of installed Work.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Firestopping through-penetrations of fire rated assemblies.
   2. Firestopping joints in fire rated assemblies.
   3. Firestopping tops of fire rated walls.
   4. Smoke sealing at joints between floor slabs and exterior walls.
   5. Smoke sealing penetrations and joints of smoke partitions.

B. Related Requirements:
   1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar used for firestopping.
   2. Section 09 21 16 - Gypsum Board Assemblies: Gypsum board fireproofing.
   3. Division 22: Plumbing work requiring firestopping.
   4. Division 23: HVAC work requiring firestopping.
   5. Division 26: Electrical work requiring firestopping.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
   2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
   3. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestops Systems; 2023a.
   4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems;2015, Reapproval 2019.

B. California Department of Public Health (CDPH):
   1. CDPH Standard Method VOC V1.2 - Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers - Version 1.2; 2017.

C. Intertek Testing Services (ITS):
   1. ITS (DIR) - Directory of Listed Products; Current Edition.

D. Underwriters Laboratories Inc. (UL):
   1. UL (FRD) - Fire Resistance Directory; Current Edition.
   2. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including all Revisions.
   3. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including all Revisions.
   4. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including all Revisions.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on product characteristics, performance, and limitation criteria.

C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.

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

F. Engineering Judgements: For conditions not covered by UL (FRD) or ITS (DIR) listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.5 QUALITY ASSURANCE

A. All firestopping on the project to be performed by the same Company.

B. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gauge minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
   1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
   2. Floor Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
      a. Floor Penetrations Within Wall Cavities: T-Rating is not required.

C. Through Penetration Firestopping of Non-Fire Rated Floor Assemblies: Materials to resist free passage of flame and products of combustion.
   1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
   2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

D. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
   1. Smoke Barrier Joints Air Leakage: Maximum 5.0 cfm/sq ft of door opening at 0.30 inch water gauge pressure differential.

E. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gauge minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

F. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of work.

B. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.

C. Maintain this minimum temperature before, during, and for minimum three (3) days after installation of materials.

D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Conform to UL (FRD) or ITS (DIR) for fire resistance ratings and surface burning characteristics.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

2.2 FIRESTOPPING

A. Manufacturers:
   1. 3M Fire Protection Products
   2. A/D Fire Protection Systems, Inc.
   3. Hilti Corp.
   4. Nelson Firestop Products
   5. Specified Technologies
   6. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
   1. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
      a. Maximum volatile organic compound content in accordance with CDPH Standard Method VOC V1.2.
   2. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
      a. Maximum volatile organic compound content in accordance with CDPH Standard Method VOC V1.2.
   3. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
   4. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
      a. Maximum volatile organic compound content in accordance with CDPH Standard Method VOC V1.2.
   5. Firestop Pillows: Formed mineral fiber pillows.

2.3 ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

1. Maximum volatile organic compound content in accordance with CDPH Standard Method VOC V1.2.

B. Dam Material: Permanent; mineral fiber matting.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

D. Remove incompatible materials affecting bond.

E. Install damming materials to arrest liquid material leakage.

3.3 APPLICATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit, and other items, requiring firestopping.

C. Apply primer as recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

D. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.

E. Compress fibered material to maximum 40 percent of its uncompressed size.

F. Install fire-rated cable management/firestopping products at locations as indicated on the Drawings or any location where low-voltage cable penetrates a fire rated partition.

G. Dam material to remain.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.

C. Install descriptive label at all penetrations including UL assembly and verify noted UL assembly is consistent with installation.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes joint sealants and accessories.

B. Related Sections:
1. Section 07 84 00 - Firestopping: Firestopping sealants.
2. Section 08 80 00 - Glazing: Glazing sealants and accessories.
3. Section 09 21 16 - Gypsum Board Assemblies: Acoustic sealant.
4. Section 09 30 00 - Tiling: Sealant used as tile grout.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015, Reapproval 2022.
2. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle); 2022.
3. ASTM C736 - Standard Test Method for Extension-Recovery and Adhesion of Latex Sealants; 2012, Reapproval 2022.
4. ASTM C834 - Standard Specification for Latex Sealants; 2017, Reapproval 2023.
5. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
6. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016, Reapproval 2023.
7. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
8. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.
9. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension; 2016, Reapproval 2021.
10. ASTM D2202 - Standard Test Method for Slump of Sealants; 2000, Reapproval 2019.
11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
12. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
13. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, Editorial Changes 2021.

B. California Department of Public Health (CDPH):
1. CDPH Standard Method VOC V1.2 - Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers - Version 1.2; 2017.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate the Work with other Sections referencing this Section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Shop Drawings: Submit schedule of sealant products to be installed and drawings indicating application locations of each sealant product.

D. Samples for Initial Selection: Submit two (2) sets of samples of manufacturer's full and custom range of colors and finishes for each joint sealant product indicated for Architect's initial selection.

E. Samples for Verification: Acquire Architect's direction to provide one of the following from Architect's initial selection:
   1. Submit two samples, 6 inches long, illustrating profile, dimension, color, and finish.
   2. Install Mockup samples of three (3) different shades of each sealant at each variation of construction type to be sealed for Architect to make selection verifications. Mockup locations to be as directed by Architect.
      a. This Mockup requirement is for sealants that will remain visible and without paint or coating.

F. Installation Plan: Resubmit shop drawings with added information. Indicate locations of sealant colors and finishes in compliance with Architect's verification of samples decisions.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.

J. Indoor Air Quality Certificates:
   1. Certify volatile organic compound content for each interior sealant and related primer.

K. Warranty Sample: As specified in this Section.

1.5 QUALIFICATIONS

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years documented experience manufacturing products indicated in this Section.

B. Installer Qualifications: Company specializing in performing the Work of this Section and with at least three (3) years documented experience installing the Work of this Section.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.7 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.

B. Warranty: Provide warranty in which sealant manufacturer agrees to correct installed sealant work that fails. Failures include sealants that do not cure, fail to maintain seal including watertightness, exhibit loss of adhesion or cohesion, or staining of sealed substrate. Warranty period indicated is to begin on the date of Substantial Completion.
   1. Warranty Period:
      a. Five (5) years.

1.8 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 60 00 - Product Requirements: Extra materials, spare parts, and maintenance products.
   1. One (1) gallon of each sealant type and color installed at joints between masonry and adjacent work.
   2. One (1) gallon of each sealant type and color installed joints between metal frames and adjacent work.

PART 2 PRODUCTS

2.1 JOINT SEALANTS - GENERAL

A. Fire-Rated Construction Elements and Assemblies: Provide only products that comply with requirements indicated on Drawings and comply with Authorities Having Jurisdiction.

B. Comply with requirements indicated on Drawings and other specification Sections.

C. Exterior Joints:
   1. Seal open joints except open joints indicated on Drawings as not sealed.
   2. Seal the following joints:
      a. Wall expansion and control joints.
      b. Joints between doors, windows, and other frames and adjacent construction.
      c. Joints between different exposed materials.
   3. Do not seal intentional weep holes in masonry or opening frames.

D. Interior Joints:
   1. Do not seal interior joints indicated on Drawings as not sealed.
   2. Do not seal gaps and openings at junction of suspended ceilings to vertical construction unless indicated to be sealed on Drawings or as fire-rating, smoke, or sound control requirements.
   3. Seal open joints except specific open joints indicated on Drawings as not sealed.
   4. Seal the following joints:
      a. Opening Frames: Joints as junction of doors, windows, and access frames to other construction.
      b. Sound and Smoke Control Wall and Ceiling Assemblies:
         1) Gaps at electrical outlets, wiring devices, and piping penetrations.
         2) Joints at junction to other construction.

E. ASTM reference designations for joint sealant Types, Grades, Classes, and Uses:
   1. ASTM C920, Type S: Single component.
   2. ASTM C920, Type M: Multi-components.
   3. ASTM C920, Grade P: Pourable.
   4. ASTM C920, Grade NS: Non-sag.
   5. ASTM C920, Exposure Use T: Traffic.
   6. ASTM C920, Exposure Use NT: Non-traffic.
   7. ASTM C920, Substrate Use G: Glass.
   8. ASTM C920, Substrate Use M: Mortars.
   9. ASTM C920, Substrate Use A: Aluminum.
   10. ASTM C920, Substrate Use O: Other.
   11. ASTM C920, Class XX: Movement capability, percent (single value used when expansion and contraction are equal).
   12. ASTM C920, Class XX/YY: Movement capability, percent (expansion / contraction).
   13. ASTM C834, Type OP: Opaque.
   14. ASTM C834, Grade: Temperature Rating.

2.2 NON-SAG JOINT SEALANTS

A. Type JSS-1: Silicone Joint Sealant, single-component, non-sag, neutral-curing, ASTM C920, Type S, Grade NS, Class 100/50, Use T, NT, G, M, A, and O.
   1. Manufacturers: Products are to comply with requirements.
      a. Dow Chemical Company.
      b. Pecora Corporation.
      c. Tremco Incorporated.
   2. Basis of Design: Dow Chemical Company - DOWSIL 790.
   3. Joint Movement Capability: Plus 100 and minus 50, ASTM C719.
   4. Hardness: 15, Shore A, ASTM C661.
   5. Staining: None on brick, concrete, granite, and limestone.
   6. VOC Content: 26 g/L maximum.
   7. Color:
      a. To be selected by Architect from manufacturer's full range.
   8. Applications: Locations where field painting is not required.
      a. Exterior: Control, expansion, and soft joints in masonry, and between masonry and adjacent work.
      b. Exterior: Control, expansion, and construction joints in vertical cast-in-place concrete.
      c. Exterior: Joints between metal frames and non-masonry work.
      d. Exterior: Joints within framing of aluminum storefront, curtain wall, and window systems.

B. Type JSS-2: Silicone Joint Sealant, single-component, non-sag, neutral-curing, ASTM C920, Type S, Grade NS, Class 50/50, Use NT, G, A, and O.
   1. Manufacturers: Products are to comply with requirements.
      a. Dow Chemical Company.
      b. Pecora Corporation.
      c. Tremco Incorporated.
   2. Basis of Design:
      a. Dow - DOWSIL 795.
   3. SWRI Validation certified.
   4. Joint Movement Capability: Plus and minus 50, ASTM C719.
   5. Hardness: 30 - 35, Shore A, ASTM C661.
   6. Peel Strength: 30 - 32 lb/in, ASTM C794.
   7. Staining: None on brick, concrete, granite, marble, and limestone.
   8. VOC Content: 32 g/L maximum.
   9. Color:
      a. To be selected by Architect from manufacturer's full range.
   10. Applications: Locations where field painting is not required.
      a. Exterior: Lap joints in sheet metal work.
      b. Exterior: Joints between metal frames and non-masonry work.
      c. Exterior: Joints within exterior insulation finish systems (EIFS).
      d. Exterior: Joints for which no other sealant type is indicated.

C. Type JSS-3: Silicone Joint Sealant, mildew resistant, single-component, non-sag, neutral-curing, ASTM C920, Type S, Grade NS, Class 50/50 or 25/25, Use NT, G, M, and A.
   1. Manufacturers: Products are to comply with requirements.
      a. Dow Chemical Company.
      b. Pecora Corporation.
      c. Sika Corporation.
      d. Tremco Incorporated.
   2. Basis of Design:
      a. Pecora - 898NST.

3. Mold and mildew resistant.
4. Non-corrosive to copper, brass, and zinc allows.
5. Fungi Resistance: No growth (less than 2 ug), ASTM G21.
6. Joint Movement Capability: Plus and minus 50 or 25, ASTM C719.
7. Hardness: 25 - 35, Shore A, ASTM C661.
8. Peel Strength: Pass for glass, white marble, granite, and fiberglass, ASTM C794.
9. Staining: None on granite and marble.
10. VOC Content: 50 g/L maximum.
11. Color:
    a. To be selected by Architect from manufacturer's full range.
12. Applications: Locations where field painting is not required.
    a. Interior: Joints between wet area fixtures and floors, walls, and ceilings.
    b. Interior: Joints at through wall plumbing penetrations.

D. Type JSL-1: Siliconized Acrylic Latex Joint Sealant, single-component, non-sag, non-staining, nonbleeding, ASTM C834, Grade OP, Grade -18 Degrees F.
1. Manufacturers: Products are to comply with requirements.
    a. Pecora Corporation.
    b. Sika - Master Builders Solutions.
    c. Tremco Incorporated.
2. Basis of Design:
    a. Sika - MasterSeal NP 520.
3. Overcoat: Paintable.
4. Elongation at Break: 169 percent, ASTM D412.
5. Recovery: 91.3 percent, ASTM C736.
6. Slump: 0 (zero) inch, ASTM D2202.
7. Tensile Strength: 203 psi, ASTM D412.
8. Fire Spread / Smoke Development Index: 10/5, ASTM E84.
9. Sound Transmission Class (STC): 58 db, ASTM E90.
10. VOC Content: 13 g/L maximum.
11. Color:
    a. To be selected by Architect from manufacturer's full range.
12. Applications: Locations where field painting of substrates is required on both sides of joint unless indicated otherwise on Drawings.
    a. Interior: Joints of painted wood.
    b. Interior: Joints of painted gypsum wallboard construction.
    c. Interior: Acoustic sealant in concealed applications.
    d. Interior: Joints of painted substrates for which no other sealant is indicated.

E. Type JSU-1: Polyurethane Elastomeric Joint Sealant, single-component, non-sag, moisture-curing, ASTM C920, Type S, Grade NS, Class 35/35, Use T, NT, M, A, and O.
1. Manufacturers: Products are to comply with requirements.
    a. Pecora Corporation.
    b. Sika USA.
    c. Tremco Incorporated.
2. Basis of Design: Sika - Sikaflex-1A.
3. SWRI Validation certified.
4. Overcoat: Paintable.
5. Joint Movement Capability: Plus and minus 35, ASTM C719.
6. Hardness: 25 - 45 Shore A, ASTM C661.
7. Peel Strength: 20 lb/in, ASTM C794.
8. Tensile Strength: 175 psi at 21 days, ASTM D412.
9. Elongation: 550 percent, ASTM D412.
10. Service Temperature: Minus 40 to 170 degrees F.

11. VOC Content: 37 g/L maximum, ASTM D3960.
12. Color:
    a. To be selected by Architect from manufacturer's full range.
13. Applications: Locations where field painting of substrates is required on both sides of joint unless indicated otherwise on Drawings.
    a. Interior: Joints in concrete and concrete panels.
    b. Interior: Joints on underside of concrete planks and panels.
    c. Interior: Joints in unit masonry.
    d. Interior: Joints between metal frames and adjacent construction.
    e. Interior: Traffic joints in floors and at junction of floors to walls.

2.3 SELF-LEVELING JOINT SEALANTS

A. Type JSS-3: Self-Leveling Silicone Joint Sealant, single-component, neutral-curing, ASTM C920, Type S, Grade P, Class 100/50, Use T, M, A, and O.
1. Manufacturers: Products are to comply with requirements.
    a. Dow Chemical Company.
    b. Pecora Corporation.
    c. Tremco Incorporated.
2. Basis of Design:
    a. Pecora - 300 SL (Self-Leveling).
3. Joint Movement Capability: Plus 100 and minus 50, ASTM C719.
4. Hardness: 15, Shore A, ASTM C661.
5. Elongation at Break: 1,400 percent, ASTM D412.
6. Service Temperature: Minus 40 to 180 degrees F.
7. Color:
    a. To be selected by Architect from manufacturer's full range.
8. Applications: Locations where field painting is not required.
    a. Exterior: Control, construction, and expansion joints in concrete paving and between concrete and asphalt paving.

2.4 ACCESSORIES

A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

C. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specified sealant, 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.

D. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

E. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify substrate surfaces and joint openings are as required and ready to receive work.

C. Verify that accessories are as required by sealant manufacturer and are compatible with sealant and application surfaces.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of Work of this Section. Prepare materials to be installed and equipment used during installation.

B. Remove loose materials and foreign matter impairing adhesion of sealant.

C. Clean and prime joints.

D. Perform preparation in accordance with ASTM C1193.

E. Protect elements surrounding Work of this Section from damage or disfiguration.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Perform installation in accordance with ASTM C1193.

C. 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.

D. Apply masking tape to protect adjacent surfaces and to form uniform sealant edge.

E. Install bond breaker backing tape where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces or other construction.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool sealant surface concave, unless otherwise indicated and remove masking tape at appropriate time to form uniform sealant edge and as to not mar substrate beneath.

3.4 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect sealants until cured.

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes expansion joint cover assemblies for floor, wall and ceiling surfaces.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Execution requirements for placement of joint assembly frames specified in this Section in masonry.
   2. Section 07 90 00 - Joint Protection: Expansion and control joint finishing utilizing sealant and bond breaker.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
   2. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
   3. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.

B. Intertek Testing Services (ITS):
   1. ITS (DIR) - Directory of Listed Products; Current Edition.

C. Underwriters Laboratories Inc. (UL):
   1. UL (Dir) - Online Certifications Directory; Current Edition.
   2. UL (FDR) - Fire Resistance Directory; Current Edition.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Product Data: Submit joint assembly profiles, profile dimensions, anchorage devices, and manufacturer’s full range and custom range of colors and finishes.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of work, affected adjacent construction, and anchorage locations.

D. Samples for Initial Selection: Submit two samples of manufacturer’s full range of colors and finishes for Architect’s initial selection.
   1. For Exterior Wall Applications: Allow for custom color selection by Architect.

E. Samples for Verification: Submit two samples 6 inches long, illustrating profile, dimension, color, and finish selected from Architect’s initial selection.
   1. For Exterior Wall Applications: Allow for custom color selection by Architect.

F. Manufacturer’s Installation Instructions: Submit rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Architectural Art Mfg., Inc.
   2. Balco, Inc.
   3. Watson Bowman Acme Corporation.
   4. Construction Specialties, Inc.
   5. MM Systems Corporation.
   6. Nystrom, Inc.

B. Basis of Design: MM System Corporation.

2.2 APPLICATIONS

A. Colors to be as selected by Architect from manufacturer's full range, unless indicated otherwise.

B. Interior Joints:
   1. Floor to Floor Joints: Flushline System FSS Series.
   2. Wall to Wall Masonry Joints: ESS Series.
   3. Wall to Wall Masonry Corner Joints: ESS Series.
   4. Wall to GWB Ceiling Joints: VSGL Series.
   5. Wall to Acoustic Ceiling Joints: VSGL Series.
   6. Inline Acoutstic Ceiling Joints: VSG Series.

C. Exterior Joints:
   1. Wall to Wall Masonry Joints: ESS Series.
   2. Wall to Wall Masonry Corner Joints: ESS Series.

D. Fire Rated Expansion and Seismic Joints: Pyro-Flex Fire Barrier.
   1. Provide cover assembly labled to have fire rating equivalent to that required for constructed joint.
      a. Acceptable Evaluation Agencies: UL, ULC, and Intertek.

2.3 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on Drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Joint Cover Styles: As indicated in the Applications Article of this Section and as indicated on Drawings.
   4. Joint Movement Capability: If not indicated, provide minimum plus/minus 50 percent joint movement capability.
   5. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   6. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.
   1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
   2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and minimize exposed metal.

C. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not collect dirt.

D. Covers In Fire Rated Assemblies: Provide cover assembly labeled to have fire rating equivalent to that required for constructed joint.
   1. Acceptable Evaluation Agencies: UL, ULC, and Intertek.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
   1. Colors: As selected by Architect from manufacturer's full range of finishes.

B. Anchors and Fasteners:
   1. Exterior Applications: Stainless steel as recommended by cover manufacturer.
   2. Interior Applications at Cementitious Substrates: Stainless steel as recommended by cover manufacturer.
   3. Interior Applications at Non-Cementitious Substrates: As recommended by cover manufacturer.

C. Backing Paint: Asphaltic type.

D. Sealant: Silicone, color to match preformed expansion joint color.

2.5 FABRICATION

A. Joint Covers: Aluminum cover plate, designed to permit plus or minus 50 percent joint movement with full recovery, surface mounted.

B. Back paint components in contact with cementitious materials or dissimilar metals.

C. Shop assemble components and package with anchors and fittings.

D. Furnish joint components in single continuous length wherever practical. Minimize site splicing.

2.6 FACTORY FINISHING

A. As selected by Architect from manufacturer's full range of finishes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Examine substrates for conditions detrimental to installation of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

D. Verify that joint sealant system has been installed before application of rigid joint cover assembly.

E. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Provide anchoring devices for installation and embedding.

D. Provide templates and rough-in measurements.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install components and accessories in accordance with manufacturer's instructions.

C. Align materials and cover assemblies as indicated on the Drawings.

D. Align work plumb and level, flush with adjacent surfaces.

E. Rigidly anchor to substrate to prevent misalignment.

F. Where indicated, apply field sealant to exterior joint material, both sides of joint.

3.4 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer’s recommendations.

B. Clean installed work in accordance with manufacturer’s recommended materials and procedures.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Do not permit traffic over unprotected floor joint surfaces.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Non-fire-rated hollow metal doors and frames.
   2. Fire-rated hollow metal doors and frames.
   3. Hollow metal frames for wood doors and door types other than steel doors.
   4. Hollow metal borrowed lites glazing frames.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Wall construction type. Masonry grout fill of metal frames and placement of anchors into masonry wall construction.
   2. Section 08 14 16 - Flush Wood Doors: Wood doors for metal frames.
   3. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.
   4. Section 08 80 00 - Glazing: Glass for doors and lite frames.
   5. Section 09 21 16 - Gypsum Board Assemblies: Wall construction type.
   6. Section 09 90 00 - Painting and Coating: Field painting.

1.2 REFERENCES

A. Americans With Disabilities Act (ADA):
   1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; Current Edition.

B. American National Standards Institute (ANSI) and Steel Door Institute (SDI):
   1. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
   2. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.
   3. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames; 2023.
   4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

C. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
   2. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2019.
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

D. International Code Council (ICC):
   1. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

E. Intertek Testing Services (ITS):
   1. ITS (DIR) - Directory of Listed Products; Current Edition.

F. National Fire Protection Association (NFPA):
   1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives: 2022.
   2. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

3. NFPA 105 - Standard for Smoke Door Assemblies and other Opening Protectives; 2022.
4. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
5. NFPA 257 - Standard On Fire Test For Window And Glass Block Assemblies; 2022.

G. Steel Door Institute (SDI):
1. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

H. Underwriters Laboratories Inc. (UL):
1. UL (DIR) - Online Certifications Directory; Current Edition.
2. UL 9 - Standard for Safety Fire Tests of Window Assemblies; Current Edition, Including All Revisions.
3. UL 10B - Standard for Safety Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
4. UL 10C - Standard for Safety Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
5. UL 1784 - Standard for Safety Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate fire rating of metal frames to fire rating requirements of doors and wall construction for compliance with overall fire rated separation requirements.

C. Coordinate Work with the requirements of frame and door opening construction, door hardware, and glazing.

D. Coordinate frames to accommodate various glazing types, door types and hardware requirements as indicated in the Drawings and other specification sections.

E. Coordinate door frames and anchors with adjacent wall construction which may include, but not be limited to, masonry and framed wall construction with various finish types.

F. Coordinate fabrication of doors and frames to include factory installed steel plate reinforcing for required hardware devices as indicated in this Section and in Section 08 71 00 for each door and frame. Reinforcing to comply with ANSI/SDI A250.8 and ANSI/SDI A250.6.

G. Coordinate fabrications and sequence installation to accommodate required door hardware electric wire connections.

1.4 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene at project site minimum one week prior to commencing work of this section.

C. Require attendance of Architect, Owner, Owner’s Locksmith and installers of doors, frames, hardware, access control systems, electrical and walls.

D. Review specification section and cited standards for this Work and Work of related installers; verify submittal approvals and outstanding issues; verify qualifications including qualifications of Contractor's inspectors.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer’s product data describing products and components. Include sample of each warranty specified.

C. Shop Drawings: Indicate materials and details of design and construction; hardware locations; reinforcement type and locations; anchor types, spacing, locations and fastening methods; door and frame elevations and assemblies; glazing; fire rating; smoke and draft control; and finishes.

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.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section with at least five (5) years documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three (3) years documented experience.

D. Maintain at project site copies of reference standards relating to installation of products specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept frames and doors on site in manufacturer’s packaging. Inspect for damage.

C. Comply with manufacturer’s recommendation and ANSI/SDI A250.8 in accordance with specified requirements.

D. Protect with resilient packaging; prevent against humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Furnish manufacturer’s five (5) year warranty for fire rated and for smoke and draft control assemblies.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door - Assa Abloy.
   2. Curries - Assa Abloy.
   3. Fleming Door Products - Allegion.
   4. Pioneer Industries.
   5. Republic Doors - Allegion.
   6. Steelcraft - Allegion.

7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 REGULATORY REQUIREMENTS

A. Regulatory requirements in this Article are minimum requirements, unless requirements by authorities having jurisdiction are more stringent. Comply with the most stringent requirements.

B. Fire Rated Assemblies:
   1. Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated.
   2. Fire Rating: As indicated on Drawings, tested in accordance with UL 10C and NFPA 252 (positive pressure fire tests).
   3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
      a. Attach fire rating label to each fire rated unit.
   4. Temperature-Rise Rating (TRR) Across Framed Door Thickness: In accordance with local building code and authorities having jurisdiction.

C. Smoke and Draft Control Assemblies:
   1. Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Locations as indicated on Drawings.
   3. Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire rated doors, and as follows:
      a. Maximum Air Leakage: 3.0 cfm/sq ft (0.02 cu m/sec/sq m) of door opening at 0.10 inch w.g. (24.9 Pa) pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
      b. Gasketing: Provide gasketing and edge sealing as necessary to achieve leakage limit.
      c. Label: Include the "S" label on fire-rating label of door.

D. Fire Rated, Borrowed-Lite Assemblies:
   1. Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire protection ratings.
   2. Fire Rating: As indicated on Drawings, tested in accordance with UL 9 and NFPA 257.

E. Accessibility: Comply with ICC A117.1 and ADA Standards.

2.3 HOLLOW METAL DOORS AND FRAMES

A. Standard and custom shop fabricated hollow metal doors and frames; fire rated and smoke and draft control assemblies; refer to Drawings and this Section for sizes and configurations.

B. Finish for doors and frames:
   1. Factory primed and field finished. Refer to 09 90 00 - Coating and Painting for field finish.

C. Interior Doors: ANSI/SDI A250.8, 1-3/4 inch thick.
   1. Level 3 - Extra Heavy Duty; door face 0.053 inch (16 gauge) thick steel, minimum.
   2. Model 2 (seamless), unless indicated otherwise on Drawings.
   3. Physical Performance: Level A (1,000,000 cycles), in accordance with ANSI/SDI A250.4.
   4. Door Face Sheet: Flush.
   5. Door Core:

a. Manufacturer's standard core material/construction and in compliance with requirements.

6. End Closures: Steel channel type; 0.042 inch thick; flush with door faces and edges.
7. Fire-Rating and Smoke and Draft Control: As indicated on Drawings and in compliance with REGULATORY REQUIREMENTS in this Section.

D. Interior Frames: ANSI/SDI A250.8.
1. Level 3 - Extra Heavy Duty; 0.053 inch (16 gauge) thick steel, minimum.
2. Joinery of Frame Members:
a. Full profile continuously welded type.
3. Fire-Rating and Smoke and Draft Control: As indicated on Drawings and in compliance with REGULATORY REQUIREMENTS in this Section.

E. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on Drawings. Non-removable stops on non-secured side of frame.

2.4 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; steel coating and finish same as door components; factory installed.
1. In Fire-Rated Doors: UL (DIR) or ITS (DIR) listed fusible link louver, same rating as door.
2. Style: Standard straight slat blade, unless indicated otherwise on Drawings.
3. Louver Free Area: Comply with air flow requirements.
4. Fasteners: Concealed fasteners.

B. Glazing: As specified in Section 08 80 00 - Glazing; factory installed.

C. Removable Glazing Stops: Rolled steel channel shape, mitered, or butted corners; prepared for countersink type screw holes and screws.

D. Frame Anchors:
1. Masonry Walls: Masonry strap type; three holes in strap; galvanized.
2. Metal Stud Walls: Steel stud channel type.
3. Base Anchor: Fixed base type.

E. Astragals for Double Doors: Comply with requirements of door operation and fire rating and smoke and draft control.

F. Hollow Metal Fixed Panels: If indicated on Drawings, provide panels of same construction, performance, and finish as doors.

G. Silencers: Specified in Section 08 71 00.

H. Weatherstripping: Specified in Section 08 71 00.

2.5 FABRICATION

A. Fabricate doors and frames to comply with fire rating and smoke and draft control indicated on Drawings.

B. Fabricate doors and frames with hardware reinforcement welded in place. Comply with ANSI/SDI A250.8 and ANSI/SDI A250.6. Protect frame hardware preparations with mortar guard boxes.

C. Fabricate frames to accommodate various glazing types, door types and hardware requirements as indicated in the Drawings and other specification sections.

D. Fabricate frames and anchors to suit indicated adjacent wall and floor construction which may include, but not be limited to, concrete, masonry, and framed wall construction with indicated finish types.

E. Fabricate frames to suit masonry wall coursing with head member height as required to fill opening without cutting masonry units.

F. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

G. Prepare interior frames for silencers or other seal devices for achieving fire rating and smoke and draft control requirements.

H. Kerfed Frames: Provide kerfed-style frames where required by door seal hardware such as smoke gasketing, sound gasketing or weatherstripping.

I. Frame Silencers and Weatherstripping:
   1. Interior Frames: Prepare frames for silencers. Provide three single silencers for single doors on strike side. Provide two single silencers on frame head at double doors without mullions.
   2. Exterior Frames: Configure exterior frames with profile to receive recessed weatherstripping.

J. Frame Mullions for Double Doors: Removable type, with profile matching jambs.

K. Frame Transom Bars for Glazed Lights: Fixed type, integral with adjacent frame construction and with profile matching jamb and head.

L. Attach fire rating label to each fire rated door and frame.

M. Attach label to each hollow metal door and frame indicating A-60 Galvannealed.

2.6 SHOP FINISHING

A. Steel Sheet: Galvanized to ASTM A653/A653M, A60.

B. Primer: Baked. ANSI A250.10 rust inhibitive type.

C. Bituminous Coating: Fibered asphalt emulsion. Coating inside of frames to be set in masonry walls or otherwise grouted solid with cementitious grout. Apply coating after fabrication and after primer has cured.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify existing conditions before starting work.

C. Verify opening sizes and tolerances are acceptable.

D. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

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

3.3 INSTALLATION

A. Install doors and frames in accordance with ANSI/SDI A250.8.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate installation of doors and frames with indicated types of doors, electrical connections, hardware and glazing panels that are specific to each opening as indicated on the Drawings and in the Specifications.

D. 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 A250.8 and ANSI/SDI A250.6.

E. Coordinate installation of door frames and anchors with indicated adjacent wall and floor construction which may include, but not be limited to, concrete, masonry, and framed wall construction with indicated finish types.

F. Grout solid, frames in masonry construction. Prior to grouting, provide bracing sufficient so that pressure of grout will not deform frames.

G. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

H. Comply with glass and glazing installation requirements in Section 08 80 00.

I. Adjust door for smooth and balanced door movement and latching.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Comply with tolerances and clearances indicated in SDI 117.

C. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.5 SCHEDULE

A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION

SECTION 08 11 16.10

ALUMINUM DOORS WITH FRP FACE PANEL

PART 1 GENERAL

1.1 SUMMARY

A. Section includes aluminum doors with fiberglass reinforced plastic (FRP) face panels.

B. Related Requirements:
   1. Section 07 90 00 - Joint Protection: Frame perimeter sealants.
   2. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts: Frames requiring FRP faced doors.
   3. Section 08 44 13 - Glazed Aluminum Curtain Walls: Frames requiring FRP faced doors.
   4. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
   5. Section 08 80 00 - Glazing.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
   2. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
   3. 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. ASTM International (ASTM):
   1. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
   2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
   4. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014, Reapproval 2021.
   5. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000, Reapproval 2023.

1.3 SYSTEM DESCRIPTION

A. Aluminum framed entrance system with aluminum doors faced with fiber reinforced polyester faces.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

C. Product Data: Submit component dimensions; describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

D. Samples for Initial Selection: Two manufacturer's complete set of color samples illustrating the full range of finishes and colors available. Include samples for FRP surfaces, aluminum frame finishes, glass units, infill panels, glazing materials. Submit for Architect's initial selections.

E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples to be same product material type indicated for final Work; each sample 8 x 8 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

B. Installer: Company specializing in performing work of this section with minimum five (5) years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.7 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Furnish ten (10) year manufacturer's warranty for doors and frames systems.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
   1. To design pressure of 6.24 lb/sq ft, as tested in accordance with ASTM E330/E330M.

B. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

C. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.

2.2 ALUMINUM DOORS WITH FRP FACE PANEL

A. Manufacturers:
   1. Eliason Corporation.
   2. Kawneer Co., Inc.

3. Oldcastle Building Envelope.
4. Special-Lite, Inc.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. Flush Aluminum Doors with Fiberglass Reinforced Plastic (FRP) Face Sheets: Aluminum internal framing; no steel components.
   1. Size: As indicated on Drawings.
   2. Thickness: 1-3/4 inches (44 mm).
   3. Stiles and Rails:
      a. Stiles: As indicated on Drawings, but not less than 5-1/2 inches wide, reinforced minimum 3/16 inch thick.
      b. Top and Bottom Rails: As indicated on Drawings, but not less than 6 inches wide, reinforced minimum 3/16 inch thick.
   4. Facing: Seamless, ultraviolet stabilized laminated FRP sheet.
      a. Sheet Thickness: 0.12 inch (3 mm), minimum.
      b. FRP Texture:
         1) Pebble grain.
      c. 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.
      d. Color: To be selected by Architect from manufacturer's full range.
   5. Core Insulation: Poured-in-place polyurethane foam insulation of not less than 5 lb/cu ft (80 kg/cu m) density.
   6. Hardware Reinforcement: Provide minimum internal 3/16 inch steel reinforcement.
   7. Aluminum Finish and Color:
      a. Match door frame finish and color.

C. Hardware:
   1. Coordinate with Section 08 71 00 - Door Hardware; provide door hardware for types of doors, applications, and hardware indicated:
      a. Weatherstripping: Wool pile, continuous and replaceable.
      b. Hinges: Continuous type, non-removable pin.
         1) Specified in Section 08 71 00.
      c. Threshold: Extruded aluminum, one piece for each door opening, ribbed surface.
         1) Specified in Section 08 71 00
      d. Panic Device: Specified in Section 08 71 00.
      e. Closer: Specified in Section 08 71 00.
      f. Lock Cylinders: Specified in Section 08 71 00.
      g. Finish: Hardware finish to match door aluminum finish.

D. Glazing Panels: Manufacturer’s integral aluminum frame, factory gasket glazed, and allowing for thermal movement. requirements.
   1. Interior Doors: 1/4 inch thick tempered glass.
   2. Exterior Doors: 1 inch thick insulated glazing unit; tempered glass.
   3. Refer to Section 08 80 00 - Glazing.

E. Fasteners and Anchors: Stainless steel.

2.3 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Prepare components with heavy duty internal reinforcement for door hardware.

F. Reinforce framing members for imposed loads.

2.4 ALUMINUM MATERIALS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical or 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209/B209M, 5005 alloy, H15 or H34 temper.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Examine substrates for conditions detrimental to installation of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Examine products to be installed for damage and other conditions detrimental to completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Verify dimensions, tolerances, and method of attachment with other Work.

E. Verify wall openings are ready to receive Work of this Section.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

G. Set thresholds in bed of mastic and secure.

H. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

I. Install infill panels using method required to achieve performance criteria.

J. Coordinate installation of perimeter sealants with Section 07 90 00.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.5 ADJUSTING

A. Section 01 73 00 - Execution: Adjusting requirements.

B. Adjust door for smooth and balanced door movement and latching.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures.

B. Clean installed work and comply with manufacturer's recommendations.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed construction from damage.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Flush wood doors.

B. Related Requirements:
   1. Section 08 11 13 - Hollow Metal Doors and Frames: Metal frames for wood doors indicated to be installed in metal frame.
   2. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts: Aluminum frames for wood doors indicated to be installed in aluminum frame.
   3. Section 08 71 00 - Door Hardware.
   4. Section 08 80 00 - Glazing.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
   2. ASTM E413 - Classification for Rating Sound Insulation; 2022.

B. Architectural Woodwork Institute (AWI), Architectural Woodwork Manufacturers Association of Canada (AWMAC), Woodwork Institute (WI):
   1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, Errata 2016.

C. Architectural Woodwork Institute (AWI):
   1. AWI (QCP) - Quality Certification Program; Current Edition.

D. California Air Resource Board (CARB):
   1. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; Current Edition.

E. National Fire Protection Association (NFPA):
   1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
   2. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

F. Underwriters Laboratories Inc. (UL):
   1. UL (Dir) - Online Certifications Directory; Current Edition.
   2. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
   3. UL 1784 - Standard for Safety Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Provide the necessary framing, blocking, and backing in walls and ceilings adequate for anchorage the Work.

C. Coordinate Work with door opening construction, door frame and door hardware.

D. Coordinate fire rating of metal frames to fire rating requirements of doors and wall construction for compliance with overall fire rated separation requirements.

E. Coordinate frames with smoke and draft control doors to comply with overall assembly requirements.

F. Coordinate frames with sound rated doors to comply with overall assembly requirements.

1.4 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section. Review the work requirements, project conditions, sequencing, application procedures, quality control, testing and inspection and production schedule.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type, and characteristics.

C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.
   1. Provide information as required by AWI/AWMAC/WI (AWS).
   2. Include AWI (QCP) certification program label and project registration identification.

D. Samples for Initial Selection: Two sets of manufacturer's samples; each 2 x 4 inches; illustrating the full range of wood grains, stain colors and sheens available for products with factory-applied finishes; submit for Architect’s initial selections.

E. Samples for Verification: From the Architect’s initial selections, prepare two samples for each selected finish, color, and sheen; on same product material type indicated for final Work; each 8 x 10 inches. Where finishes involve normal finish, color, sheen, and texture variations, include sample sets showing the full range of variations expected.

F. Manufacturer’s Installation Instructions: Submit special installation instructions.

G. Manufacturer's Qualifications Statement.

H. Installer's Qualifications Statement.

I. Specimen warranty.

1.6 CLOSEOUT SUBMITTALS

A. Warranties executed in Owner's name.

B. AWI (QCP) - Quality Certification Program certificates.

1.7 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standards on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with not less than five (5) years of documented experience.
   1. Accredited participant in AWI (QCP) - Quality Certification Program prior to commencement of fabrication and throughout the duration of the project.

C. Installer Qualifications: Company specializing in performing work of the type specified in this Section, with not less than five (5) years of documented experience.

D. Comply with AWI/AWMAC/WI (AWS) standards and grades indicated, unless otherwise specified or indicated.
   1. Grades indicated are minimum requirement. Where the Contract Documents indicate elements of the work requirements that exceed the minimum grade indicated, comply with the Contract Documents regarding that element of the work.

E. Comply with AWI (QCP) - Quality Certification Program requirements.
   1. AWI (QCP) quality certification:
      a. Register project and comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this Section.
      b. Provide labels or certificates indicating that installed complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
      c. Provide designated labels on shop drawings and installed products as required by certification program.
      d. Submit certifications upon completion of installation that verifies the work complies with specified requirements.

F. Attach labels from certifying agencies approved by authority having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Package, deliver, and store doors in accordance with AWI/AWMAC/WI (AWS) standards, and door manufacturer requirements.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Environmental Limitations: Comply with AWI/AWMAC/WI (AWS) standards and as follows.
   1. Do not deliver or install doors until building space is enclosed and weathertight, wet work is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period. Allow minimum of 72 hours for delivered materials to acclimate to the climate controlled building space before beginning installation.

1.10 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.

B. Furnish manufacturer's "Life of Installation" warranty for interior doors, including hanging and finishing if door(s) do not comply with warranty tolerance standards.
   1. Include coverage for defective materials, delamination, warping, cupping, bowing, and telegraphing of core construction beyond specified installation tolerances.

1.11 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 60 00 - Product Requirements: Extra materials, spare parts, and maintenance products.
   1. One (1) gallon of each type stain and finish coating system used to finish doors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Forte Opening Solutions (Formerly Masonite International Architectural).
   2. Oshkosh Architectural Door Company.
   3. Oregon Door.
   4. VT Industries.
   5. Substitutions: Section 01 60 00 - Product Requirements.

2.2 FLUSH WOOD DOORS - INTERIOR

A. Grade:
   1. Custom.

B. Performance:
   1. Extra Heavy Duty.

C. Door Size and Configuration:
   1. Thickness: 1-3/4 inches thick unless otherwise indicated on Drawings.
   2. Size: As indicated on Drawings.
   3. Glass Panel: As indicated on Drawings.

D. Non-Rated and 20-min Rated Doors:
   1. Solid Core: Type PC-5, particleboard core, 5-ply.

E. Fire Rated Doors: Tested to fire ratings indicated on Drawings in accordance with UL 10C-Positive Pressure; UL labeled without any visible seals when door is closed.
   1. Solid Core: Type FD-5 rating as scheduled; Category A for positive pressure fire test, 5-ply.

F. Wood Veneer Facings:
   1. Species:
      a. Red Oak.
   2. Veneer Cut:
      a. Plain sliced.
   3. Veneer Adjacent Leaf Matching:
      a. Slip match.
   4. Veneer Panel Leaf Matching:
      a. Balance match.
   5. Doors Matching:
      a. Pair match.
      b. Set match doors within 1 foot of each other (doors closed).
   6. Doors With Transom Matching:
      a. End match.
   7. Finish:
      a. Shop applied transparent over stain.

2.3 FABRICATION

A. Bonding Adhesive: Type I - Waterproof.
   1. Compliant with CARB (ATCM) for ultra-low emitting formaldehyde (ULEF).

B. Provide solid core blocking reinforcement for hardware applications and as follows:
   1. Lock blocks.
   2. Top rail block for closer.
   3. Center rail for exit bar.

4. Bottom rail block for kickplates.
5. Hardware through bolt blocks.

C. Edges For Veneered Doors:
1. Vertical Edges: Minimum 7/16 inch hardwood laminated to 1 inch (25mm) structural composite lumber and bonded to door core. Exposed hardwood edge species and finish to match door face veneer.
2. Horizontal Edges: Minimum 1-7/16 inch structural composite lumber and bonded to door core.

D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Furnish solid blocking for surface mounted and through bolted hardware.
1. Comply with hardware requirements indicated on Drawings and as specified in Division 08 for the specifications.
2. Include machine work required for securing door perimeter seals.

E. Door and Frame Fit: Fabricate doors so that door edge clearances of installed doors comply with AWI/AWMAC/WI (AWS) standards.

2.4 FINISHES

A. Shop Applied Finish:
1. Transparent System - 5, Conversion Varnish.
a. Sheen to be as selected by Architect from full range of options.
2. Stain Color:
a. As selected by Architect from full range of colors.

B. Seal door top edge with color sealer to match door facing.

2.5 ACCESSORIES

A. Hardware: As specified in Section 08 71 00 - Door Hardware.

B. Door Frames: As indicated on Drawings.

C. Door Louvers: Size to be as indicated on Drawings.
1. Metal Louvers:
a. Material and Finish: Roll formed steel; pre-painted finish; color as selected by Architect from full range of options.
b. Louver Blades:
1) Inverted V shape.
2) Fire rated to match door with fusible link design to UL (DIR) requirements.

D. Door View Panels: Size to be as indicated on Drawings.
1. Glazing: As indicated on Drawings, but not less than 1/4 inch (6.4 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
2. Wood Frame:
a. Glazing Stops: Solid wood material, of same species and finish as door facing, lip profile; mitered corners; fasteners to be countersunk, fill and finish to match glazing stop finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify 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.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Comply with AWI/AWMAC/WI (AWS) standards and Grade indicated, and manufacturer's requirements, unless otherwise specified or indicated.
   1. Fire Rated Doors: Comply with NFPA 80, and fire ratings as indicated on Drawings.

C. Coordinate installation of doors with installation of frames and hardware.

D. Install door louvers and vision panels plumb and level.
   1. Wood Glazing Stops: Countersink fasteners, fill and finish to match glazing stop finish.

3.4 INSTALLATION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Comply with AWI/AWMAC/WI (AWS) standards and Grade indicated, unless otherwise specified or indicated.

C. Maximum Vertical or Horizontal Distortion (Bow or Cup): Maximum 1/8 inch measured at center distance from any edge or corner of door.

D. Comply with AWI/AWMAC/WI (AWS) tolerance requirements and as follows:
   1. Telegraph: Maximum 0.010 inch in any 3 inch span.
   2. Warp: Maximum 0.125 inch per 7 feet of door section.
   3. Squareness: Maximum diagonal variance of 1/8 inch.
   4. Door to Frame Fit and Clearance: 0.125 inch gap.

3.5 ADJUSTING

A. Section 01 73 00 - Execution: Adjusting.

B. Adjust door for smooth and balanced door movement and latching.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer’s recommendations.

B. Clean installed work in accordance with manufacturer’s recommended materials and procedures.

3.7 SCHEDULE

A. Door types and locations to be as indicated on Drawings.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire resistive rated and non-rated access doors and panels with frames.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Placement of access frame unit anchors in masonry partitions.
   2. Section 08 71 00 - Door Hardware: Coordinate with locks and keying requirements.
   3. Section 09 21 16 - Gypsum Board Assemblies: Placement of access frame unit anchors in gypsum board partitions.
   4. Section 09 90 00 - Painting and Coating: Field paint finish.
   5. Divisions of Work such as plumbing, HVAC and electrical construction requiring access doors.

1.2 REFERENCES

A. Intertek Testing Services (ITS):
   1. ITS (DIR) - Directory of Listed Products; Current Edition.

B. National Fire Protection Association (NFPA):
   1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

C. Underwriters Laboratories Inc. (UL):
   1. UL (FDR) - Fire Resistance Directory; Current Edition.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate the work of this Section with the work and devices requiring access to controls, valves, traps, dampers, cleanouts, and similar items located behind finished surfaces, but requiring operation and maintenance. Provide access doors and frames for such access.

C. Coordinate exact locations with various trades and local code requirements to assure proper placement of access doors and panels.

D. Coordinate locks and keying with requirements indicated in Section 08 71 00 - Door Hardware.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.

C. Shop Drawings: Indicate exact position of each access door units. Indicate sizes that are at variance with sizes indicated and request Architect's approval.

D. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Project Record Documents: Provide drawings and schedule indicating locations of installed access units.

1.6 QUALITY ASSURANCE

A. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly in which access doors and frames are being installed.
   1. Provide products listed by ITS (DIR) or UL (FRD) as suitable for the purpose indicated. Attach labels identifying certification.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Manufacturers:
   1. Acudor Products, Inc.
   2. Cendrex, Inc.
   3. JL Industries of Activar Construction Products Group, Inc.
   4. Karp Associates, Inc.
   5. Nystrom, Inc.
   6. Milcor LTD, Partnership.
   7. Substitutions: Section 01 60 00 - Product Requirements.

B. Flush Framed Access Doors (Type 1): Frames and nominal 1 inch wide exposed flanges of 16 gage steel and door panels of 14 gage steel.

C. Gypsum Board Access Doors (Type 2): Frames and nominal 1 inch wide flanges of 16 gage steel and door panels of 14 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09 21 16.

D. Fire Rated Access Doors (Type 3): Frames and nominal 1 inch wide exposed flanges of minimum 16 gage steel and door panels of 20 gage steel. Provide self-closing and latching doors with keyed lock to match cylinders specified in Section 08 71 00.

E. Gypsum Board Fire Rated Access Doors (Type 4): 16 gage steel frames with minimum 22 gage galvanized steel drywall bead flanges and door panels of 20 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09 21 16. Provide self-closing and latching doors with keyed lock to match cylinders specified in Section 08 71 00.

2.2 FABRICATION

A. Factory fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.

B. Wall and Ceiling Access Door and Panel Hardware:
   1. Hinges: Standard continuous or concealed spring pin type, 175 degree steel hinges.
   2. Latches and Locks:
      a. Screwdriver Operated Latches:
         1) Locations: Non-public secured rooms such as mechanical, electrical, HVAC, and plumbing equipment rooms.
      b. Keyed Locks: Provide keyed locks. Keyed locks to match cylinders specified in Section 08 71 00.

1) Locations: All locations accessible to public and not indicated to be otherwise.

2.3 FINISHES

A. Base Metal Protection: Factory apply baked-on primer coat that is compatible with indicated finish system.

B. Finish System: Field paint after installation to match adjacent material finish. Refer to Section 09 90 00 - Painting and Coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Examine substrates for conditions detrimental to installation of the work. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify rough openings for access doors and panels are correctly sized and located.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install units in accordance with manufacturer's instructions.

C. Install frames plumb and level in openings, and secure units rigidly in place.

D. Position units to provide convenient access to concealed equipment when necessary.

E. Set concealed frame type units flush with adjacent finished surfaces.

F. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

3.4 ADJUSTING

A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

B. Adjust opening/closing and latch operation to smooth operation.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer’s recommendations.

B. Clean installed work in accordance with manufacturer’s recommended materials and procedures.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protect installed construction.

END OF SECTION

SECTION 08 33 13
COILING COUNTER DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Overhead coiling counter doors.

B. Related Requirements:
   1. Section 08 71 00 - Door Hardware: Lock cylinder type.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2023.
   2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
   3. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
   4. ASTM D7091 - Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals; 2022.

B. National Association of Architectural Metal Manufacturers (NAAMA):
   1. NAAMM AMP 500 - Metal Finishes Manual; 2006.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit general construction, component connections and details.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect’s initial selections.

E. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 8 inches long. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Manufacturer’s Installation Instructions: Indicate installation sequence and procedures, and adjustment and alignment procedures.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 78 23 - Operation and Maintenance Data.

B. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.6 WARRANTY

A. Warranty: Manufacturer's warranty that all parts and components, except counterbalance spring and finish, are to be free from defects in materials and workmanship for five (5) years. Counterbalance springs to be warrantied for one (1) year.

1.7 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 60 00 - Product Requirements: Extra materials, spare parts, and maintenance products.
   1. Five (5) each of prefinished door slats for each door unit installed.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Design and install overhead coiling door system to withstand the effects of earthquake motions in accordance with ASCE 7 and the local authorities having jurisdiction.

B. Operation Cycles: Design complete door assembly including operator for usage of up to 20 cycles per day.

C. Manual Operation: Manual hand crank lift or push up unit with overhead counterbalance device, requiring 25 lbs nominal force to operate.

D. Source Limitations: Provide overhead coiling doors from one manufacturer for each type of door. Provide operators and other accessories from source acceptable to overhead coiling door manufacturer.

2.2 COILING COUNTER DOORS

A. Manufacturers:
   1. C.H.I. Overhead Doors.
   2. Cookson Doors.
   3. Cornell Doors.
   4. Overhead Door Corporation.
   5. Raynor Garage Doors.
   6. Wayne-Dalton, a Division of Overhead Door Corporation.
   7. Substitutions: Section 01 60 00 - Product Requirements.

B. Basis of Design:
   1. Cookson Doors - Model ESC10.

2.3 COMPONENTS

A. Curtain:
   1. Slat Material:
      a. Aluminum Slats: Extruded aluminum; ASTM B221, alloy 6063, temper T5.
         1) Thickness:

a) 16 gauge (0.050 inch) minimum.

2. Slat Profile: Single thickness flat slat.
3. Slat Size: Nominal 1-1/2 or 2 inches wide by required length.
4. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
5. Curtain Bottom: Rectangular tube shape bottom bar fitted with a continuous vinyl bumper to protect finished sill top or countertop; material and finish to match curtain. Provide integral latch and locking devices.

B. Guides: Continuous channel of profile to retain door in place, stationary or operating.
1. For Aluminum or Steel Curtains: Guides to be extruded aluminum; ASTM B221, alloy 6063, temper T5; continuous strips of wool pile inserted (removable) into guides to eliminate metal-to-metal contact and to provide dust-seal around curtain. Metal finish to match curtain.

C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension.

D. Hood Enclosure and Fascia: Same material and finish as the curtain. Shape and profile to be as indicated on Drawings.

E. Mounting: Face of wall with hood above opening, unless indicated otherwise on Drawings.

F. Trim: Material and finish to match curtain.

G. Operation Type:
1. Manual Operation:
a. Manual push-up; include accessory metal pull-down pole.

H. Hardware:
1. Interior Side of Curtain: Center mounted hand turn lock with latch engaging keepers at each curtain guide. Provide 2 lift handles, centered on curtain and 20 inches apart.

I. Fasteners, Bolts and Anchor Devices: Finish to match adjacent material finish, size suitable for loads and to provide secure anchorage.
1. Stainless steel.

2.4 SHOP APPLIED FINISH

A. Finishes to be factory applied. Coating thickness indicated is minimum total dry-film thickness (TDFT), in accordance with ASTM D7091.

B. Color to be selected by Architect from manufacturer's full range.

C. Aluminum:
1. Clear Anodized Finish: AAMA 612 Clear anodic coating with non-aqueous electro-deposited organic seal, 0.7 mils TDFT.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify opening sizes, tolerances and conditions are acceptable.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install units in accordance with manufacturer's instructions.

C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

F. Install perimeter trim and closures.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maintain dimensional tolerances and alignment with adjacent Work.

C. Maximum Variation from Plumb: 1/16 inch.

D. Maximum Variation from Level: 1/16 inch.

E. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.5 ADJUSTING

A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

B. Adjust counter door, hardware, and operating assemblies for smooth and noiseless operation.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove labels and visible markings.

C. Clean counter door and components in accordance with manufacturer's recommended materials and instructions.

END OF SECTION

SECTION 08 33 13.13

COILING COUNTER FIRE SHUTTER

PART 1 GENERAL

1.1 SUMMARY

A. Section includes labeled, rated assemblies for automatic closing coiling counter shutters:
   1. Operation:
      a. Manual.
   2. Type:
      a. Fire rated assembly type.

B. Related Sections:
   1. Section 05 50 00 - Metal Fabrications: Door opening jamb and head members.
   2. Section 06 10 53 - Miscellaneous Rough Carpentry: Door opening jamb and head members.
   3. Section 08 31 13 - Access Doors and Frames: Access doors.
   4. Section 08 71 00 - Door Hardware: Locking devices.
   5. Division 26 - Electrical: Requirements for constructing electrical work.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2020.
   2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
   3. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2020.

B. International Organization for Standardization (ISO):
   1. ISO 9000:2015 - Quality Management Systems - Fundamentals and Vocabulary.

C. National Fire Protection Association (NFPA):
   1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

D. Underwriters Laboratories Inc. (UL):
   1. UL (Dir) - Online Certifications Directory; current edition.
   2. UL (FDR) - Fire Resistance Directory; current edition.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate keying requirements with Owner.

C. Coordinate support and anchorage requirements with building construction elements required to provide adequate support and anchorage locations.

D. For Shutter Systems Requiring Electrical Connections: Coordinate with this Section, Division 26 - Electrical, and Drawings to provide connectivity as indicated. Such connections may include, but not be limited to the following:
   1. Electrical Service for powering components.
   2. Facility Monitoring Systems that may include, but not be limited to, fire alarm system, security alarm system, etc.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit general construction, color charts, component connections and details, wiring diagram and electrical equipment.

C. Shop Drawings: Indicate pertinent dimensioning, profile of components, head/floor/jamb seals, locking hardware, anchorage methods, hardware locations, and installation details. Show interface with adjacent work. If electrical operation is required, include information for electrical components and interface with electrical work by others.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect’s initial selections.

E. Samples for Verification: From the Architect’s initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Quality Assurance/Control Submittals:
1. Provide proof of manufacturer ISO 9001:2015 registration.
2. Provide proof of manufacturer and installer qualifications.
3. Provide manufacturer's installation instructions. Indicate installation sequence and procedures, and adjustment and alignment procedures.

G. Maintenance Data: Indicate lubrication requirements and frequency. Indicate periodic adjustments required.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Operation and Maintenance Manual.

C. Certificate stating that installed materials comply with this Contract Documents.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer Qualifications: ISO 9001:2015 registered and a minimum of five (5) years experience in producing coiling counter fire shutters of the type specified.
2. Installer Qualifications: Manufacturer's written approval.

1.7 DELIVERY STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Comply with manufacturer's instructions.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Warranties.

B. Provide manufacturer's warranty against defects in material and workmanship.
1. Duration: Two (2) years from date certified for Substantial Completion.

1.9 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 78 43.46 - Spare Parts and Maintenance Products: Comply with requirements indicated therein, including the Schedule of Spare Parts and Maintenance Products.

1.10 MAINTENANCE SERVICE:

A. Submit for Owner's consideration and acceptance, a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide doors with UL label for the fire rating classification as follows:
   1. 1-1/2 hours rated.

B. Manufacturer Customization: Refer to manufacturer provided descriptions and drawings.
   1. Manufacturer designed and customized layout and configuration.
   2. Manufacturer designed and customized products.

2.2 MANUFACTURERS

A. Manufacturers:
   1. Amarr.
   2. Clopay Building Products.
   3. Cookson Doors.
   4. Cornell Doors.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Basis of Design:
   1. Cookson - Model ERC10 (labeled for fire protection).

2.3 MATERIALS

A. Galvanized Steel: Galvanized in accordance with ASTM A653/A653A.

2.4 COMPONENTS

A. Curtain: Minimum 22 gauge metal; No. 1F, interlocked flat-faced slats, 1-1/2 inches (38 mm) high by 1/2 inch (13 mm) deep; bottom bar and vinyl astragal.
   1. Galvanized Steel: Minimum 12 gauge formed shapes.
      a. Finish:
         1) Powder Coat Finish:
            a) Smooth Finish.

B. Endlocks:
   1. Fabricate continuous interlocking slat sections with high strength galvanized steel endlocks riveted to slats per UL requirements.

C. Guides:
   1. Galvanized Steel: Minimum 12 gauge formed shapes.
      a. Finish:
         1) Powder Coat Finish:
            a) Smooth Finish.

D. Counterbalance Shaft Assembly:

1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.
2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

E. Brackets: Fabricate from reinforced steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
1. Finish: Match Guides.

F. Hood and Mechanism Covers: Include reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) metal intermediate support brackets as required to prevent excessive sag.
1. Galvanized Steel: Minimum 24 gauge.
a. Finish: Match Guides.

2.5 FACTORY APPLIED FINISH

A. Galvanized Steel:
1. Dual process rinsing agents in preparation for application of chemical bonding baked-on base coat and baked-on powder coat finish coat.
2. Smooth Powder Coat Finish:
a. Baked-On Base Coat.
b. Zirconium Pre-Treatment.
c. Baked-On Polyester Powder Coating: Minimum 2.5 mils (0.065 mm) cured film thickness. Pencil hardness to be H or better per ASTM D3363.
d. Color to be selected by Architect from manufacturer's full range.

2.6 OPERATION

A. Manual Operation:
1. AlarmGard Advanced Manual Fire Door Operators: Electrically activated, manually operated, 115 volt AC system with planetary gear reduction, a transformer with 24v secondary output and an internal failsafe release mechanism.
a. Manual Operation:
1) Chain Hoist.
2) Crank.
b. Provide an internal electrical failsafe release device that requires no additional wiring, external cables, or mounting locations.
c. Activate automatic closure by the following:
1) Central Alarm System: Signal activates failsafe release device.
2) Local Detectors: Signal activates failsafe release device.
3) Power outage.
d. Provide an internal solenoid brake mechanism to hold the door at any position during normal door operation.
e. Delay automatic closure after notification for no more than ten seconds.
f. Control automatic closure speed with an internal, totally enclosed, variable rate centrifugal governor without the use of electrical pulsation, constant rate viscosity, oscillation type or other exposed governing devices.
g. Maintain automatic closure speed at average of 12 inches (304mm) per second.
h. Electrically reset internal failsafe release device and door operating system upon restoration of electrical power and upon clearing of the alarm signal without requiring human supervision.
i. Provide minimum #50 roller chain from operator output shaft to the door drive shaft.

j. Install system only with manufacturer supplied or specified fasteners.
k. Ensure that manual resetting of spring tension, release devices, linkages or mechanical dropouts will not be required.
l. Notify electrical contractor to supply and install the appropriate disconnect switch, all conduit and wiring per the door system wiring instructions.
m. Drop test and reset door system twice by all means of activation and comply fully with NFPA 80 Section 5.

2.7 ACCESSORIES

A. UL Labeled and Listed Countertop to Meet NFPA 80 Requirements:
1. Stainless Steel: 2 inches (51 mm) thick profile, minimum 14 gauge.
a. Fire Rated: 1-1/2 hour rated, UL Labeled.
b. Shape Design: Sized and configured for opening size and wall construction.
1) Rectangular shape design for between jambs mounted unit.
c. Finish: NAAMM No. 4 satin directional polished.

B. Photoelectric Smoke/Heat Detector (when not connected to central alarm system): UL listed.

C. Fire Emergency Annunciator: Fire emergency annunciator to give advanced warning that fire shutter is about to close, activating warning signal upon alarm.
1. Annunciator Type: Comply with ADA requirements.
a. Horn and Strobe, and Voice Warning Module.

D. Operator and Full Bracket Mechanism Cover: Sheet metal cover to enclose exposed moving operating components at coil area of unit.
1. Base Material:
a. Galvanized steel, minimum 24 gauge.
2. Finish: Match door hood.

E. Corrosion Protection Between Dissimilar Materials: Provide concealed permanent protection from corrosion between dissimilar materials by application of self-adhering rubberized asphalt sheet or other permanent coating compatible with substrates.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that field measurements and clearances are as required.

C. Examine substrates upon which work will be installed. Verify conditions are as required.

D. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

E. Examine products to be installed for damage and other conditions detrimental to completion of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install the work in compliance with the design requirements, applicable codes, manufacturer's recommendations, and the Contract Documents.
   1. Comply with NFPA 80.

C. Install door components, assemblies, and operating equipment with necessary hardware, anchors, inserts, hangers and supports.

D. Provide concealed permanent corrosion protection between dissimilar materials to prevent electrolytic corrosion.

3.4 ADJUSTING

A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

B. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.

B. Site Test: Test doors for normal operation and automatic closing. Coordinate with authorities having jurisdiction to witness test and certify Drop Test Form.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work in accordance with manufacturer’s recommendations including cleaning procedures and materials.

B. Clean surfaces soiled by work as recommended by manufacturer of soiled substrate.

C. Remove surplus materials and debris from the site.

3.7 DEMONSTRATION AND TRAINING

A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of the work of this Section.

END OF SECTION

SECTION 08 33 26

OVERHEAD COILING GRILLES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electric Motorized Operating coiling metal grilles and operating hardware.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Adjacent wall construction.
   2. Section 08 71.00 - Door Hardware: Lock cylinders and keys.
   3. Section 09 21 16 - Gypsum Board Assemblies: Adjacent wall and ceiling construction.
   4. Section 09 51 13 - Acoustical Panel Ceilings: Adjacent ceiling construction.
   5. Division 26 - Electrical: Requirements for wiring, conduits, disconnect switches, connection to power supply and control station wiring.

1.2 REFERENCES

A. ASTM International:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   3. NEMA MG 1 - Motors and Generators.

C. Underwriters Laboratories Inc.:
   1. UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate keying requirements with Owner.

C. For Grilles Requiring Electrical Connections: Coordinate with this Section, Division 26 - Electrical, and Drawings to provide connectivity as indicated. Such connections may include, but not be limited to the following:
   1. Electrical Service for powering components.
   2. Facility Monitoring Systems that may include, but not be limited to, fire alarm system, security alarm system, etc.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Electric Motorized Operation: Submit general construction, component connections, details, control switches and electrical equipment.

C. Shop Drawings: Indicate pertinent components, dimensioning, anchorage methods, hardware locations, interface with adjacent construction and installation details.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.

E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 8 inches long. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Manufacturer's Certification: Certificate stating that materials comply with this specification.

G. Manufacturer's Installation Instructions: Submit installation sequence and procedures, adjustment and alignment procedures.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Operation and Maintenance Data: Indicate lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by UL, or another testing firm acceptable to authority having jurisdiction.

B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

C. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.7 DELIVERY STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Follow manufacturer's instructions.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Provide two (2) year manufacturer's warranty covering defects in material and workmanship, starting on the date of substantial completion.

B. Maintenance Service Agreement Proposal: Submit for Owner's consideration and acceptance of a maintenance service agreement for installed Work.

1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 78 43.46 - Spare Parts and Maintenance Products: Comply with requirements indicated therein, including the Schedule of Spare Parts and Maintenance Products.

PART 2 PRODUCTS

2.1 OVERHEAD COILING GRILLES

A. Manufacturers:
   1. Atlas Roll-Lite Overhead Doors.
   2. Cornell/Cookson, Inc. - VisionAire ESG10. (Basis of Design)
   3. Clopay Building Products.
   4. Mahon Door Corporation
   5. Overhead Door Corporation.
   6. Wayne-Dalton, a Division of Overhead Door Corporation.
   7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Grilles: Straight pattern grilles conforming to the following.
   1. Material: Aluminum conforming to ASTM B221.
   2. Horizontal Rods: Solid 5/16 inch diameter, minimum.
      a. Vertical Spacing: 2 inches o.c.
   3. Vertical Connecting Members: 5/8 x 1/8 inch flat aluminum bar, links spaced at 9 inch o.c.
   4. Ends: Members with nylon runners for quiet operation.
   5. Bottom Bar: 2 x 3-1/2 inch extruded aluminum tubular section reinforced with two 3 x 2 x 3/16 inch aluminum angles.
   6. Mechanical Assist Lift: Provide special lift mechanism for large grilles.

B. Guides: Extruded aluminum conforming to ASTM B221.
   1. Provide continuous angles of profile to retain grille in place with snap-on trim; mounting brackets of same metal.

C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to assure smooth operation of grille from any position; with adjustable spring tension.

D. Hood Enclosure: Square shape, minimum 24 gage (0.040 inch) thick aluminum; internally reinforced to maintain rigidity and shape.

E. Hardware:
   1. Locks: Furnish locks and keys to allow curtain to be secured.
      a. Cylinder type dead lock at curtain jamb; key operated on outside and turn latch operated on inside.
         1) Prepare curtain with lock mechanism to receive keyed cylinder as specified and furnished in Section 08 71 00, and installed as part of Work of this Section.
   2. Latch Handle: Inside center mounted, adjustable keeper, spring activated latch bar with feature to keep locked fully open and closed position; interior and exterior handle.

F. Electric Motorized Operator:
   1. Design grille assembly, including motor operator, to operate for not less than 30,000 cycles.
   2. Electric motor operated unit with manual override in case of power failure.
   3. Description: UL 325, center mounted, totally enclosed nonventilated or fan cooled motor.
   4. Motor Enclosure: NEMA MG1 Type 1 enclosure.
   5. Motor Rating: 1/2 hp; continuous duty.
   6. Motor Voltage: 115 volt, single phase, 60 Hz.

7. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
8. Controller Enclosure: NEMA 250 Type 1.
9. Grille Speed: 12 inches per second.
10. Brake: Adjustable friction clutch type, activated by motor controller.
11. Control Station: NEMA 1B three button (Open-Stop-Close) key operated control for each motorized operator; 24 volt circuit; recessed.
12. Safety Edge: Manufacturer's standard safety edge located at grille bottom, full width, sensitized type, wired to reverse grille upon striking object.

2.3 FINISHES

A. Grille Components:
   1. To be selected by Architect from submitted samples.

B. Guides and Hood Enclosure: Match grille finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify opening sizes, tolerances and conditions are acceptable.

C. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

D. For Grilles Requiring Electrical Connections: Verify that compatible electrical service connectivity is present and that recessed controls boxes and conduits are ready for installation.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install the Work in accordance with manufacturer's instructions and as follows:

C. Use anchor devices to securely fasten assembly to wall construction and building framing without distortion or stress.

D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

F. For Doors Requiring Electrical Connections: Coordinate with this Section, Division 26 - Electrical, and Drawings.
   1. Electrical Service: Install wiring from electrical service location to electrical components and include appropriate service disconnect devices.
   2. Facility Monitoring Systems: Install wiring connections from door operator mechanism to facility monitoring systems when requirements are indicated. Such monitoring systems may include, but not be limited to, fire alarm system, security alarm system, etc.

G. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

H. Install perimeter trim and closures.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maintain dimensional tolerances and alignment with adjacent Work.

C. Maximum Variation From Plumb: 1/16 inch.

D. Maximum Variation From Level: 1/16 inch.

E. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.5 ADJUSTING

A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

B. Adjust components, hardware, and operating assemblies for smooth and quiet operation, without binding or distortion.

C. Test required interface functionality with Facility Monitoring Systems.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Clean installed Work in accordance with manufacturer’s recommendations including cleaning procedures and materials.

C. Remove unneeded labels and visible markings.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protect installed construction.

B. Protect completed Work from damage.

3.8 DEMONSTRATION AND TRAINING

A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of components of the installed Work.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Aluminum-framed storefront systems.
2. Glass and glazing panels.
3. Aluminum frame doors and hardware.
4. Structural design requirement.

B. Related Requirements:
1. Section 05 50 00 - Metal Fabrications: Metal fabricated attachment devices.
2. Section 07 90 00 - Joint Protection: Perimeter joint sealers other than those integral to the aluminum-framed entrances and storefronts frames and glazing.
3. Section 08 11 16.10 - Aluminum Doors with FRP Face Panel.
4. Section 08 14 16 - Flush Wood Doors.
5. Section 08 44 13 - Glazed Aluminum Curtain Walls.
6. Section 08 71 00 - Door Hardware: Hardware requirements for reinforcing plates and electrical items to be integrated into the storefront frame of this Section.
7. Section 08 80 00 - Glazing: Glazing for aluminum-framed entrances and storefronts.
8. .
9. Division 26 - Electrical: Electrical requirements to be integrated into the storefront framing of this Section.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2017.
2. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2014.
3. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum; 2015.
4. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
5. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
6. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
7. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
8. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
9. AAMA SFM-1 - Aluminum Store Front and Entrance Manual; 2014.

B. American Society of Civil Engineers (ASCE):
1. 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 International (ASTM):

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
3. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
5. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018, Reapproval 2022.
6. ASTM E283/E283M - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
7. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference; 2014, Reapproval 2021.
8. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000, Reapproval 2023.
9. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002, Reapproval 2018.
10. 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, Reapproval 2023.

D. The Society for Protective Coatings (SSPC):
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic, and Type II - Organic); 2019.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
2. Coordinate work of this Section with related Door Hardware requirements.
   a. Provide reinforcement in system framing members to accommodate hardware items indicated in this Section and other related door hardware Sections.
   b. Prepare system framing members to accommodate electrical hardware devices such as security access readers and automatic operators.
3. Coordinate work of this Section with related Electrical requirements.
   a. Provide electrical service wiring for electrical hardware devices such as security access readers, automatic operators, and other electrical requirements.

B. Pre-Installation Meetings:
1. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
2. Convene minimum one week prior to commencing work of this Section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit component dimensions; describe components within assembly, anchorage and fasteners, glass and infill panels, door hardware, and internal drainage details.

C. Shop Drawings: Indicate system dimensions, doors and frames, framed opening requirements and tolerances, anticipated deflection under load, affected related work, weep drainage network, expansion and contraction joint location and details, and field welding required.

1. Details to indicate fasteners and anchoring details to building components and construction.
2. Details to indicate system interface and maintenance of continuity of building envelope air and weather barrier components by others.
3. Provide design and calculations sealed by Professional Structural Engineer demonstrating compliance with wind loading per ASCE 7.
4. Include details of core, stile, and rail construction, trim for lites, and all other components.
5. Include details of finish hardware mounting.
6. Include shop applied and field applied sealants by manufacturer; include product name and application locations on drawings. Show sealant joint sizes, including tolerances and maximum/minimum joint sizes required.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.

E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 8 x 8 inches. Include samples of glazing, infill panels and glazing materials. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Design Data: Indicate engineered framing members structural and physical characteristics, calculations, dimensional limitations.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

H. Installation Data: Special installation requirements.

I. Field Quality Control Submittals: Submit field inspection and test reports required in FIELD QUALITY CONTROL article in this Section.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 - Aluminum Storefront and Entrance Manual.

B. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum five (5) years documented experience.
1. Same manufacturer required for the following work:
    a. Aluminum-Framed Entrances and Storefronts.
    b. Glazed Aluminum Curtain Walls.

D. Installer Qualifications: Company specializing in performing Work of this Section with minimum five (5) years documented experience.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Handle products of this Section in accordance with AAMA CW-10.

C. Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or spray type coatings which bond when exposed to sunlight or weather. Provide adequate ventilation through wrappings.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

B. Do not install sealants when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Provide five (5) year warranty to correct defective Work.

C. Provide five (5) year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting, condensation, or misting. Include provision for replacement of failed units.

D. Provide manufacturer warranty against excessive degradation of metal finishes. Include provision for replacement of units with excessive fading, chalking, peeling, blistering, or flaking. Warranty period to be as follow:
   1. Ten (10) year manufacturer warranty.

1.9 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 60 00 - Product Requirements: Extra materials, spare parts, and maintenance products.
   1. Three (3) each of each type of weatherstripping and sill sweeps installed.
   2. Three (3) each of each type of threshold installed.
   3. Three (3) each of each type of hinge installed.
   4. Three (3) each of each type of panic device installed.
   5. Three (3) each of each type of closer installed.
   6. Three (3) each of each type of lock cylinder installed.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Aluminum-Framed Storefront System: Includes extruded aluminum framing and doors with supplementary internal support components where required, aluminum and glass entrances, shop fabricated components, factory finished glass, glazing and infill panels, related joint sealers, flashings, anchorage, and attachment devices.

B. Provide products and system designed to comply with the State Building Code for the State in which the project is located.

2.2 PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components and system to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, including increased wind loads at building corners.
   1. As calculated in accordance with ASCE 7 - Calculation of Wind Loads, as measured in accordance with ASTM E330/E330M.
   2. Comply with Design Loads indicated on Drawings and applicable code requirements based on geographical location.

B. Seismic Loads: Design and size components and system to withstand seismic loads and sway displacement as calculated in accordance with ASCE 7 and applicable code requirements.

C. Deflection: Limit mullion deflection to flexure limit of glass of span; with full recovery of glazing materials.

D. System Assembly: Accommodate the following without damage to system, components, or deterioration of seals.
   1. Movement within system.
   2. Movement between system, system components and perimeter construction.
   3. Dynamic loading and release of loads.
   4. Deflection of structural support framing.
   5. Tolerance of supporting components.

E. Air Leakage: 0.06 cfm/sq ft maximum leakage through assembly wall area when tested in accordance with ASTM E283/E283M at the following pressure differential.
   1. 1.57 psf pressure differential.

F. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

G. Vapor Seal: Limit vapor seal with interior atmospheric pressure of 1 inch static pressure, 72 degrees F, 40 percent relative humidity without seal failure.

H. Water Penetration: None, when measured in accordance with ASTM E331 with test pressure differential at 20 percent of design pressure, but not less than 2.86 psf and not to exceed 12.00 psf.

I. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U-value of 0.45 Btu/(hr sq ft deg F) when measured in accordance with AAMA 1503.

J. Expansion / Contraction: System to provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

K. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

L. Not Permitted: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.

2.3 ALUMINUM-FRAMED STOREFRONTS

A. Exterior Storefronts: Application to be where one side of storefront is exposed to unconditioned air; includes building exterior exposure.
   1. Extruded aluminum frame members with internal reinforcement of aluminum or shaped steel structural sections as required to withstand imposed loads, including loads imposed by operating doors and hardware of types and sizes indicated.
   2. Frame components to be thermally broken from exterior exposed surfaces.
   3. Frame size, configuration, dimensions, and profile: As indicated on Drawings.
      a. For frames with laminated glass panels, coordinate with glass panel thickness.
      b. Continuous perimeter filler.
   4. Provide glazing panels and infill panels as indicated on Drawings, sealed weathertight within frames.
      a. Panel Position Within Frame:
         1) As indicated on Drawings.

5. Exterior Subsills: High performance type, profile of extruded aluminum, thermally broken, with back flange turned up full height of frame face and sealed end dams each end.
6. Internal weep drainage system to drain to exterior.
7. Manufacturers:
   a. Kawneer Co., Inc.
   b. Oldcastle BuildingEnvelope.
   c. Tubelite, Inc.
   d. U.S. Aluminum, a C.R. Laurance Company.
   e. YKK AP America.
   f. Substitutions: Section 01 60 00 - Product Requirements.
8. Basis of Design:
   a. Kawneer Co., Inc.:
      1) Trifab VG 451T, 2 inch sightline.

B. Interior Storefronts: Application to be where both sides of storefront are exposed to interior conditioned air.
1. Extruded aluminum frame members with internal reinforcement of aluminum or shaped steel structural sections as required to withstand imposed loads, including loads imposed by operating doors and hardware of types and sizes indicated.
2. Frame components not required to be thermally broken.
3. Frame size, configuration, dimensions, and profile: As indicated on Drawings.
   a. For frames with laminated glass panels, coordinate with glass panel thickness.
4. Provide glazing panels and infill panels as indicated on Drawings, sealed weathertight within frames.
   a. Panel Position Within Frame:
      1) As indicated on Drawings.
5. Manufacturers:
   a. Kawneer Co., Inc.
   b. Oldcastle BuildingEnvelope.
   c. RACO.
   d. Tubelite, Inc.
   e. U.S. Aluminum, a C.R. Laurance Company.
   f. YKK AP America.
   g. Substitutions: Section 01 60 00 - Product Requirements.
6. Basis of Design:
   a. Surface Mount Type:
      1) Kawneer - Trifab VG 451, 2 inch sightline.

2.4 COMPONENTS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical; 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209/B209M, 5005 alloy, H15 or H34 temper, wall thickness as required for system application and use but not less than 0.125 inch.

C. Sheet Steel: ASTM A653/A653M; galvanized to minimum G90.

D. Steel Sections: ASTM A36/A36M; shaped to suit aluminum framing and mullion members.
1. For use as concealed structural support reinforcement.
   a. For exterior framing, steel to be galvanized per ASTM A123/A123M.
   b. For interior framing, steel to be shop primed.

E. Structural Supporting Anchors Attached to Structural Steel:
1. Design to suit attachment requirements.

F. Structural Supporting Anchors Attached to Reinforced Concrete Members:
   1. Design to suit attachment requirements.

G. Fasteners: Provide aluminum, non-magnetic stainless steel, or other non-corrosive metal fasteners, recommended to be compatible by the manufacturer of materials being fastened, including doors, frames, stops, panels, hardware, anchors, and other items receiving fasteners. For exposed fasteners (if any) provide Oval Phillips Head screws with finish matching the item to be fastened. The use of sex bolts will not be accepted.

H. Framing Members Profiles: Extruded aluminum and as indicated on Drawings.

I. Trim Components Profiles: Extruded aluminum and as indicated on Drawings.

J. Glass and Glazing Panels:
   1. As indicated on Drawings.
   2. As specified in Section 08 80 00 - Glazing.

K. Doors:
   1. Material: As indicated on Drawings.
   2. Thickness: As indicated on Drawings.
   3. Storefront Framing Members:
      a. Coordinate frame's door stop and door silencer feature (along the frame stop) with door thickness and door type indicated on Drawings.
      b. Coordinate reinforcement and shop preparation with door hardware, including closers, hinges, latching and locking components, automatic door operators, and other hardware indicated in other Sections.
      c. Coordinate storefront frames with the specified doors, types, weight, and hardware and as indicated. Provide aluminum storefront frames with internal and concealed reinforcement and anchorage required to support attachment of the hinges and closers and to withstand the operating and closing loads imposed on the storefront frames by the specified doors and hardware. (e.g. The heavy weight of a solid wood door imposes greater operating loads on door frame members than aluminum and FRP doors.).
      d. Coordinate with security, safety and other electrical wiring and hardware requirements such as automatic door operators and actuators.
   4. Glass and Glazing Panels:
      a. As indicated on Drawings.
   5. Glazing Stops Profile: As indicated on Drawings.
   6. Stiles and Rails: Extruded aluminum; profiles as indicated on Drawings.
      a. Exterior door components to be thermally broken; interior door components not required to be thermally broken.
      b. Coordinate reinforcement and shop preparation with door hardware attachment and operating requirements.
      c. Unless Indicated Otherwise on Drawings:
         1) Stiles to be 6 inches.
         2) Top and middle rails to be 6 inches.
            a) Doors scheduled to receive exit hardware device to be fabricated with middle rail.
         3) Bottom rails to be 10 inches.
   7. Finish: For aluminum framed doors, finish to match storefront frame in which the door is set. Finish for other door types shall be as indicated on Drawings or in other Sections.

L. Door Hardware:
   1. Weatherstripping and Sill Sweep Strips: For aluminum frame doors, manufacturer's standard type to suit application; removable for maintenance replacement.

2. Threshold: Specified in Section 08 71 00. Extruded aluminum, one piece for each door opening, ribbed non-slip surface.
3. Hinges: Specified in Section 08 71 00.
4. Exit Panic Devices: Specified in Section 08 71 00.
5. Closers: Specified in Section 08 71 00.
6. Automatic Door Operators and Actuators: Specified in Section 08 71 00.
7. Lock Cylinders: Specified in Section 08 71 00.
8. Other hardware as may be indicated on Drawings or in Section 08 71 00.
9. Finish: Exposed hardware to match hardware finishes specified in Section 08 71 00.

M. Flashings:
1. Exposed Flashings: Sheet aluminum, finish to match framing members.
   a. Thickness: 18 gauge, 0.040 inch, minimum.
2. Concealed Flashings: Sheet aluminum.
   a. Thickness: 22 gauge, 0.025 inch, minimum.

N. Firestopping: As specified in Section 07 84 00.

O. Storefront System Sealants: As recommended by storefront system manufacturer; silicone type, with adhesion in compliance with ASTM C794; compatible with glazing panels, infill panels, framing members, flashings, other components, and accessories.

P. Glazing Gaskets and Accessories: As recommended by storefront and glazing system manufacturers; type to suit application to achieve weather, moisture, and air infiltration requirements.

Q. Perimeter Sealants and Backing Materials: Provide sealants and backing materials complying with requirements specified in Section 07 90 00.

R. Sealant for Setting Thresholds: Non-curing butyl type.

2.5 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Provide System Internal Drainage: Drain to the exterior by means of a weep drainage networks any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

D. Prepare system members to receive anchor devices. Fabricate anchors.

E. Arrange fasteners and attachments to conceal from view.

F. Prepare system members with internal reinforcement for door hardware.

G. Prepare system members for installation of door hardware and electrical hardware devices such as security access readers and automatic operators.

H. Prepare components with internal reinforcement for window treatments.

I. Reinforce framing members to withstand external imposed loads.

J. Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.

2.6 SHOP FINISHING

A. Anodized Aluminum Finish:

1. Clear Anodized Finish: AAMA 611, AA-M12C22A41 Clear anodic coating; Class I, not less than 0.7 mils thick.

B. Extent of Finish:
1. Apply factory coating to surfaces exposed at completed assemblies.
2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

C. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.

D. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

E. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify dimensions, tolerances, and method of attachment with other Work.

C. Verify wall openings are ready to receive Work of this Section.

D. Verify that construction to which the Work is to be anchored is complete, structurally sound, and adequate to provide the required securement.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install wall system in accordance with engineered design, manufacturer’s instructions, and AAMA SFM-1 - Aluminum Storefront and Entrance Manual.

C. Installation to interface with and maintain continuity of building envelope air and weather barrier components by others.

D. Coordinate with installers of other products to be installed as integral or surface mounted components to the Work required in this Section.
1. Provide open pathways for electrical wiring and device attachment requirements, to include, but not limited to, the following:
a. Electrical hardware devices such as security access readers and automatic operators.
b. Electrical life safety and security devices.

E. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

F. Provide alignment attachments and shims to permanently fasten system to building structure.

G. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

H. Provide thermal isolation where components penetrate or disrupt building insulation.

I. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form watertight dam.

J. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

K. Install integral flashings and integral joint sealers.

L. Set thresholds in bed setting sealant and secure.

M. Install hardware using hardware manufacturer's templates. Refer to Section 08 71 00 for door hardware requirements other than specified in this Section.

N. Glazing:
   1. Coordinate installation of glass with Section 08 80 00 - Glazing; separate glass from metal surfaces.

O. Install system weather seal sealants, seals, gaskets and glazing and infill panels to achieve performance criteria.

P. Install perimeter sealant and backer to achieve performance criteria conforming with installation criteria specified in Section 07 90 00.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.

B. Manufacturer's Field Services: Provide services of storefront manufacturer's field representative to inspect for proper installation of system and submit report. Representative is to submit inspection report, including list of deficiencies within 5 days of each inspection.
   1. Inspections Required:
      a. 10 percent of completion of the work of this Section.
      b. 100 percent of completion of the work of this Section.

C. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each area as directed by Architect or Owner.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Tests are to be observed and reported by storefront manufacturer's field representative. Submit test results and observations report within 5 days of each test.

D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements. Submit reports of retest results within 5 days of each retest.

3.5 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/16 inch every 3 feet non-cumulative or 1/16 inches per 10 feet, whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.6 ADJUSTING

A. Section 01 73 00 - Execution: Testing and adjusting.

B. Adjust operating hardware for smooth operation and latching.

3.7 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

E. Remove excess sealant by method acceptable to sealant manufacturer.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect finished Work from damage.

3.9 DEMONSTRATION AND TRAINING

A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of components of the installed Work.

END OF SECTION

SECTION 08 42 26.10

GLASS DISPLAY CASE DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Glass display case doors and hardware.

B. Related Requirements:
   1. Section 07 90 00 - Joint Protection: System perimeter sealant and back-up materials.
   2. Section 08 71 00 - Door Hardware: Lock cylinders.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. ASTM International (ASTM):
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
   3. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
   4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
   5. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2021.
   6. ASTM B455/B455M - Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes; 2020.
   7. ASTM C1036 - Standard Specification for Flat Glass; 2021.
   8. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate work with adjacent construction to accommodate anchorage of the work of this Section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for system components including glass; door hardware, rails, frames, and finishes.

C. Shop Drawings: Indicate elevations, framed opening requirements, tolerances; anchorage and fasteners; glass; door hardware requirements and installation details.

D. Samples for Initial Selection: Two sets, representing manufacturer's full range of available metal materials and finishes.

E. Samples for Verification: From the Architects initial selection, prepare and submit two samples, minimum size 6 inches representing actual material and finish of exposed metal and of glass.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures. Requirements for submittals.

B. Operation and Maintenance Data: Submit for maintaining metal finishes. Include care and cleaning instructions, list of recommended cleaning and polishing materials, and lubrication requirements.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept all-glass entrances on site in manufacturer's protective packaging. Inspect for damage.

C. Protect finished metal surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Furnish five (5) year manufacturer's warranty for door closers.

1.9 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 60 00 - Product Requirements: Extra materials, spare parts, and maintenance products.
   1. Furnish two (2) sets of special wrenches and tools for door closers.

PART 2 PRODUCTS

2.1 GLASS DISPLAY CASE DOORS

A. Manufacturers:
   1. CR Laurence.
   2. Dorma Glass.
   3. Sugatsune.
   4. Virginia Glass Products Corp.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Frameless Doors:
   1. Door Operation: Swing.
   2. Glass Type:
      a. Tempered glass.
   3. Glass Thickness:
      a. 1/2 inch thick.
   4. Door Rails: Extruded aluminum.
      a. Location: Door top and bottom.
      b. Rail Shape: Square.

c. Rail Height:
1) 2.5 inches.
d. Rail Thickness: As required for door loads and hardware.
5. Stops and Locks: Incorporated into rails.
6. Header:
a. Extruded aluminum.
b. As indicated on Drawings.
c. Concealment for closer.
7. Door Hardware: Stainless steel, unless specified otherwise.
a. Pivots:
1) Floor mounted center hung pivot with cover plate.
b. Closer:
1) Concealed in header.
c. Lock: Bottom rail; cylinder type; keyed outside, thumb turn inside.
d. Lock Cylinders: As specified in Section 08 71 00.

2.2 COMPONENTS

A. Steel Sections: ASTM A36/A36M; shapes to suit frame sections.

B. Aluminum Extrusions: ASTM B221 (ASTM B221M), alloy 6063, temper T5.

C. Stainless Steel: ASTM A666; Type 304.

D. Brass Components: Conforming to ASTM B455/B455M.

E. Fasteners: Stainless steel.

F. Tempered Glass: Flat glass meeting requirements of ASTM C1036, Type I - Transparent Flat Glass, Quality Q3, and Kind FT, fully tempered, in accordance with ASTM C1048, and as follows:
1. Color: Class 1, Clear.
2. Prepare glazing panels for required fittings and hardware before tempering.
3. Polish edges that will be exposed in finished work to bright flat polish.
4. Temper glass materials horizontally; visible tong marks or tong mark distortions are not permitted.

2.3 FABRICATION

A. Verify field measurements prior to fabrication.

B. Fabricate doors with continuous top and bottom continuous rails. Reinforce rails with steel sections or tie rods where required.

C. Fabricate sidelights with continuous top and bottom glazing channels.

D. Fabricate doors and sidelights allowing for minimum clearances and shim spacing around perimeter of assembly.

E. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof.

F. Break form cladding to match rail profiles. Fabricate cladding to align flush with adjacent cladding with hairline joints.

G. Prepare components to receive anchor devices and hardware. Fabricate anchorage items.

H. Arrange fasteners, attachments, and jointing to ensure concealment from view.

I. Prepare components with drillings for door hardware.

2.4 SHOP FINISHING

A. Stainless Steel Finishes:
   1. Satin Polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.

B. Galvanizing: ASTM A123/A123M; hot dip galvanized after fabrication.

C. Aluminum Finish:
   1. Clear Anodized Finish: AAMA 611, AA-M12C22A41 Clear anodic coating; Class I, not less than 0.7 mils thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that openings are acceptable.

C. Do not begin installation until substrates and openings have been properly prepared.

D. If substrate and anchorage locations preparation is not as required for installation of the Work, correct unsatisfactory preparation before proceeding.

E. Verify wall openings are ready to receive work of this section.

F. Verify block outs for floor closers are sized and located properly.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

3.3 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Install in accordance with manufacturer's installation instructions.

C. Use anchorage devices to securely attach glazing channels assembly to structure.

D. Align assembly plumb and to indicated position, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install hardware and hang doors.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Horizontal Components and Sight Lines: Not more than 1/16 inch in 10 feet variation from level, non-cumulative.

C. Vertical Components and Sight Lines: Not more than 1/16 inch in 10 feet variation from plumb, non-cumulative.

D. Variation from Plane or Indicated Location: Not more than 1/16 inch (1.6 mm).

E. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.5 ADJUSTING

A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

B. Adjust doors to operate correctly, without binding to frame, sill, or adjacent doors.

C. Adjust operating hardware for smooth, balanced operation.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

C. Remove protective material from prefinished surfaces.

D. Wash down exposed surfaces using solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

E. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

3.7 PROTECTION OF FINISHED WORK

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect finish work and glazing from damage.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Automatic operators.
4. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.
3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
4. Division 08 Section “Automatic Door Operators”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.

4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

    a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:

    a. Ives (IV) - 5BB Series, 5-knuckle.
    b. McKinney (MK) - TA/T4A Series, 5-knuckle.
    c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.2 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Pemko (PE) - EL-CEPT Series.
    b. Securitron (SU) - EL-CEPT Series.
    c. Von Duprin (VD) - EPT-10 Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

    a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney (MK) - QC-C Series.
    b. dormakaba BEST (ST) - WH Series.
    c. Von Duprin (VD) - Connect.

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Ives (IV).
    c. Rockwood (RO).
    d. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Ives (IV).
    c. Rockwood (RO).
    d. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

1. Manufacturers:

    a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA).

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.

4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Manufacturer’s Standard.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Three (3).
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.6 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

a. Heavy duty 12-gauge wrought steel case.
b. Stainless steel 3/4" one-piece anti-friction reversible latchbolt with a one-piece hardened stainless steel 1” projection deadbolt.
c. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
d. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
e. Meets UL Certification Directory ZHLL.R21744 for products used in windstorm rated assemblies.
f. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.13 requirements to 12.3 million cycles or greater.
g. Status indicators inside, outside, or on both sides of doors as specified; available with wording for “locked/unlocked”, “vacant/occupied” or custom wording options. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status.
h. Ten-year limited warranty for mechanical functions.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 8800FL Series.
b. Corbin Russwin Hardware (RU) - ML2000 Series.
c. Schlage (SC) - L9000 Series.

2.7 DEADLOCKS AND LATCHES

A. Cylindrical Deadlocks: ANSI/BHMA A156.36 Grade 1 Certified Products Directory (CPD) listed deadlocks to fit standard ANSI 161 preparation. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - D100 Series.
b. Corbin Russwin Hardware (RU) - DL3000 Series.
c. Schlage (SC) - B600 Series.

2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.9 ELECTRIC STRIKES

A. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 1 million operating cycles. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Manufacturers:

    a. HES (HS) - 1006 Series.
    b. HES (HS) - 1500/1600 Series.
    c. Von Duprin (VD) - 6200/6400 Series.

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical exit devices shall have the following functions and features:

a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
e. Five-year limited warranty for electromechanical features.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 7000 Series.
b. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
c. Von Duprin (VD) - 35A/98 XP Series.

2.11 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of

use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:

   a. Corbin Russwin Hardware (RU) - DC8000 Series.
   b. LCN Closers (LC) - 4040 Series.
   c. Norton Rixson (NO) - 7500 Series.

C. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Manufacturers:

   a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - Unitrol Series.
   b. Corbin Russwin Hardware (RU) - Unitrol Series.
   c. Norton Rixson (NO) - Unitrol Series.

2.12 ELECTROHYDRAULIC DOOR OPERATORS

A. Electrohydraulic Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that meet ANSI/BHMA A156.4 requirements and are UL listed for use on fire rated doors and UL10C certified that comply with requirements for the Americans with Disabilities Act (ADA). Operators shall be verified by GreenCircle to offer energy savings of 19% when compared to similar products to accommodate openings up 250 pounds and 48” wide.

1. Provide operators with features as follows:

   a. Non-handed with push and pull side mounting.
   b. Operates as mechanical surface closer during close cycles, when door is opened manually or if power is off.
   c. Activation by push button, hands-free or radio frequency devices.
   d. On board electronics to collect usage and cycle count data to facilitate preventative maintenance/diagnostics.
   e. Two-year limited warranty.
   f. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building’s IT required.
      1) Simple setup with no app required.
      2) View status and make adjustments without removing the cover.
      3) Built-in logic to support single use restroom applications with no external relay boards, logic modules, position switches required.
   g. Mounting backplate to simplify and speed up installation.

2. Operators shall have the following functionality:

a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
b. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. Door will stay open until signal from alarm system is stopped.
c. Infinite Hold Open: Door will hold open at set position until power is turned off.
d. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
e. Open Delay: Delays operator opening for locking hardware.
f. Overload Safety Shut-Off: After two minutes of receiving a door activation signal, inverter times out and door closes to prevent motor/inverter damage.
g. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
h. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
i. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
j. Vestibule Delay: When the wall switch is pressed, first door in vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.

3. Manufacturers:

a. Gyrotech Nabco - GT500 Series.
b. LCN (LC) - 4630/4640 Series.
c. Norton Rixson (NO) - 6000 Series.

2.13 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:

a. LCN Door Closers (LC) - SEM7800 Series.
b. Norton Rixson (RF) - 980/990 Series.
c. Sargent Manufacturing (SA) - 1560 Series.

2.14 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Ives (IV).
    c. Rockwood (RO).
    d. Trimco (TC).

2.15 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Ives (IV).
    c. Rockwood (RO).
    d. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

    a. dormakaba (DO).
    b. Norton Rixson (RF).
    c. Rockwood (RO).
    d. Sargent Manufacturing (SA).

2.16 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and

provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).
4. Zero (ZE).

2.17 ELECTRONIC ACCESSORIES

A. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.

1. Manufacturers:

a. Alarm Controls (AK) - TS Series.
b. Security Door Controls (SD) - 400 Series.
c. Securitron (SU) - PB Series.

B. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 3280 Series.
b. Security Door Controls (SD) - DPS Series.
c. Securitron (SU) - DPS Series.

C. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.

1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
2. Manufacturers:

    a. Securitron (SU) - AQL Series.
    b. Altronix (AS) - Maximal 11F.

2.18 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.19 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. SU - Securitron
3. RO - Rockwood
4. YA - ASSA ABLOY ACCENTRA
5. HS - HES
6. RF - Rixson
7. NO - Norton
8. PE - Pemko
9. OT - Other
10. AK - Alarm Controls

Hardware Sets

Set: 1.0
Doors: 119B, 214.3, 214J

1	All Hardware	By Door Manufacturer		OT

Set: 2.0
Doors: 100A

6	Hinge (heavy weight)	T4A3386	US32D	MK
2	Electric Power Transfer	EL-CEPT	630	SU
1	Mullion	KRM200F	600	YA
1	Rim Exit Device, Exit Only	7100 B G EO Less Dogging	630	YA
1	Rim Exit Device, Nightlatch	7100 B MELR 121NL Less Dogging	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Rim Cylinder	1109	626	YA
2	Door Pull	BF157	US32D	RO
1	Conc Overhead Stop	6-X36	630	RF
1	Surface Closer	UNI7500	689	NO
1	Automatic Opener	6011 / 6021 (As Required)	689	NO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Gasketing	5110BL x Length Required		PE
2	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
1	Card Reader	Provided By Security Supplier		OT
2	ElectroLynx Harness	QC-C**** x Length Required		MK
2	ElectroLynx Harness	QC-C1500P		MK
2	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Door Switch	505D		NO
1	Door Switch	504D		NO
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

7100 series MELR (24VDC device) requires power supply with 1Amp output per device. Motor pulls .65A for retraction and .2A for hold.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader retracting exit device latch for predetermined time limit. Exit device latch can be electrically held retracted for open access.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
4. Egress free for immediate exit. ADA egress by actuator switch.
5. REX switch in push rail allows authorized exit without alarm condition.
6. Door position switch monitor open/closed status.

7. Exit device latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 3.0
Doors: 100B, 100C, 100D

3	Hinge (heavy weight)	T4A3386	US32D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit Device, Exit Only	7100 B G EO Less Dogging	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Door Pull	BF157	US32D	RO
1	Surface Closer	UNI7500	689	NO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Gasketing	5110BL x Length Required		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Keyswitch	MK		SU
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader retracting exit device latch for predetermined time limit. Exit device latch can be electrically held retracted for open access.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
4. Egress free for immediate exit. ADA egress by actuator switch.
5. REX switch in push rail allows authorized exit without alarm condition.
6. Door position switch monitor open/closed status.
7. Exit device latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 4.0
Doors: 100E

6	Hinge (heavy weight)	T4A3786	US26D	MK
2	Electric Power Transfer	EL-CEPT	630	SU
1	Mullion	KRM200F	600	YA
1	Rim Exit Device, Exit Only	7100 B G EO Less Dogging	630	YA
1	Rim Exit Device, Nightlatch	7100 B MELR 121NL Less Dogging	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Rim Cylinder	1109	626	YA
2	Door Pull	BF157	US32D	RO
2	Conc Overhead Stop	6-X36	630	RF

1	Automatic Opener	D6000 Series	689	NO
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	5110BL x Length Required		PE
2	Silencer	608		RO
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Door Switch	505D		NO
1	Door Switch	504D		NO
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader retracting exit device latches for predetermined time limit. Exit device latches can be electrically held retracted for open access.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
4. Egress free for immediate exit. ADA egress by actuator switch.
5. REX switch in push rail allows authorized exit without alarm condition.
6. Door position switches monitor open/closed status.
7. Exit device latches release (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 5.0
Doors: 100F, 100G

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit Device, Dummy	7100-2 634F	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Set: 6.0
Doors: 100H

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit Device, Nightlatch	7100-2 121NL	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Rim Cylinder	1109	626	YA
1	Door Pull	BF157	US32D	RO
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Set: 7.0
Doors: 101A, 301

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Electric Strike	1500C-LMS	630	HS
1	SMART Pac Bridge Rectifier	2005M3		HS
1	Conc Overhead Stop	6-X36	630	RF
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

CONFIRM ELECTRIC STRIKES AND LOCKS DO NOT NEED STAND ALONE POWER SUPPLY PRIOR TO SUBMITTALS. ARCHITECT STATES THESE ARE POWERED DIRECTLY FROM THE ACS.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. Electric strike latch bolt switch monitors door open/closed/latched status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 8.0
Doors: 101B

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Asylum or Institutional Lock	AUR3 8830-2FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Electric Strike	1500C-LMS	630	HS
1	SMART Pac Bridge Rectifier	2005M3		HS
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Pushbutton	TS-12		AK
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

CONFIRM ELECTRIC STRIKES AND LOCKS DO NOT NEED STAND ALONE POWER SUPPLY PRIOR TO SUBMITTALS. ARCHITECT STATES THESE ARE POWERED DIRECTLY FROM THE ACS.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access. Remote release by pushbutton located at reception.
3. Egress free for immediate exit.
4. Electric strike latch bolt switch monitors door open/closed/latched status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 9.0
Doors: 101C, 101D, 209, 302A, 311, 402C, 410, 502C, 510

2	Hinge, Full Mortise	TA2714	US26D	MK	
1	Hinge, Full Mortise	TA2714 QC	US26D	MK	
1	Fail Secure Lock	AUR3 8891FL 2196 Less Core REX	626	YA	
1	Core	1210 CMK VKC0	626	YA	
1	Surface Closer	7500	689	NO	
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO	
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO	
3	Silencer	608		RO	
1	Card Reader	Provided By Security Supplier		OT	
1	ElectroLynx Harness	QC-C**** x Length Required		MK	
1	ElectroLynx Harness	QC-C1500P		MK	
1	Position Switch	DPS - M / W-BK (SPDT)		SU	
1	Wiring Diagram	Elevation and Point to Point as Specified			OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

CONFIRM ELECTRIC STRIKES AND LOCKS DO NOT NEED STAND ALONE POWER SUPPLY PRIOR TO SUBMITTALS. ARCHITECT STATES THESE ARE POWERED DIRECTLY FROM THE ACS.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader allowing ingress.
3. Door position switch monitor open/closed status.
4. Lockset remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 11.0
Doors: 102, 104, 108, 109, 111, 204B, 204C, 214A, 215A, 605A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AUR3 8808FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 12.0
Doors: 102A, 105, 107, 129, 214E

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Bathroom Lock	AUR3 8862FL V21	626	YA
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 13.0
Doors: 103, 106, 110, 113, 116, 117, 120, 203B

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Entry Lock	AUR3 8807FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 14.0
Doors: 112, 205

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Set: 15.0
Doors: 114

2	Hinge (heavy weight)	T4A3786	US26D	MK
1	Hinge (heavy weight)	T4A3786 QC	US26D	MK
1	Fail Secure Lock	AUR3 8891FL 2196 Less Core REX	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

CONFIRM ELECTRIC STRIKES AND LOCKS DO NOT NEED STAND ALONE POWER SUPPLY PRIOR TO SUBMITTALS. ARCHITECT STATES THESE ARE POWERED DIRECTLY FROM THE ACS.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader allowing ingress.
3. Door position switch monitor open/closed status.
4. Lockset remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 16.0
Doors: 115

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Passage Latch	AUR3 8801FL	626	YA
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 17.0
Doors: 118A, 212B, 212C

6	Hinge (heavy weight)	T4A3786	US26D	MK
1	Mullion	KRM200F	600	YA
1	Rim Exit Device, Dummy	7100-2 634F	626	YA
1	Rim Exit Device, Nightlatch	7100-2 121NL	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Rim Cylinder	1109	626	YA
2	Door Pull	BF157	US32D	RO
2	Surface Closer	CLP7500T	689	NO
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	5110BL x Length Required		PE

Set: 18.0
Doors: 118B, 200.X, 300X, 400X, 500X

6	Hinge (heavy weight)	T4A3386	US32D	MK
2	Electric Power Transfer	EL-CEPT	630	SU
1	Mullion	KRM200F	600	YA
1	Rim Exit Device, Exit Only	7100 B G EO Less Dogging	630	YA
1	Rim Exit Device, Nightlatch	7100 B MELR 121NL Less Dogging	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Rim Cylinder	1109	626	YA
2	Surface Closer	UNI7500	689	NO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Gasketing	5110BL x Length Required		PE
2	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
1	Card Reader	Provided By Security Supplier		OT
2	ElectroLynx Harness	QC-C**** x Length Required		MK
2	ElectroLynx Harness	QC-C1500P		MK
2	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	Size and Type as Required		SU

1	Wiring Diagram	Elevation and Point to Point as Specified	OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader retracting exit device latch for predetermined time limit. Exit device latch can be electrically held retracted for open access.
3. Egress free for immediate exit.
4. REX switch in push rail allows authorized exit without alarm condition.
5. Door position switch monitor open/closed status.
6. Exit device latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 19.0
Doors: 118C, 118D, 217

6	Hinge (heavy weight)	T4A3386	US32D	MK
1	Mullion	KRM200F	600	YA
2	Rim Exit Device, Exit Only	7100 EO Less Dogging	630	YA
2	Surface Closer	UNI7500	689	NO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Gasketing	5110BL x Length Required		PE
2	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
2	Position Switch	DPS - M / W-BK (SPDT)		SU

Set: 20.0
Doors: 119

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AUR3 8808FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
3	Silencer	608		RO

Set: 21.0
Doors: 122A, 124

6	Hinge, Full Mortise	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	555 / 557 (As Required)	US26D	RO
1	Classroom Lock	AUR3 8808FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Hold Open	10-X26	689	RF
1	Surface Closer	7500H	689	NO
2	Astragal	S771C x Door Height		PE
2	Silencer	608		RO

Set: 22.0
Doors: 300J, 400J, 500J, 600C, 602X.1, 602X.2

6	Hinge (heavy weight)	T4A3386	US32D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555 / 557 (As Required)	US26D	RO
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
1	Surface Closer	UNI7500	689	NO
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO
2	Astragal	S771C x Door Height		PE
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
2	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
2	Position Switch	DPS - M / W-BK (SPDT)		SU

Set: 23.0
Doors: 128, 310, 409, 509

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 25.0
Doors: 200.1

6	Hinge (heavy weight)	T4A3786	US26D	MK
2	Electric Power Transfer	EL-CEPT	630	SU
1	Fire Rated Surf Vert Rod, Exit Only	7170F90 LBR B EO	630	YA
1	Fire Rated Surf Vert Rod, Nightlatch	7170F90 LBR B MELR AU627F	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Rim Cylinder	1109	626	YA
2	Surface Closer	7500	689	NO
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO
2	Electromagnetic Holder	998 x Voltage as Required	689	RF
2	Astragal	S771C x Door Height		PE
1	Gasketing	S88BL (Head & Jambs)		PE
1	Card Reader	Provided By Security Supplier		OT
2	ElectroLynx Harness	QC-C**** x Length Required		MK
2	ElectroLynx Harness	QC-C1500P		MK
2	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally held open by wall magents.
2. In locked condition authorized access by card reader retracting exit device latches for predetermined time limit. Exit device latches can be electrically held retracted for open access.
3. Egress free for immediate exit.
4. REX switch in push rail allows authorized exit without alarm condition.
5. Door position switches monitor open/closed status.
6. Exit device latches release (fail secure) in event of power loss/activation of fire alarm or lockdown system. Keyed cylinder override for emergency access.

Set: 26.0
Doors: 201, 202, 204.1, 204.2, 215, 312, 316, 402A, 402B, 411, 415, 502A, 502B, 511, 515, 603

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit Device, Nightlatch	7105 AU627F Less Dogging	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Rim Cylinder	1109	626	YA
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	S88BL (Head & Jambs)		PE

Set: 27.0
Doors: 201X, 215X, 603X, 604X, 605X

3	Hinge (heavy weight)	T4A3386	US32D	MK
1	Rim Exit Device, Nightlatch	7100 121NL Less Dogging	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Rim Cylinder	1109	626	YA
1	Door Pull	BF157	US32D	RO
1	Surface Closer	UNI7500	689	NO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
1	Position Switch	DPS - M / W-BK (SPDT)		SU

Set: 29.0
Doors: 203

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Intruder Classroom Lock	AUR3 8808-2FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Set: 30.0
Doors: 203A, 214D

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Entry Lock	AUR3 8807FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
3	Silencer	608		RO

Set: 32.0
Doors: 300A, 300B, 400A, 400B, 500A, 500B, 602A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Set: 33.0
Doors: 211, 303, 304, 305, 306, 313, 315, 317, 401, 403, 404, 405, 412, 414, 416, 417, 501, 503, 504, 505, 512, 514, 516, 517

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AUR3 8809FL 2196 Less Core V01	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 34.0
Doors: 214.1, 214.2

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Deadbolt	D161 LC	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
1	Push Plate	70F	US32D	RO
1	Pull Plate	BF 106x70C	US32D	RO
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Notes: ***SPECIAL TEMPLTING AS REQUIRED TO ALLOW 180° SWING.***

Set: 36.0
Doors: 204X, 212.1X, 212.2X, 214X

3	Hinge (heavy weight)	T4A3386	US32D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit Device, Nightlatch	7100 B MELR AU627F	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Rim Cylinder	1109	626	YA

1	Surface Closer	CPS7500	689	NO	
1	Gasketing	Provided By Door/Frame Supplier		OT	
1	Rain Guard	346C x Width of Frame Head		PE	
1	Sweep	345AV x Length Required		PE	
1	Card Reader	Provided By Security Supplier		OT	
1	ElectroLynx Harness	QC-C**** x Length Required		MK	
1	ElectroLynx Harness	QC-C1500P		MK	
1	Position Switch	DPS - M / W-BK (SPDT)		SU	
1	Power Supply	Size and Type as Required		SU	
1	Wiring Diagram	Elevation and Point to Point as Specified			OT

Set: 37.0
Doors: 215B

3	Hinge, Full Mortise	TA2714	US26D	MK	
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	626	YA	
1	Core	1210 CMK VKC0	626	YA	
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO	
3	Silencer	608		RO	

Set: 38.0
Doors: 216

3	Hinge (heavy weight)	T4A3786	US26D	MK	
1	Fire Rated Rim Exit, Passage	7100F AU628F	626	YA	
1	Core	1210 CMK VKC0	626	YA	
1	Rim Cylinder	1109	626	YA	
1	Surface Closer	CPS7500	689	NO	
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO	
1	Gasketing	S88BL (Head & Jambs)		PE	

Set: 39.0
Doors: 300, 400, 500

6	Hinge (heavy weight)	T4A3786	US26D	MK	
2	Electric Power Transfer	EL-CEPT	630	SU	
1	Fire Rated Surf Vert Rod, Exit Only	7170F90 LBR B EO	630	YA	
1	Fire Rated Surf Vert Rod, Nightlatch	7170F90 LBR B MELR AU627F	630	YA	
1	Core	1210 CMK VKC0	626	YA	
1	Rim Cylinder	1109	626	YA	
2	Surface Closer	PR7500	689	NO	
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO	
2	Electromagnetic Holder	998 x Voltage as Required	689	RF	
1	Gasketing	S88BL (Head & Jambs)		PE	
1	Card Reader	Provided By Security Supplier		OT	
2	ElectroLynx Harness	QC-C**** x Length Required		MK	
2	ElectroLynx Harness	QC-C1500P		MK	
2	Position Switch	DPS - M / W-BK (SPDT)		SU	
1	Power Supply	Size and Type as Required		SU	
1	Wiring Diagram	Elevation and Point to Point as Specified			OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader retracting exit device latch for predetermined time limit. Exit device latch can be electrically held retracted for open access.
3. Egress free for immediate exit.
4. REX switch in push rail allows authorized exit without alarm condition.
5. Door position switch monitor open/closed status.
6. Exit device latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 41.0
Doors: 300C, 300D, 300E, 300F, 300G, 300H, 400C, 400D, 400E, 400F, 400G, 400H, 500C, 500D, 500E, 500F, 500G, 500H, 600A, 600B

6	Hinge, Full Mortise	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555 / 557 (As Required)	US26D	RO
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
1	Surface Closer	CLP7500	689	NO
2	Astragal	S771C x Door Height		PE
2	Silencer	608		RO

Set: 42.0
Doors: 301A, 401A, 501A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Deadbolt Lock	AUR3 8840FL 2196 Less Core V21	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608		RO

Set: 43.0
Doors: 302.1, 302.2

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Mortise Exit Device, Nightlatch	7130 SECURE AU656F	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA
2	Rim Cylinder	1109	626	YA
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	S88BL (Head & Jambs)		PE
1	Alarm	Supplied by Access Control Provider		OT
2	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader allowing ingress.
3. Interior card reader to shunt alarm for free egress.
4. Egress without credential will sound alarm.
5. Door position switch tied to access control system and alarm.
6. Lockset remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access. Free egress at all times.

Set: 44.0
Doors: 312X, 316X, 411X, 415X, 511X, 515X, 606X

3	Hinge (heavy weight)	T4A3386	US32D	MK	
1	Electric Power Transfer	EL-CEPT	630	SU	
1	Rim Exit Device, Nightlatch	7100 B MELR AU627F	630	YA	
1	Core	1210 CMK VKC0	626	YA	
1	Rim Cylinder	1109	626	YA	
1	Surface Closer	CPS7500	689	NO	
1	Gasketing	303AS (Head & Jambs)		PE	
1	Rain Guard	346C x Width of Frame Head		PE	
1	Sweep	345AV x Length Required		PE	
1	Threshold	271A x Length Required x MSES25SS		PE	
1	Card Reader	Provided By Security Supplier		OT	
1	ElectroLynx Harness	QC-C**** x Length Required		MK	
1	ElectroLynx Harness	QC-C1500P		MK	
1	Position Switch	DPS - M / W-BK (SPDT)		SU	
1	Power Supply	Size and Type as Required		SU	
1	Wiring Diagram	Elevation and Point to Point as Specified			OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader allowing ingress.
3. Door position switch monitor open/closed status.
4. Lockset remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 45.0
Doors: 208, 219, 318A, 318B, 418A, 418B, 518A, 518B

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
3	Silencer	608		RO

Set: 46.0
Doors: 402D

6	Hinge, Full Mortise	TA2714	US26D	MK
2	Roller Latch	910	US26D	RO
2	Dummy Trim Single	AUR3 855FL	626	YA
2	Door Stop	403 (or) 441CU (As Required)	US26D	RO
2	Astragal	S771C x Door Height		PE
2	Silencer	608		RO

Set: 47.0
Doors: 307, 406, 506

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Deadbolt Lock	AUR3 8840FL 2196 Less Core V21	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 48.0
Doors: 601, 601B

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Fire Rated Rim Exit, Nightlatch	7100F AU627F	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Rim Cylinder	1109	626	YA
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	S88BL (Head & Jambs)		PE

Set: 49.0
Doors: 602B, 607

3	Hinge (heavy weight)	T4A3386	US32D	MK
1	Storeroom Lock	AUR3 8805FL 2196 Less Core	630	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	UNI7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
1	Position Switch	DPS - M / W-BK (SPDT)		SU

Set: 50.0
Doors: 604, 605, 606

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit Device, Nightlatch	7105 AU627F	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Mortise Cylinder	2153	626	YA

1	Rim Cylinder	1109	626	YA
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	S88BL (Head & Jambs)		PE
1	Door Bottom	411APKL		PE

Set: 51.0
Doors: 204A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AUR3 8808FL 2196 Less Core	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Door Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608		RO

Set: 52.0
Doors: 122B, 125

6	Hinge (heavy weight)	T4A3386	US32D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555 / 557 (As Required)	US26D	RO
1	Fail Secure Lock	AUR3 8891FL 2196 Less Core REX	626	YA
1	Core	1210 CMK VKC0	626	YA
1	Surf Overhead Stop	10-X36	630	RF
1	Surface Closer	UNI7500	689	NO
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Astragal	S771C x Door Height		PE
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
2	Sweep	345AV x Length Required		PE
1	Threshold	271A x Length Required x MSES25SS		PE
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
2	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	Size and Type as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: HARDWARE SUPPLIER SHALL COORDINATE ALL ELECTRIFIED HARDWARE WITH ALL RELATED TRADES.

CONFIRM ELECTRIC STRIKES AND LOCKS DO NOT NEED STAND ALONE POWER SUPPLY PRIOR TO SUBMITTALS. ARCHITECT STATES THESE ARE POWERED DIRECTLY FROM THE ACS.

Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader allowing ingress.
3. Door position switch monitor open/closed status.

4. Lockset remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

END OF SECTION 087100

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass glazing materials and installation requirements are included in this Section for frame assemblies specified in other Sections.

B. Related Requirements:
   1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants.
   2. Section 08 11 13 - Hollow Metal Doors and Frames: Doors and frames to receive glazing in this Section.
   3. Section 08 14 16 - Flush Wood Doors: Doors to receive glazing in this Section.
   4. Section 08 11 16.10 - Aluminum Doors with FRP Face Panel: Doors to receive glazing in this Section.
   5. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts: Framing system to receive glazing in this Section.
   6. Section 08 44 13 - Glazed Aluminum Curtain Walls: Framing system to receive glazing in this Section.
   7. Section 08 83 00 - Mirrors: Glazing for metal framed mirrors specified in this Section.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI Z97.1 - Safety Glazing Materials Used In Buildings - Safety Performance Specifications And Methods Of Test; 2015, Reapproval 2020.

B. American Society of Civil Engineers (ASCE):
   1. 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 International (ASTM):
   1. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005, Reapproval 2019.
   2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
   3. ASTM C1036 - Standard Specification for Flat Glass; 2021.
   4. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
   5. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.
   6. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016; Reapproval 2023.
   7. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
   8. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
   9. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
   10. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

11. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

D. Code of Federal Regulations (CFR):
1. 16 CFR 1201 - Safety Standard for Architectural Glazing; Current Edition.

E. Glass Association of North America (GANA):
1. GANA (GM) - GANA Glazing Manual; 2022.
2. GANA (SM) - GANA Sealant Manual; 2008.
3. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.

F. National Fenestration Rating Council Incorporated (NFRC):
1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors; 2023.
2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

G. National Fire Protection Association (NFPA):
1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
3. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2022.

H. Underwriters Laboratories Inc. (UL):
1. UL (BMD) - Building Materials Directory; Current Edition.
2. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 PRE-INSTALLATION MEETING

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week before starting Work of this Section; require attendance by all affected installers.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
1. Glass: Provide structural, physical, and environmental characteristics, size limitations, special handling, or installation requirements. Include manufacturer’s full range of samples of glass tinting options for Architects selection.
2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify full range of available colors.

C. Shop Drawings:
1. Indicate sizes, layout, thicknesses, and loading conditions for glass.

D. Samples:
1. Glass: Submit two samples, 12 x 12 inches in size, of each glass type.
2. Glazing Units: Submit two samples, 12 x 12 inches size, of assembled sealed insulating glazing units.
3. Glazing Materials: Submit 12 inch long bead of glazing sealant and gaskets, color as selected.

E. Design Data: Submit design calculations indicating compliance with requirements for resistance of wind loads for glass and glazing units.

F. Certifications: Submit the follow.
   1. Certify that products of this Section meet or exceed specified requirements.
   2. Manufacturer's qualification certification.
   3. Fabricator's qualification certification.
   4. Installer's qualification certification.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the following standards:
   1. GANA (GM) - GANA Glazing Manual.
   2. GANA (SM) - GANA Sealant Manual.
   3. GANA (LGRM) - Laminated Glazing Reference Manual.
   4. Maintain one copy of each document on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years of documented experience.

C. Fabricator Qualifications: Fabricator certified by glass manufacturer for type of glass, glass unit, coating, and treatment involved and capable of providing requirements indicated in this Section.

D. Installer Qualifications: Company specializing in performing work of this Section with minimum five (5) years of documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install glazing when ambient temperature is less than 50 degrees F.

C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting, condensation or misting, and replacement of failed units.

C. Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.

D. Spandrel Glass: Provide a five (5) year warranty to include coverage for deterioration of spandrel glass coating, including replacement of failed units.

1.8 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Section 01 60 00 - Product Requirements: Extra materials, spare parts, and maintenance products.
   1. Extra Insulating Glass Units: One percent (1%), but no less than one (1) each, of each type and size installed. Furnish storage rack to hold all pieces of glass.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide glazing and glazing assemblies of type and thickness designed to support assembly dead loads and to withstand live loads caused by positive and negative wind pressure acting

normal to plane of glass. Comply with the State Building Code for the State in which the project is located.

1. Wind Loads: Design and size glazing and glazing assemblies to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, including increased wind loads at building corners.
    a. Design calculations of glass and glass assemblies to be in accordance with ASCE 7.
    b. Comply with Design Loads indicated on Drawings and applicable code requirements based on geographical location.
    c. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
2. Seismic Loads: Design and size components and system to withstand seismic loads and sway displacement as calculated in accordance with ASCE 7 and applicable code requirements.
3. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, whichever is less with full recovery of glazing materials.
4. Glass thickness listed in this Section and on Drawings is minimum. Actual thickness to be as required by design to comply with performance requirements.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.

1. In conjunction with vapor retarder and joint sealer materials described in other Sections.
2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:

1. U-Values: NFRC 100.
2. Solar Heat Gain Coefficients: NFRC 200.
3. Solar Optical Properties: NFRC 300.

2.2 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.

1. Glass Lite Thicknesses: As indicated, but not less than 1/4 inch; provide greater thickness as required for exterior glazing wind load design.
2. Annealed Glass: ASTM C1036, Type I (transparent flat), Class 1 (clear), Quality-Q3.
3. Tinted Glass: ASTM C1036, Type 1 (transparent flat), Class 2 (tinted), Quality-Q3, color and performance characteristics as indicated.
4. Heat-Strengthened Glass: ASTM C1048, Kind HS.
5. Fully Tempered Safety Glass: ASTM C1048, Kind FT.
6. Acid Etched Glass: ASTM C1036, Type II (transparent flat), Class 1 (clear), Quality-Q3.
7. Tempered Acid Etched Glass: ASTM C1048 Kind FT (fully tempered), Type II (transparent flat), Class 1 (clear), Quality-Q3.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.

1. Laminated Safety Glass:
    a. Comply with ANSI Z97.1 - Class A or 16 CFR 1201 - Category II impact test requirements.
2. Interlayer:
    a. Polyvinyl Butyral (PVB) Interlayer; 0.030 inch thick, minimum.

C. Low-E Coating Types:
1. Low-E (solar control): Manufactured using the magnetron sputtered vacuum deposition (MSVD) process and in compliance with ASTM C1376.

2.3 INSULATING GLASS UNITS - GENERAL

A. Manufacturers:
1. Cardinal Glass Industries.
2. Guardian Industries Corporation.
3. Pilkington North America Inc.
4. Viracon (Subsidiary of Apogee Enterprises, Inc.)
5. Vitro Architectural Glass (formerly PPG Glass).
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Basis of Design: Guardian Industries Corporation.

C. Fabricators:
1. Fabricator certified by glass manufacturer for type of glass, glass unit, coating, and treatment involved and capable of providing requirements indicated in this Section.

D. Insulating Glass Units: Types as indicated.
1. Factory assembled units consisting of continuously sealed lites of glass separated by an aluminum (or stainless steel) spacer with sealants.
2. Overall Unit Thickness: Dependent on assembled unit components.
3. Durability: Certified by an independent testing agency to comply with ASTM E2190.
4. Metal Edge Spacers:
a. Aluminum, mitered and spigoted.
1) Desiccant: Molecular sieve or silica gel, or blend of both.
5. Edge Seal: Dual Seal - Glass to elastomer with supplementary silicone sealant.
6. Interpane Air Space: Purged dehydrated space, and hermetically sealed. Space fill type to be as indicated in each IGU Type.
7. Primary IGU Seal:
a. The primary IGU sealant must be fully wetted against the glass and be continuous around the perimeter of each side with a targeted width of 5/32 inch and a minimum width of 3/32 inch.
b. The minimum thickness of the primary seal after pressing is 1/16 inch.

2.4 INSULATING GLASS UNITS

A. **Type IG1** - Insulating Glass Unit:
1. Outboard Lite:
a. Coating:
1) Low-E Coating (solar control type), on #2 surface.
a) Basis of Design:
(1) Guardian - SunGuard SN 54.
b. Tint:
1) Class 1 - Clear.
c. Glass Type:
1) Fully Tempered Safety Glass.
d. Glass Thickness: 1/4 inch (6 mm) minimum.
2. Inboard Lite:
a. Coating:
1) None.
b. Tint:
1) Class 1 - Clear.
c. Glass Type:

1) Fully Tempered Safety Glass.
d. Glass Thickness: 1/4 inch (6 mm) minimum.
3. Interspace Content: 1/2 inch (12.7 mm) wide.
a. Dehydrated Air filled.
4. Overall Unit Thickness: 1 inch (25 mm).
5. Provide labeling where safety glazing labeling is required.
6. Glass Unit Performance Characteristics:
a. Visible Light Transmittance (%): 54.
b. Visible Light Reflectance Outdoors (%): 14.
c. Winter U-Value Nighttime: 0.29.
d. Solar Heat Gain Coefficient (SHGC): 0.28.
e. Light to Solar Gain (LSG): 1.91.

B. **Type IG1L** - Insulating Glass Unit: Match **Type IG1** except as follows.
1. Inboard Lite:
a. Glass Type: Laminated Safety Glass - Clear PVB interlayer.

C. **Type IG2** - Insulating Glass Unit:
1. Outboard Lite:
a. Coating:
1) Low-E Coating (solar control type), on #2 surface.
a) Basis of Design:
(1) Guardian - SunGuard SN 54.
b. Tint:
1) Class 2 - Tinted:
a) Color:
(1) Crystal Grey - 38%.
c. Glass Type:
1) Fully Tempered Safety Glass.
d. Glass Thickness: 1/4 inch (6 mm) minimum.
2. Inboard Lite:
a. Coating:
1) None.
b. Tint:
1) Class 1 - Clear.
c. Glass Type:
1) Fully Tempered Safety Glass.
d. Glass Thickness: 1/4 inch (6 mm) minimum.
3. Interspace Content: 1/2 inch (12.7 mm) wide.
a. Dehydrated Air filled.
4. Overall Unit Thickness: 1 inch (25 mm).
5. Provide labeling where safety glazing labeling is required.
6. Glass Unit Performance Characteristics:
a. Visible Light Transmittance (%): 39.
b. Visible Light Reflectance Outdoors (%): 9.
c. Winter U-Value Nighttime: 0.29.
d. Solar Heat Gain Coefficient (SHGC): 0.23.
e. Light to Solar Gain (LSG): 1.67.

D. **Type IG2L** - Insulating Glass Unit: Match **Type IG2** except as follows.
1. Inboard Lite:
a. Glass Type: Laminated Safety Glass - 65% translucent PVB interlayer.

2.5 GLASS UNITS - SINGLE PANE

A. **Type SG** - Safety Glass, Tempered.
   1. Application: Locations as follows.
      a. All interior locations unless indicated otherwise.
   2. Tint:
      a. Class 1 - Clear.
         1) Exception: If adjacent glass is tinted, match tinted glass.
   3. Glass Type: Fully Tempered Safety Glass.
   4. Thickness: 1/4 inch.

B. **Type SGL** - Safety Glass, Laminated.
   1. Application: Locations as follows.
      a. Locations indicated on Drawings.
   2. Tint:
      a. Class 1 - Clear.
         1) Exception: If adjacent glass is tinted, match tinted glass.
   3. Glass Type: Laminated Safety Glass.
   4. Thickness: 1/4 inch.

2.6 GLAZING COMPOUNDS

A. All materials to be approved by manufacturers of products to which glazing compounds are to be applied.

B. 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.

C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; 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.

2.7 ACCESSORIES

A. All accessories to be approved by manufacturers of products to which accessories are to be applied.

B. Setting Blocks: Neoprene, 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 inches x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

C. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inches long x one half the height of the glazing stop x thickness to suit application, self-adhesive on one face.

D. 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.
   1. Width: As required for application.
   2. Thickness: As required for application.
   3. Manufacturers:
      a. Pecora Corporation - Extru-Seal Glazing Tape.
      b. Tremco Sealants - Tremco 440 Glazing Tape.

E. Spacer Rod Diameter: As required for application.

F. Glazing Gaskets (Splines): Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

G. Fire-Resistant Glazing Materials: Materials used to obtain required fire-resistant rating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

C. Verify that the minimum required face and edge clearances are being provided.

D. 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.

E. Verify that sealing between joints of framing system members has been completed effectively.

F. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

B. Prepare materials to be installed and equipment used during installation.

C. 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.

D. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

E. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION - GENERAL

A. Perform installation in accordance with GANA Glazing Manual.
   1. Glazing Sealants: Comply with ASTM C1193.
   2. Fire Rated Openings: Comply with NFPA 80.

B. 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.

C. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

D. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

E. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

F. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

G. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as weld splatter, fire-safing, plastering, mortar droppings, etc.

3.4 INSTALLATION METHODS

A. Utilize installation method required by manufacturer and glazing system design.

B. Dry Glazing Method (Gasket Glazing):
   1. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
   2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
   3. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
   4. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

C. Dry Glazing Method (Tape and Gasket Spline Glazing):
   1. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
   2. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
   3. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
   4. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
   5. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
   6. Carefully trim protruding tape with knife.

D. Dry Glazing Method (Tape and Tape):
   1. Application - Interior Glazed: Set glazing infills from the interior of the building.
   2. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
   3. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
   4. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
   5. Place glazing tape on free perimeter of glazing in same manner described above.
   6. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
   7. Carefully trim protruding tape with knife.

E. Wet Glazing Method (Compound and Compound):
   1. Application - Interior Glazed: Set glazing infills from the interior of the building.
   2. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inches centers, kept 1/4 inch below sight line.
   3. Locate and secure glazing pane using glazers' clips.
   4. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

F. Wet/Dry Glazing Method (Preformed Tape and Sealant):
   1. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
   2. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.
   3. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
   4. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
   5. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
   6. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.

a. Place glazing tape on glazing pane of unit with tape flush with sight line.

7. Fill gap between glazing and stop with glazing manufacturer's required sealant type to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
8. Apply cap bead of glazing manufacturer's required sealant type along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.

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.

3.6 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

C. Remove non-permanent 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.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Protect installed construction from damage.

3.8 SCHEDULE

A. Refer to Drawings for locations of Glass Unit Types.

END OF SECTION

SECTION 08 83 00
MIRRORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Frameless glass mirrors, for wall mounted installation.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Wall construction.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety.

B. ASTM International:
   1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
   2. ASTM C1036 - Standard Specification for Flat Glass.
   3. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
   4. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
   5. ASTM C1193 - Standard Guide for Use of Joint Sealants.
   6. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror, 2008, Reapproved 2013

C. Consumer Product Safety Commission:
   1. CPSC 16 CFR 1201; Safety Standard for Architectural Glazing.

D. Glass Association of North America:
   1. GANA - FGMA Sealant Manual.
   2. GANA - Glazing Manual.

E. South Coast Air Quality Management District:
   1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

1.3 PERFORMANCE REQUIREMENTS

A. Limit mirrored glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less based on loading requirements specified in Section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
   2. Glazing Materials: Submit chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

C. Manufacturer’s Certificate: Certify mirrors meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for mirror installation methods.

B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum five years documented experience.

B. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing film and substrates on which mirrors are installed.

1.7 PRE-INSTALLATION MEETING

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week before starting Work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install glazing when ambient temperature is less than 50 degrees F.

C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing sealants.

1.9 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Furnish two (2) year warranty to include coverage for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Tempered Safety Mirror Glass: ASTM C1503, Kind FT fully tempered, Type 1 transparent flat, Class 1 clear, Quality Q2 mirror; type with copper and silver coating, and organic overcoating.
   1. Edge Treatment:
      a. Flat Polished/Ground.
   2. Edge Seal: Seal edge after edge treatment to prevent chemical or atmospheric penetration of backing.
   3. Perform edge treatment and sealing in factory immediately after cutting to final sizes.
   4. Thickness: Nominal total of 1/4 inch, unless otherwise indicated.
   5. Size: Sizes noted on Drawings.

2.2 ACCESSORIES

A. Mirror Adhesive: Chemically compatible with mirror coating and wall substrate.

2.3 MIRROR HARDWARE

A. Metal J-Channels: Fabricated with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
   1. Metal:
      a. Stainless steel.
   2. Finish:
      a. Bright polished.
   3. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch.
   4. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch.

B. Fasteners: Fabricated of same metal and alloy as fastened metal. Finish to match fastened metal in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify openings for mirrored glazing are correctly sized and within tolerance.

C. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive mirrors.

3.2 PREPARATION

A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

B. Prepare materials to be installed and equipment to be used during installation.

C. Clean contact surfaces with solvent and wipe dry.

D. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

E. Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

A. Perform installation in accordance with GANA Glazing Manual.
   1. Glazing Sealants: Comply with ASTM C1193.
   2. Set mirrors plumb and level, free of optical distortion.
      a. Mirrors shall be butt mounted to unpainted wall with mastic to comply with manufacturer's recommendations
   3. Set mirrors with edge clearance free of surrounding construction.

B. For wall-mounted mirrors, install mirrors with mastic and mirror hardware.
   1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
   2. For mirror hardware in the form of a continuous J-channel at bottom and continuous top trim at top, fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
   3. Install mastic as follows:
      a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
   4. Place plumb and level without visible distortion.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect for quality of glazing.

3.5 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. Remove labels after Work is complete.

C. Clean mirrors and adjacent surfaces.

D. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

3.6 SCHEDULE

A. Trophy Case.

B. Where indicated on the drawings.

END OF SECTION

SECTION 08 91 00

LOUVERS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes louvers, frames, and accessories.

B. Related Requirements:
   1. Section 07 90 00 - Joint Protection: Sealant at louver perimeter.
   2. Division 23 - Heating, Ventilating and Air-Conditioning (HVAC): Coordinate Work of this Section with requirements of HVAC systems.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. 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. Air Movement and Control Association International, Inc. (AMCA):
   1. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.
   2. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2021, Editorial Revisions 2022.

C. American Society of Civil Engineers (ASCE):
   1. ASCE 7 - Minimum Design Loads and Associated Criteria For Buildings And Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM International (ASTM):
   1. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
   2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with installation of masonry flashings.

C. Coordinate Work with installation of mechanical ductwork and electrical services to motorized devices.

D. Coordinate air-flow rate and capacity to comply with the design requirements indicated in the contract documents.

E. Verify field measurements prior to fabrication.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data describing design characteristics, maximum recommended air velocity, design free area, materials, and finishes.

C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb, and sill details; blade configuration, screens, blank-off panel areas required, and frames.

D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selection.

E. Samples for Verification: From the Architect's initial selection, prepare two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AMCA 500-L testing and AMCA 511 certification. Attach AMCA seal to louvers.

B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.

1.7 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties.

B. Provide minimum fifteen (15) year manufacturer's warranty on finish.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design and size system components and anchorage to safely withstand assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to louver plane.
   1. Wind Design Pressure:
      a. As indicated on Drawings, in accordance with ASCE 7, and in accordance with the State Building Code for the State in which the project is located.

B. Louver Air Passage: To permit passage of air at velocity of 750 ft / min without blade vibration or noise, with maximum static pressure loss of 0.10 inches measured at 750 ft / min.

C. Louver Free Area: To permit 50 percent free area.

D. Louver Water Penetration: Not more than 0.01 oz/sq ft of free area at minimum 750 ft / min face velocity.

2.2 WALL LOUVERS

A. Manufacturers:
   1. Airline Products Company.
   2. Airolite.
   3. Arrow United Industries.

4. Construction Specialties Inc.
5. Greenheck Corporation.
6. Ruskin.
7. Substitutions: Section 01 60 00 - Product Requirements.

B. Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.

C. Louver Construction: Extruded aluminum; size, configuration and face dimensions as indicated on Drawings.

D. Louver Panel Depth: Minimum 5 inches deep, or deeper if required by size and performance requirements.

E. Heads, sills, jambs, and mullions to be one-piece structural aluminum extrusion members; minimum extrusion wall thickness to be 0.081 inch and with integral perimeter formed with sealant slot and retaining bead to retain backer rod for sealant application.
1. Intermediate Mullions: Concealed of extruded aluminum, profiled to suit louver frame.

F. Louver Blades: Drainable blades to be one-piece aluminum extrusions; minimum extrusion wall thickness to be 0.060 inch and with integral front lip gutter and multiple secondary gutters designed to stop and drain moisture to exterior of building envelope.
1. Storm proof, sloped at 45 degrees, chevron style.

G. Sill Pan: Sill flashings to include sill pan, minimum 3 inch high by full depth formed from minimum 0.050 inch thick aluminum; single length one-piece construction; integral formed drip edge to divert moisture away from building face. End dam side panels to be continuous welded to sill pan and full height of sill pan.

H. Hinged Units: Where indicated on Drawings, provide secondary frame to which louver frame is attached; non-ferrous hinges; all finishes to match colors selected by Architect.

2.3 MATERIALS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical or 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209/B209M, 5005 alloy, H15 or H34 temper, wall thickness as required for system application and use but not less than 0.050 inch.

2.4 ACCESSORIES

A. Screens: Mechanically fasten to interior side of louver.
1. Bird Screen: Interwoven wire mesh of aluminum, 0.063 inch diameter wire, 1/2 inch open weave, square design, set in aluminum frame.
2. Insect Screen: 18 x 16 size aluminum mesh, set in aluminum frame.

B. Blank-Off Panels: Furnish where indicated on the Drawings; fabricated by the louver manufacturer; metal type to be same as louver and frame metal type; metal finish type to be same as louver finish type.
1. Panel Type:
a. Composite Metal Sheet Panel: Blank-off panels to be composite construction faced on both sides with 0.032 inch (0.81 mm) thick metal sheet and core to be expanded polystyrene (EPS) having R-value of 4, minimum. Panel perimeter frame to be 0.050 inch (1.27mm) thick-formed metal channels; mitered at the corners.
1) Composite Panel Thickness:
a) 2 inches.

2. Secure blank-off panels to interior side of louver and fully sealed weathertight.
3. Blank-Off Panels Finish: In accordance with AAMA 2605, 70 percent resin fluoropolymer coating, minimum 1.4 mil (0.035mm) thick; color to be flat black.

C. Fasteners and Anchors: Concealed; stainless steel type.

D. Flashings: Sheet aluminum; finish to match louver finish.

E. Sealants: Silicone type specified in Section 07 90 00.

2.5 FACTORY FINISHING

A. Powder Coat: Polyvinylidene fluoride (PVDF) powder coat system complying with AAMA 2605, minimum 70 percent PVDF resin with minimum total dry film thickness (DFT) of 1.5 mils, 0.0015 inch (0.038 mm).

B. Colors and Gloss: As selected by Architect from manufacturer’s full range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify prepared openings and flashings are ready to receive Work and opening dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Section 01 73 00 - Execution: Related to installation of Work.

B. Provide continuous corrosion protection between dissimilar materials.

C. Louver systems, including sill flashings, to be installed in accordance with Drawings the manufacturer’s recommendations and to shed water to exterior of building envelope.

D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior of building envelope.

E. Sill pan to be embedded in full bed of sealant. Design system such that penetrations in flashings and sill pan are only for the purpose of structural anchoring of louver system.

F. Fully seal anchor holes and heads to prevent water penetration.

G. Install louvers level and plumb.

H. Secure louvers in opening framing with concealed fasteners.

I. Install bird and insect screen and frame to interior of louver.

J. Install perimeter sealant and backing rod in accordance with Section 07 90 00.

3.3 CLEANING

A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

B. In accordance with manufacturer's recommendations, strip protective finish coverings and clean surfaces and components.

END OF SECTION