

ARCHITECTS

Capital Bank Plaza

333 Fayetteville Street, Suite 225

Raleigh NC 27601

# PROJECT MANUAL

Volume 1 of 2

Divisions 00 thru 19

Architect's Project Number: 01905.000

## Erwin Elementary School

S 10<sup>th</sup> Street

Erwin, NC 28339

Harnett County Schools

1008 South 11<sup>th</sup> Street

Lillington, North Carolina 27546

March 4, 2020

For Construction

Addenda 1 thru 6 Incorporated



Set Number: \_\_\_\_\_



**SECTION 00 01 01**

**PROJECT TITLE PAGE**

**Date** March 4, 2020  
For Construction

**Project Identification** Erwin Elementary School  
S 10<sup>th</sup> Street  
Erwin, NC 28339  
Harnett County, NC  
  
Architect Project No.: 01905.000

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**END OF SECTION**

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SEALS PAGE

Architectural

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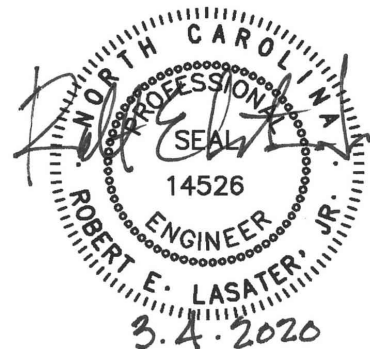
Architectural

SfL+a Architects, PA  
Thomas Warren Hughes  
NC Registration Number 9537



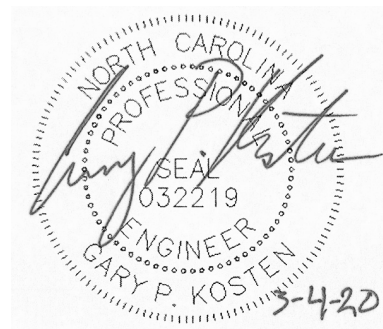
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LHC Structural Engineers, PC  
Robert E. Lasater, Jr.  
NC Registration Number 14526

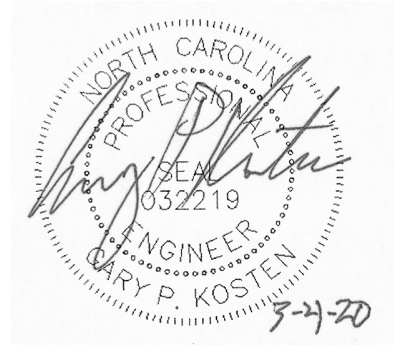


Fire Protection Engineering  
Plumbing Engineering

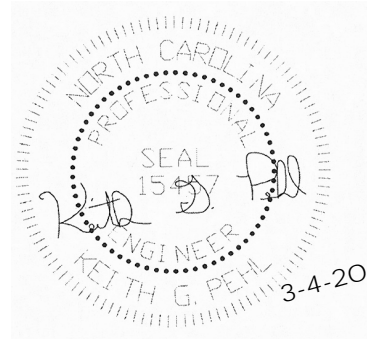
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Gary Kosten  
NC Registration Number 032219



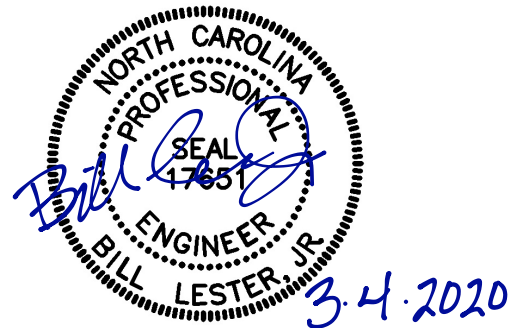
Mechanical Engineering  
Optima Engineering, PA  
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Provided By Construction Manager At Risk
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Refer to Project Manual Vol 1
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**1.1 SUMMARY**

- A. Section Includes:
  - 1. Geotechnical Exploration Report.

**1.2 GEOTECHNICAL EXPLORATION REPORT (101 pages, follows this page)**

- A. A copy of a geotechnical report is included with this document.
  - 1. Title: REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL EVALUATION; New Erwin Elementary School; Erwin, North Carolina.
  - 2. Prepared For: Harnett County Schools (Mr. Brooks Matthews), 1008 S. 11th Street, Lillington, North Carolina 27546.
  - 3. Prepared By: Building & Earth Sciences, Inc.; Kurt A Miller, PE; 610 Spring Branch Road, Dunn, North Carolina 28334.
  - 4. Preparer's Project No: RD190564.
  - 5. Report Date: January 15, 2020.
- B. This report 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 report, 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.

**PART 2 PRODUCTS (Not Used)**

**PART 3 EXECUTION (Not Used)**

**END OF SECTION**







REPORT OF SUBSURFACE EXPLORATION  
AND GEOTECHNICAL EVALUATION  
**NEW ERWIN ELEMENTARY SCHOOL**  
**ERWIN, NORTH CAROLINA**  
BUILDING & EARTH PROJECT NO.: **RD190564**

***PREPARED FOR:***  
**Harnett County Schools**

***JANUARY 15, 2020***

**BUILDING & EARTH**

Geotechnical, Environmental, and Materials Engineers





Geotechnical, Environmental, and Materials Engineers

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[www.BuildingAndEarth.com](http://www.BuildingAndEarth.com)

January 15, 2020

Harnett County Schools  
1008 S. 11<sup>th</sup> Street  
Lillington, North Carolina 27546

Attention: Mr. Brooks Matthews

Subject: Report of Subsurface Exploration and Geotechnical Evaluation  
New Erwin Elementary School  
Erwin, North Carolina  
Building & Earth Project No: RD190564

Mr. Matthews:

Building & Earth Sciences, Inc. has completed an authorized subsurface exploration and geotechnical engineering evaluation for the New Erwin Elementary School located at 301 S. 10<sup>th</sup> Street in Erwin, North Carolina.

The purpose of this exploration and evaluation has been to assess general subsurface conditions at the site and to address applicable geotechnical aspects of the proposed construction and site development. Recommendations in this report are based on a physical reconnaissance of the site and observation and classification of subsurface samples recovered from twenty-seven (27) soil test borings drilled at the site. Confirmation of anticipated subsurface conditions during construction is an essential part of geotechnical services.

We appreciate the opportunity to provide consultation services for the proposed project. If you have any questions regarding the information in this report or need any additional information, please call us.

Respectfully Submitted,

**BUILDING & EARTH SCIENCES, LLP**

North Carolina Firm Engineering License Number F-1081

  
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Staff Professional



Kurt A. Miller, P.E.  
Senior Geotechnical Engineer



  
George P. Ballock, P.E. (AL)  
Regional Vice President



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Subsurface Exploration and Geotechnical Evaluation,  
New Erwin Elementary School, Erwin, North Carolina  
Project No: RD190564, January 15, 2020

## 1.0 PROJECT & SITE DESCRIPTION

Proposed for construction is a new elementary school located at 301 S. 10<sup>th</sup> Street in Erwin, North Carolina. It is our understanding the existing building will be razed and a completely new structure will be constructed in its place. The new building footprint will overlap the existing building footprint. Property boundaries are Denim Drive to the north, S. 10<sup>th</sup> Street to the east, and East D Street to the south. The new school is expected to be 2 stories in height with a footprint covering about 78,000 sq. ft. Support will be through masonry bearing walls. Additional information regarding the project is summarized in Table 1, below. An aerial photograph (Google Earth Imagery dated 3/2018) and site photographs made during our field exploration follow the table.

Development Item	Detail	Description
<b>General Site</b>	Size (Ac.)	±15.3 acres
	Existing Development	Erwin Elementary School (5 existing structures)
	Vegetation	Mostly grass, with trees located along boundary lines
	Drainage	Well-drained
	Cuts & Fills <sup>2</sup>	≤10 feet of Fill (Based on F.F.E. = 209.00 ft.)
<b>Proposed Buildings</b>	No. of Bldgs.	1
	Square Ft.	78,000 ft. <sup>2</sup> (Estimated) per floor
	Stories	2
	Construction	Masonry
	Column Loads <sup>1</sup>	≤250 kips
	Wall Loads <sup>1</sup>	≤4 klf
	Preferred Foundation	Conventional Shallow Spread
Preferred Slab	Concrete Slab-on-grade	
<b>Pavements</b>	Traffic	Not Provided
	Standard Duty	Yes, Rigid and Flexible
	Heavy Duty	Yes, Rigid and Flexible

**Table 1: Project and Site Description**

Reference: HCS – Erwin ES Request for Proposal (11/14/2019) and Erwin ES Preliminary Survey (9/23/19)

**Notes:**

- 1. If actual loading conditions exceed our anticipated loads, Building & Earth Sciences should be allowed to review the proposed structural design and its effects on our recommendations for foundation design.**
- 2. When a grading plan is finalized, Building & Earth should be allowed to review the plan and its effects on our recommendations.**

Subsurface Exploration and Geotechnical Evaluation,  
New Erwin Elementary School, Erwin, North Carolina  
Project No: RD190564, January 15, 2020

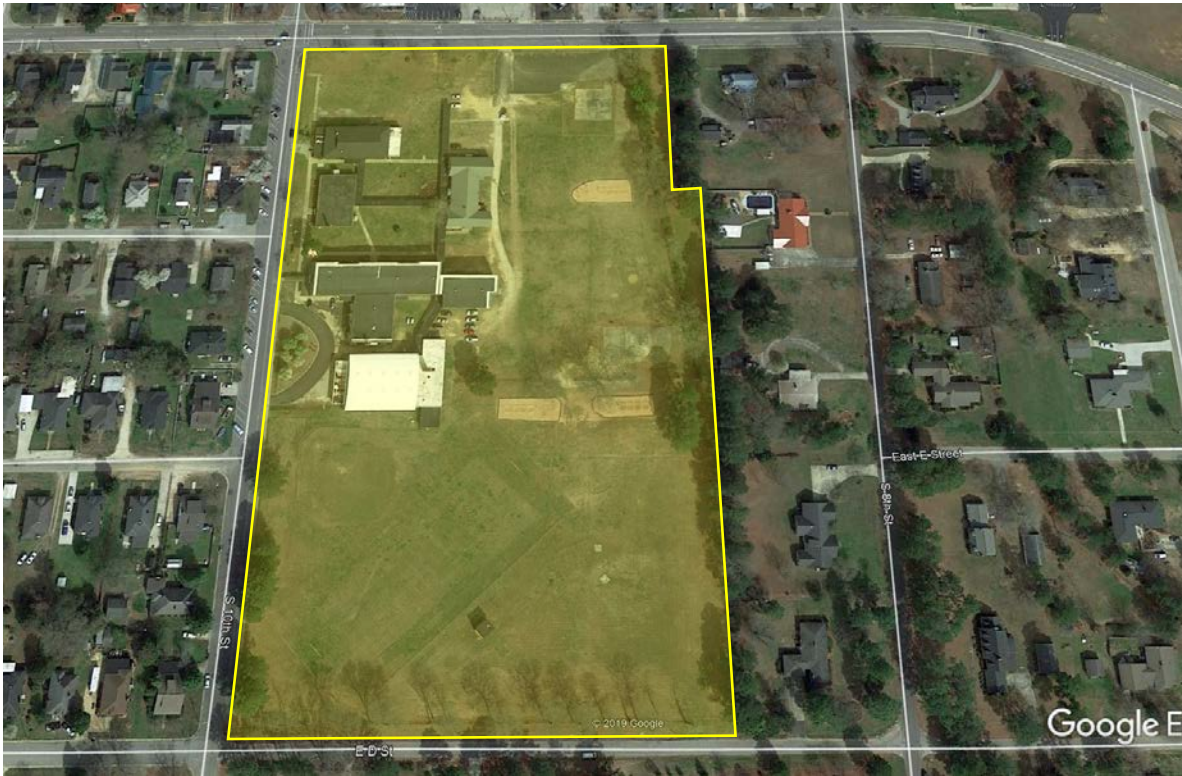


Figure 1: Aerial Image of Project Site (Google Earth dated 3/2018)



Figure 2: Looking Northeast across the Project Site

Subsurface Exploration and Geotechnical Evaluation,  
New Erwin Elementary School, Erwin, North Carolina  
Project No: RD190564, January 15, 2020

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**Figure 3: Photograph Showing General Site Conditions**



**Figure 4: Looking East across the Project Site**



Subsurface Exploration and Geotechnical Evaluation,  
 New Erwin Elementary School, Erwin, North Carolina  
 Project No: RD190564, January 15, 2020

## **2.0 SCOPE OF SERVICES**

Drilling for the authorized subsurface exploration was performed during the period December 17 through December 20, 2019 in conformance with our proposal LV21663, dated December 13, 2019. Occasionally some modification to work scopes appearing in our proposals is required to provide for proper evaluation of encountered subsurface conditions. Modification to the scope included the performance of 11 soil classifications (12 proposed). No other modifications to the work scope were required to complete this exploration.

The purpose of the geotechnical exploration has been to assess general subsurface conditions at specific boring locations and to gather data on which to base a geotechnical evaluation with respect to the project. Subsurface exploration for this project consisted of twenty-seven (27) soil test borings. The site was drilled using a Geoprobe 3230DT drill rig equipped with an automatic hammer.

Soil boring positions were field located by a representative of our staff using a Garmin GPSmap 64. As such, boring locations appearing on the Boring Location Plan, attached to this report, should be considered approximate. Boring sites were mapped by the Client prior to commencement of field work.

Soil samples recovered during our site investigation were visually classified and specific samples were selected by the project engineer for laboratory analysis. The laboratory analyses consisted of:

Test	ASTM	No. of Tests
Natural Moisture Content	D2216	<b>24</b>
Atterberg Limits	D4318	<b>11</b>
Material Finer Than No. 200 Sieve by Washing	D1140	<b>11</b>
Standard Proctor Compaction Test	D698	<b>2</b>
Laboratory California Bearing Ratio	D1883	<b>2</b>

**Table 2: Scope of Laboratory Tests**

Results of the laboratory analyses are presented on the attached Boring Logs and in tabular form in the report Appendix. Descriptions of laboratory tests that were performed are also included in the Appendix.

Information gathered from the exploration was evaluated to identify a suitable foundation type for the new elementary school. The information was also evaluated to identify any special subgrade preparation procedures that may be required during the project earthworks phase. Results of the work presented in this report provide or address the following:

- Summary of existing surface conditions.
- A description of the subsurface conditions encountered at the boring locations.
- Site preparation considerations including material types to be expected during grading as well as recommendations regarding handling and treatment of unsuitable soils, if encountered.
- Compaction requirements and recommended criteria to establish suitable surfaces for structural backfill.
- Boring logs detailing the materials encountered with soil classifications, penetration values, and groundwater levels (if measured).
- Presentation of depth to observed SHWT, and infiltration test results.
- Presentation of laboratory test results.
- Recommendations for foundation and floor slab support of the new structure.
- Presentation of the estimated total and differential settlement.
- Recommendations for new pavement thicknesses for access roads, bus loops, and parking lots.
- Plans and maps showing the location of the project and our onsite work.

### **3.0 GEOTECHNICAL SITE CHARACTERIZATION**

The following paragraphs are intended to provide a general characterization of the site from a geotechnical engineering perspective. It is not the intention of this report to address every potential geotechnical matter that may arise, nor to provide every possible interpretation of conditions encountered. The following condition descriptions and subsequent geotechnical recommendations are based on the assumption significant changes in subsurface conditions do not occur between boreholes. However, anomalous conditions can occur due to variations in existing fill that may be present at the site, or due to natural variations in site geologic conditions. It will be necessary to evaluate actual conditions during site grading and foundation installation.

### 3.1 GEOLOGY

Appearing on the USGS *Geologic Map of North Carolina*, the project site is situated along the western boundary of the North Carolina Coastal Plain and is characterized by soils associated with the Middendorf formation. These soils were deposited over time as a result of erosion from rains and streams flowing toward the Atlantic Ocean. Per the literature, the general site area is underlain by terrace deposits and upland sediments consisting of unconsolidated clay, silt, and sand, during oceanic subsidence which occurred during the Cenozoic (65 million years of age) era. Conditions encountered in borings drilled for this study generally correlate to the published geological information.

### 3.2 EXISTING SURFACE CONDITIONS

At the time of our field work, the site was described as gently sloped in a northeasterly direction. According to Google Earth aerial imagery, elevations on-site and within the proposed building footprint appear to range from approximately 200' to 209'. The site is currently occupied by 5 separate structures and associated pavements, all of which will be razed to make way for the new school building.

Ground cover consists of grass, with bare earth exposed in some areas. A tree line exists along the eastern boundary, with a few trees extending to the center of the site. From review of historical aerial imagery, it appears the site has had the same configuration since at least 1994. The site appeared to be well-drained at the time of our field work, with site grading and drainage structures providing effective storm water management near existing structures and roadways.

### 3.3 SUBSURFACE CONDITIONS

A generalized stratification summary has been prepared using data from the soil test borings and is presented in Table 3, below. The stratification depicts general soil conditions and strata types encountered during our field investigation.

Stratum No.	Typical Thickness	Description	Consistency / Relative Density
1	2 – 18 in.	Topsoil	N/A
2	2 – 6 in.	Asphalt or Aggregate Base	N/A
3	0.5 – 1.4 ft.	Fill – Silty Sand (SM) or Clayey Sand (SC)	Very Loose to Medium Dense
4	5.3 – 22 ft.	Sandy Fat Clay (CH) or Elastic Silt (MH)	Soft to Very Stiff
5	2.4 – 12.7 ft.	Sandy Lean Clay (CL)	Soft to Hard
6	6.5 – 21.5+ ft. (Past B.T.)	Silty Sand (SM) and Clayey Sand (SC)	Very Loose to Dense

**Table 3: Stratification Summary**

Subsurface soil profiles have also been prepared using subsurface data obtained from specific borings. These are presented in the Appendix. For specific details regarding information obtained from individual soil borings, please refer to the Boring Logs included in the Appendix. Ground surface elevations at the boring sites, reported on the logs and throughout this report, were estimated using the Google Earth elevation tool.

### **3.3.1 TOPSOIL**

Ground cover at all the boring sites, with the exception of B-04 and B-05, is described as sod with 2 to 18 inches of topsoil. No testing has been performed to verify these soils meet requirements of "topsoil". Topsoil depths reported on the boring logs should only be considered an estimate as topsoil thickness may vary in unexplored portions of the site.

### **3.3.2 ASPHALT OR AGGREGATE BASE**

Borings B-04 and B-05 were drilled through existing asphalt pavement; asphalt was also encountered beneath a fill layer in B-16, and beneath the topsoil in B-17. Crushed stone was encountered in B-21 and B-26 below the topsoil layer. Approximately 2 to 6 inches of asphalt or crushed stone was observed in these borings. It should be noted that asphalt pavement and aggregate thickness may vary in unexplored portions of the site.

### **3.3.3 FILL – SILTY SAND (SM) OR CLAYEY SAND (SC)**

Previously placed fill soils, visually classified as silty sand (SM) or clayey sand (SC), were observed in 13 of the test borings beginning just below the topsoil or asphalt/aggregate base. Soils in this layer extend to depths approximately 1.0 to 2.0 feet below the surface. SPT N-values in this soil layer range from 3 to 14 blows per foot. Soils of this stratum are further described as very loose to medium dense, brown, fine to medium grained, and moist.

### **3.3.4 SANDY FAT CLAY (CH) OR ELASTIC SILT (MH)**

High plasticity fine-grained soils described as sandy fat clay (CH) or elastic silt (MH) were observed in borings B-01 through B-06, B-12 through B-18, and B-27 beginning just below the topsoil or fill layer and extending to depths 6.0 to 23.5 feet below the surface. SPT N-values in this soil layer range from 2 to 23 blows per foot. Values in the range of 4 to 7 blows per foot are considered representative in the upper 3 feet. N-values generally increase with depth. These soils are further described as soft to very stiff, reddish brown to brown, fine grained, and moist to wet.

Laboratory classification testing was performed on various samples collected from this stratum. Testing indicates the soil has liquid limits from 60 to 76 and plasticity indices from 21 to 36. From 50 to 75 percent of the material passes the No. 200 sieve. These data correspond to a USCS CH or MH classification.

### **3.3.5 SANDY LEAN CLAY (CL)**

Low plasticity fine-grained soils described as sandy lean clay (CL) were observed in borings B-07 through B-11 just below the topsoil layer, extending to depths 3.5 to 13.5 feet below the surface. In boring B-13, these soils were observed from 24.0 to 28.5 feet below the surface; CL soils were also observed in B-24 below the SC layer, and in B-25 below the fill layer. SPT N-values in this soil layer range from 2 to 26 blows per foot. Values in the range 5 to 8 blows per foot are considered representative in the upper 3 feet of the layer, with 16 to 18 blows per foot considered representative below 3 feet. Soils of this stratum are further described as soft to hard, reddish brown to grayish brown, fine grained, and moist to wet.

Laboratory classification testing was performed on two samples collected from this stratum. Testing indicates the soil has liquid limit values from 30 to 33, plasticity indices from 13 to 17, and 59 to 63 percent passing the No. 200 sieve. These data correspond to a USCS CL classification.

### **3.3.6 SILTY SAND (SM) AND CLAYEY SAND (SC)**

In-situ coarse grained soils described as silty sand (SM) and clayey sand (SC) were encountered below the CH-MH layer in B-05, B-06, and B-12 through B-18, below the CL layer in B-07 and B-10, and below the topsoil or fill layers in B-19 through B-24, and B-26. The soils in this layer generally extend past boring termination depths. These soils are further described as very loose to dense, light brown to reddish brown, fine to medium grained, and moist to wet. SPT N-values in the stratum range from 2 to 26 blows per foot, with low relative density ( $N \leq 8$ ) soils noted at various depths throughout the stratum. Wash 200 grain size and Atterberg limits tests were performed on four samples collected from this layer. The testing indicates 20 to 46 percent passing the #200 sieve, liquid limits in the range 28 to 78, and plasticity indices in the range 10 to 42. This material is classified as SM or SC in accordance with the USCS classification system.

### **3.3.7 AUGER REFUSAL**

Auger refusal is the drilling depth at which a borehole can no longer be advanced using soil drilling procedures. Auger refusal can occur on hard soil, boulders, buried debris or bedrock. Coring is required to sample materials below auger refusal. Auger refusal did not occur in the borings drilled for this study.

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### 3.3.8 GROUNDWATER

Groundwater was encountered in 12 borings at the time of drilling at depths ranging from 5.9 to 15.5 feet. Twenty-four hour monitoring in stand-pipe piezometers, placed in borings B-06, B-13, and B-19, was also performed. Groundwater was measured in the piezometers at 3.5 to 13.5 feet (elevation 191.5 to 196.5). These borings were backfilled about 24 hours after drilling; all other borings were backfilled on the date drilled. Groundwater data is summarized in the following table.

Boring No.	Depth at Time of Drilling (ft.)	Stabilized Depth at 24-hours (ft.)	Approximate Elevation (ft.)
B-01	Not encountered	Not measured	--
B-02	Not encountered	Not measured	--
B-03	Not encountered	Not measured	--
B-04	Not encountered	Not measured	--
B-05	15.0	Not measured	193.0
B-06	15.0	13.5	195.5
B-07	Not encountered	Not measured	--
B-08	Not encountered	Not measured	--
B-09	Not encountered	Not measured	--
B-10	Not encountered	Not measured	--
B-11	Not encountered	Not measured	--
B-12	12.4	Not measured	191.6
B-13	13.0	12.5	191.5
B-14	13.0	Not measured	194.0
B-15	15.5	Not measured	193.5
B-16	15.0	Not measured	193.0
B-17	10.1	Not measured	193.9
B-18	7.1	Not measured	192.9
B-19	5.9	3.5	196.5
B-20	Not encountered	Not measured	--
B-21	10.2	Not measured	192.8
B-22	15.0	Not measured	193.0
B-23	Not encountered	Not measured	--
B-24	Not encountered	Not measured	--
B-25	Not encountered	Not measured	--
B-26	Not encountered	Not measured	--
B-27	Not encountered	Not measured	--

**Table 4: Groundwater Depths**

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### 3.3.9 SEASONAL HIGH WATER TABLE AND INFILTRATION TESTING

In order to measure the depth to the Seasonal High Water Table (SHWT), Mr. Mike Eaker, a North Carolina Licensed Soil Scientist with Southeastern Soil & Environmental Associates, Inc., under contract to Building & Earth Sciences, performed the field measurements and provided a letter summarizing his work. Mr. Eaker's report details the procedures used in his field evaluation, results of his soil observations, depth to SHWT, and the depth to observed water at each test location. This report is included in the Appendix.

Once the SHWT was measured, Building & Earth performed infiltration testing on the project site. The flow of the near-surface soils has been approximated using the concepts presented in Bernoulli's Equation for steady state flow and Darcy's Law for fluid flow through a porous media. Additionally, our  $K_{sat}$  values were calculated using the Glover solution, which is dependent on the geometry of the borehole and the hydraulic head.

Infiltration testing was performed on January 10, 2020 at three locations shown on the Boring Location map, identified as I-01, I-03, and I-04. Based on the results of our testing, the soils in these locations have a stabilized  $K_{sat}$  value which ranges from 0 to 0.04 inches per hour. Detailed data sheets for infiltration testing are presented in the Appendix of this report.

### 3.3.10 SEISMIC SITE CLASSIFICATION

Basis of Evaluation	Recommended Site Classification
ASCE/SEI 7-16	<b>D</b>
<p>The SeisOpt<sup>®</sup> refraction microtremor (ReMi<sup>®</sup>) method was used to determine the Seismic Site Class of the building area. SeisOpt<sup>®</sup> ReMi<sup>®</sup> V<sub>s</sub>4.0 software uses data from conventional seismograph and P-wave geophones to estimate average shear wave velocities and one and two-dimensional shear wave profiles to a depth of 100 feet below the existing site grades. These velocities are used to classify a building site with the Site Class A through E designation, in accordance with ASCE/SEI 7-16, Chapter 20. The average shear wave velocity (<math>V_s</math>) in the upper 100 feet was 1,133 feet per second (ft/s). The results of the shear wave velocity analysis are included in the Appendix.</p>	

**Table 5: Seismic Site Classification**

The ASCE 7 Hazard Tool (<https://asce7hazardtool.online/>) was used to determine:

- The mapped Risk-targeted Maximum Considered Earthquake ( $MCE_R$ ) ground motion parameters for 0.2-second ( $S_s$ ) and 1-second ( $S_1$ ) spectral response acceleration, 5% damped;
- The short-period ( $F_a$ ) and long-period ( $F_v$ ) site coefficients;

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- The 0.2-second ( $S_{MS}$ ) and 1-second ( $S_{M1}$ ) spectral response acceleration, adjusted for site class;
- The design parameters for 0.2-second ( $S_{DS}$ ) and 1-second ( $S_{D1}$ ) spectral response acceleration; and
- The Seismic Design Category.

The following assumptions were made: Risk Category III; and approximate center of the site, latitude 35° 19' 31.64" N, longitude 78° 40' 11.86" W. If actual Risk Category or location is different, Building & Earth Sciences should be notified to review the effects on our evaluation. Results of the evaluation using the ASCE 7 Hazard Tool are as follows:

Parameter	Value	Parameter	Value
$S_s$ :	0.133	$S_1$ :	0.065
$F_a$ :	1.6	$F_v$ :	2.4
$S_{MS}$ :	0.212	$S_{M1}$ :	0.156
$S_{DS}$ :	0.142	$S_{D1}$ :	0.104
<b>Seismic Design Category:</b>		B	

Table 6: Seismic Parameters

#### 4.0 SITE DEVELOPMENT CONSIDERATIONS

A preliminary finished floor elevation of 209.00 feet was provided at the time of this report (ECLS "Boundary Survey" dated 9/23/2019). Based on the given information, we anticipate up to 10 feet of structural fill will be required to achieve finished grades. ***If amendments are made to the final grading plan, Building & Earth should be notified to review its effects on our recommendations.***

Based on our evaluation of the subsurface soil information and the anticipated foundation loads, it appears that building support with a conventional shallow spread foundation system is feasible. Site development recommendations presented below are intended for development of the site to support construction with a shallow spread foundation system. ***If a different type of foundation system is preferred, Building & Earth should be allowed to review the site development recommendations to verify they are appropriate for the preferred foundation system.***



Primary geotechnical concerns affecting this project are:

- Stabilization measures required due to low consistency and low relative density soils encountered across the site.
- Shrink and swell potential of naturally occurring fat clays and elastic silts encountered during subsurface exploration.
- Previously placed fill soils encountered across most of the site.
- Proper placement of structural fill soils to achieve planned final grades.
- Clearing operations required due to existing structures occupying the site.

Recommendations addressing the site conditions are presented in the following sections.

#### **4.1 INITIAL SITE PREPARATION**

Initial site preparation is planned to include razing of the existing school structures as well as removal of associated pavements. During site clearing all trees, roots, topsoil, buried structures and utilities, pavement materials, and otherwise deleterious materials should be removed from areas to receive new buildings and pavements. A geotechnical engineer should observe clearing operations to confirm all unsuitable materials are removed from proposed construction areas. Due to previous site use, buried structures such as foundations, utility lines, septic tanks, etc. could be encountered. If encountered, these materials should be removed and resulting excavations backfilled in accordance with requirements appearing in the *Structural Fill* section of this report.

Materials disturbed during clearing operations should be stabilized in place or, if necessary, undercut to undisturbed materials and backfilled with properly compacted, approved structural fill. During site preparation the contractor should identify borrow source materials that will be used as structural fill and provide samples to the testing laboratory so that conformance to structural fill requirements, appearing below, can be confirmed and so that moisture-density (Proctor) testing can be completed prior to commencement of fill placement.

#### **4.2 SUBGRADE EVALUATION**

We recommend the project geotechnical engineer or a qualified representative evaluate the subgrade after the site is prepared. Some unsuitable or unstable areas may be present in unexplored areas of the site. All areas that will receive fill or that will support structures should be carefully proofrolled with a heavy (40,000 lb. minimum), rubber-tired vehicle at the following times.

- After an area has been stripped, and undercut if required, prior to the placement of any fill.
- After grading an area to the finished subgrade elevation in a building or pavement area.
- After areas have been exposed to any precipitation, and/or have been exposed for more than 48 hours.

Some instability may exist during construction, depending on climatic and other factors immediately preceding and during construction. If any soft or otherwise unsuitable soils are identified during the proofrolling process, they must be undercut or stabilized prior to fill placement, pavement construction, or floor slab construction. All unsuitable material identified during the construction shall be removed and replaced in accordance with the Structural Fill section of this report.

#### **4.3 MOISTURE SENSITIVE SOILS**

Moisture sensitive silty sands (SM), clayey sands (SC), silts (MH), and clays (CL, CH) were encountered across the site during the subsurface exploration. These soils will degrade if allowed to become saturated. Therefore, not allowing water to pond by maintaining positive drainage and temporary dewatering methods (if required) are important to help avoid degradation and softening of the soils.

The contractor should anticipate some difficulty during the earthworks phase if moisture levels are moderate to high. Increased moisture levels will soften the subgrade and the soils may become unstable under the influence of construction traffic. Accordingly, construction during wet weather conditions should be avoided as this could result in soft and unstable soil conditions that would require ground modification such as in place stabilization or undercutting.

#### **4.4 EVALUATION OF LOW CONSISTENCY/RELATIVE DENSITY SOILS**

Low relative density soils ( $N \leq 8$ , coarse-grained) and/or low consistency soils ( $N \leq 6$ , fine-grained) were encountered within the upper 5 feet of all but borings B-04, B-12, and B-16. Subgrade conditions may also vary in unexplored portions of the site.

In order to provide competent subgrade conditions, proofrolling the areas planned to receive buildings or pavements upon completion of site clearing and stripping will be critical in identifying soft/loose areas requiring remediation. Proofrolls should be performed with a heavy (40,000 lb. minimum), rubber-tired vehicle, and failing locations should be delineated for stabilization.

The geotechnical engineer of record, or a qualified representative, should be present to evaluate subgrade conditions and stabilization measures prior to the placement of structural fill.

In areas where soft, fine-grained soils are identified, stabilization by undercutting to a stiff subgrade will likely be required. Based on the N-values recorded during our field work, undercuts on the order of 1 to 3 feet below the topsoil can be expected in these areas. At completion of undercutting, the subgrade should be proofrolled, and backfilled with compaction in accordance with recommendations appearing in the *Structural Fill* section of this report.

In areas of loose, coarse-grained soils it is recommended that, where possible, stabilization be achieved with in-place stabilization using a 10-ton minimum, vibratory smooth-drum roller. Stabilization should extend laterally at least 5 feet beyond structure and pavement area footprints. If in-place stabilization is not viable, undercutting may be required to provide competent subgrade conditions.

#### **4.5 EVALUATION OF EXISTING FILL**

During our subsurface exploration, existing fill materials were encountered in 13 borings extending to depths 1 to 2 feet below the surface. We recommend this material be scarified and re-compacted during the earthworks phase in order to provide a competent subgrade condition for fill embankment, building foundation, and pavement subgrade support. During the scarification process, test pits through this material are recommended to confirm the subsurface is free of any materials that may adversely affect building or pavement performance.

Fill materials exposed in test pits and in areas scarified for re-compaction should be checked to evaluate the condition of the fill and the natural soils below the exposed subgrade. If organic materials, debris, over-sized rock fragments, or any other unsuitable materials are encountered, these soils should be removed and replaced with engineered fill, as outlined in the *Structural Fill* section below.

#### **4.6 EVALUATION OF IN-SITU HIGH PLASTICITY SOILS**

Based on laboratory test results and visual classification highly plastic sandy fat clays (CH) and elastic silts (MH) are present at 14 boring sites. These soils generally extend from just below the topsoil or existing fill to depths 8.5 to 23.5 feet. Based upon boring locations relative to the proposed building site, it is expected that these soils will be encountered during site grading operations.

Soils with high swell potential, such as highly plastic clays and silts, can pose engineering issues in regards to foundation settlement. Swell and shrink may cause heave or lift, as well as uneven settlement in areas of soil which are noted to have a high risk swell potential. It is therefore recommended that qualified personnel evaluate exposed subgrade soils following site stripping, and in all footing trenches to check for the presence of fat clay, elastic silt, or other soil conditions subject to volume change.

Any such soils should be removed to a minimum three-foot depth below slab-on-grade subgrade (below load leveling stone) elevations and replaced with low-plasticity or non-plastic structural fill, as outlined in the *Structural Fill* section of this report. It is noted that based upon approximate elevations of the borings, the elevation of these soils generally lies near or below at least 3 feet below finished floor elevation, with the exception of B-04, B-05, B-06, and B-15. It should also be noted that neither hydrometer grain size analysis nor expansion index testing were performed for this study.

#### **4.7 STRUCTURAL FILL**

Our understanding is that site development may require construction of fill embankments up to 10 feet in height. Analysis indicates up to 1 inch of settlement (of the natural ground) should be expected following construction of embankments of this height. We therefore recommend building construction be delayed until such settlement becomes complete. Monitoring of settlement should include placement of monuments on completed embankment surfaces, or tell tales on the natural ground prior to embankment construction. The latter are preferable as they allow for settlement monitoring during embankment construction. If monitoring is not performed, we recommend building construction be delayed a minimum 90 days following embankment completion. This recommendation applies to embankments over 5 feet in height constructed over clay soils.

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Soil Type	USCS Classification	Property Requirements	Placement Location
Sand and Gravel	GW, GP, GM, SW, SP, SM or combinations	Maximum 2" particle size	Not recommended for use
Clayey/Silty Sand and Gravel	SM, SC, GC	LL<50, PI<25, $\gamma_d$ >100 pcf	All areas – some confining condition may be required
Lean Clay	CL	LL<50, PI<25, $\gamma_d$ >100 pcf	All areas
Fat Clay	CH	N/A	Not recommended for use
Silt	ML, MH	N/A	Not recommended for use
On-site soils	SC, SM, CL, CH, MH	As noted above.	SC, SM: Areas where the material can be confined, and adequate drainage provided CL: All areas CH, MH: Not recommended for use

**Table 7: Structural Fill Requirements**

Notes:

1. All structural fill should be free of vegetation, topsoil, and any other deleterious materials. The organic content of materials to be used for fill should be less than 3 percent.
2. LL indicates the soil Liquid Limit; PI indicates the soil Plasticity Index;  $\gamma_d$  indicates the maximum dry density as defined by the density standard outlined in the table below.
3. Laboratory testing of the soils proposed for fill must be performed in order to verify their conformance with the above recommendations.
4. Any fill to be placed at the site should be reviewed by the geotechnical engineer.

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Placement requirements for structural fill are as follows:

Specification	Requirement
Lift Thickness	8" loose, 6" compacted
Density	98 Percent minimum per ASTM D-698
Moisture	For cohesive soil, $\pm 2$ percent of optimum moisture as defined by the above standard. For cohesionless soils with greater than 12 percent passing the US Standard No. 200 sieve, $\pm 3$ percent of optimum moisture as defined above. Moisture requirement is waived for cohesionless soils with less than 12 percent passing the No. 200 sieve.
Density Testing Frequency	1 test per 2,500 S.F., minimum 2 tests per lift

**Table 8: Structural Fill Placement Requirements**

#### **4.8 EXCAVATION CONSIDERATIONS**

All excavations performed at the site should follow OSHA guidelines for temporary excavations. Excavated soils should be stockpiled according to OSHA regulations to limit the potential for cave-in.

##### **4.8.1 GROUNDWATER**

Groundwater was encountered at depths from 5.9 to 15.5 feet in 12 of the borings during drilling. 24-hour monitoring indicates groundwater may be encountered at depths as high as 3.5 feet below the existing surface. Based on the provided finished floor elevation relative to groundwater elevations, it is not expected that groundwater will be encountered during mass grading. It is noted that groundwater could be encountered during site undercutting, and it is therefore recommended that where possible, low relative density soils be stabilized in place, per our recommendations in section 4.4, rather than undercut and replaced.

Furthermore, it should be noted that fluctuations in groundwater levels could occur due to seasonal variations in rainfall. The contractor must be prepared to remove groundwater seepage from excavations if encountered during construction. Excavations extending below groundwater levels may require dewatering systems (such as well points, sump pumps or trench drains). The contractor should evaluate the most economical and practical dewatering method.

#### 4.9 UTILITY TRENCH BACKFILL

All utility trenches should be backfilled and compacted in the manner specified above for structural fill. It may be necessary to reduce lift thickness to 4 to 6 inches to achieve compaction using hand-operated equipment.

#### 4.10 LANDSCAPING AND DRAINAGE CONSIDERATIONS

The potential for soil moisture fluctuations within building areas and pavement subgrades should be reduced to lessen the potential for subgrade movement. Site grading should include positive drainage away from buildings and pavements. Excessive irrigation of landscaping poses a risk of saturating and softening soils below shallow footings and pavements, which could result in settlement of footings and premature failure of pavements.

#### 4.11 WET WEATHER CONSTRUCTION

Excessive movement of construction equipment across the site during wet weather may result in ruts which will collect rainwater prolonging the time required to dry the subgrade soils.

During rainy periods, additional effort will be required to properly prepare the site and establish/maintain an acceptable subgrade. The difficulty will increase in areas where clay or silty soils are exposed at the subgrade elevation. Grading contractors typically postpone grading operations during wet weather to wait for conditions that are more favorable. Contractors can typically disk or aerate the upper soils to promote drying during intermittent periods of favorable weather. When deadlines restrict postponement of grading operations, additional measures such as undercutting and replacing saturated soils or stabilization can be utilized to facilitate placement of additional fill material.

#### 5.0 FOUNDATION RECOMMENDATIONS

Specific structural loading conditions were not known at the time of this reporting; however, based on our experience with similar projects, we anticipate individual column loads up to 250 kips and wall loads up to 4 kips per linear foot. Our analysis is based upon these maximum loads. ***If these assumptions concerning structural loading are incorrect, our office should be contacted, such that our recommendations can be reviewed.***

## 5.1 SHALLOW FOUNDATIONS

Based on conditions encountered during our field investigation and after our site preparation and grading recommendations are implemented, the proposed elementary school can be supported on conventional shallow spread foundations. Provided foundation loads are as stated, footings should be designed using a 2,000 psf allowable soil bearing pressure.

We recommend hand rod probing and dynamic cone penetrometer (DCP) testing, in accordance with ASTM STP-399, be performed for all foundation excavations. Hand rod probing should be performed for 100 percent of the excavations, and DCP testing should be performed for at least 20 percent of the column footings, with 1 test per 75 linear feet in strip footings. Soils not meeting the allowable capacity recommendations above should be stabilized, undercut and backfilled with compacted structural fill, or washed NCDOT No. 57 stone wrapped in non-woven filter fabric. Undercut depths may vary depending upon conditions observed during construction.

Although computed footing dimensions may be less, strip footings should be at least 24 inches wide, and column footings should have minimum 36-inch side dimensions. These dimensions facilitate hand cleaning of footing subgrades disturbed by the excavation process and the placement of reinforcing steel. They also reduce the potential for localized punching shear failure. **All exterior footings should bear at least 36 inches below adjacent exterior grades in order to mitigate potentially adverse effects associated with potential soil volume change.**

Settlement up to 1 inch due to the weight of fill embankments should be expected. Recommendations to mitigate this settlement appear in the structural fill section of the report. Provided settlement of embankments is complete prior to building construction, post-construction settlement of footings designed and constructed as recommended above should be 1 inch or less, with differential settlement 0.5 inches or less. All settlement estimates reported herein are based on Rocscience Settle3D settlement analyses. Settlement evaluation results from the Settle3D software are presented in the Appendix.

## 5.2 SPREAD FOUNDATIONS ON IMPROVED SUBGRADE

Supporting shallow foundations on the existing subgrade soils will result in large footings if column loads are relatively high. It may be more economical to utilize an intermediate foundation system that improves the existing weak subgrade. Ground improvement using Rammed Aggregate Piers (RAP) can provide in-place stabilization of the in-situ materials creating significantly higher bearing capacity. Rammed aggregate piers are a ground



improvement technique where subsurface conditions are stabilized through the use of stone columns. Column diameters and aerial spacing are selected through proprietary design provided by the installer. Columns are installed in pre-excavated boreholes, and processed rock (typically NCDOT size No. 57 crushed stone) is then placed into the borehole. The stone is placed in lifts, with each lift dynamically compacted (rammed) into place. The ramming action causes the stabilized zone to extend beyond the limits of the original borehole. Boreholes in the range 24 to 36 inches in diameter are typical. The stabilization technique is designed to provide support to both foundations and slabs-on-grade. Design and performance criteria for these systems are typically provided by the installation contractor. Specialty Contractors such as the Geopier Foundation Company, or Hayward Baker provide this ground improvement technique under proprietary engineering and design.

Following ground improvement, the structure can be supported on shallow strip and spread footings supported on the improved subsurface. Depending upon the RAP design, foundations supported on RAP improved subgrade can be designed using allowable bearing pressures up to about 5,000 psf.

Even though computed footing dimensions may be less, column footings should be at least 24 inches wide and strip footings should be at least 18 inches wide. These dimensions facilitate hand cleaning of footing subgrades disturbed by the excavation process and the placement of reinforcing steel. They also reduce the potential for localized punching shear failure.

All exterior footings should bear at least 24 inches below adjacent exterior grades for frost protection. Total settlement of footings designed and constructed as recommended above should be 1 inch or less.

### **5.3 FOUNDATION QUALITY ASSURANCE**

We recommend the following be included in the construction documents, and that each of these items be checked during construction.

- The geotechnical engineer of record should observe exposed foundation bearing surfaces prior to concrete placement to verify conditions anticipated during the subsurface exploration are encountered.
- All bearing surfaces should be free of soft or loose soil prior to placing concrete.

- Concrete should be placed the same day excavations are completed and bearing material conditions verified by the engineer. If the excavations are left open for an extended period, or if the bearing surfaces are disturbed after the initial observation, then the bearing surfaces should be re-evaluated prior to concrete placement.
- Water should not be allowed to pond in foundation excavations prior to concrete placement or above the concrete after foundations are completed.
- Foundation concrete should not be placed over saturated or frozen ground.
- Wherever possible, foundation concrete should be placed "neat", using excavation sidewalls as forms. Where this is not possible, the excavations created by forming the foundations must be backfilled with suitable structural fill and properly compacted.
- The building pad should be sloped to drain away from the building foundations.
- Roof drains should be routed away from the foundation soils.

## **6.0 FLOOR SLABS**

Site development recommendations presented in this report should be followed to provide for subgrade conditions suitable for support of grade supported slabs. Concrete slabs for proposed structures should be supported on either stable, natural subgrade or on compacted, engineered structural fill.

We recommend floor slabs for the proposed structure be supported on a minimum four-inch layer of ½-inch up to 1½-inch, free-draining, gap-graded gravel, such as NCDOT No. 57 stone, with no more than 5 percent passing the ASTM No. 200 sieve. The purpose of this layer is to help distribute concentrated loads and act as a capillary break for moisture migration through the subgrade soil. This gravel material should be consolidated in-place with vibratory equipment. With the gravel material, such as NCDOT No. 57 stone, a modulus of subgrade reaction of 125 pci is recommended in the design of a grade-supported building floor slab.

We recommend a minimum 10-mil vapor retarder meeting ASTM E1745, Class C requirements be placed directly below slab-on-grade floors. A higher quality vapor retarder (Class A or B) may be used if desired to further inhibit the migration of moisture through the slab-on-grade and should be evaluated based on the floor covering and use. The vapor retarder should extend to the edge of the slab-on-grade floors and should be sealed at all seams and penetrations. The slab should be appropriately reinforced (if required) to support the proposed loads.

## 7.0 PAVEMENT CONSIDERATIONS

Based on the materials encountered at the boring locations and after our recommendations for site preparation are implemented, pavements at the subject site may be designed based on a California Bearing Ratio (CBR) of 4. CBR testing was performed on two samples obtained during our field work to develop these recommendations.

For pavement design purposes, we have assumed two levels of traffic shown on the table below, for commonly used pavement sections. Per provided construction drawings, approximately 100 parking spaces are planned for staff and visitor parking, 9 spaces are designated for bus use, and 6 spaces are located at the service yard; drop-off loops, access roads, and a fire lane will be constructed as well. For planning purposes, we have estimated the following traffic conditions:

Type	Automobiles (per day)	Delivery Trucks (2-Axle/4-Tire) (per week)	Buses (per week)	Garbage Trucks (per week)	Delivery Trucks (Tractor Trailer) (per week)	ESAL
Standard Duty	600	0	0	2	0	2.2E+04
Heavy Duty	600	5	125	5	1	1.6E+05

**Table 9: Assumed Traffic Volume**

The volumes shown above are just one example of possible vehicle types and daily traffic that would result in the total equivalent 18-kip single-axle load (ESAL) shown. It has been our experience that parking lots experience a certain level of wear and stress greater than roadways designed for similar traffic volumes. Therefore, parking lots are typically designed using the AASHTO method and adjusted based on experience. If the owner would like Building & Earth to assess other likely traffic volumes, we will gladly review other options. In addition, we have assumed the following design parameters:

Design Criteria	Value
Design life (Years)	20
Terminal Serviceability	2.0
Reliability	85%
Initial Serviceability	4.2
Standard Deviation	0.45 (Flexible)
Standard Deviation	0.35 (Rigid)

**Table 10: Assumed Design Parameters**

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Note: All subgrade, base and pavement construction operations should meet minimum requirements of the NCDOT Standard Specifications for Roads and Structures. The applicable sections of the specifications are identified in Table 11, below.

Material	Specification Section
Portland Cement Concrete Pavement	710
Bituminous Asphalt Wearing Layer	610
Bituminous Asphalt Binder Layer	610
Mineral Aggregate Base Materials	520
Soil	500

**Table 11: NCDOT Specification Sections**

## 7.1 FLEXIBLE PAVEMENT

The asphalt pavement sections described herein were designed using the "AASHTO Guide for Design of Pavement Structures, 1993". Alternative pavement sections were designed by establishing the structural numbers used for the AASHTO design system and substituting materials based upon structural equivalency as follows:

Material	Structural No.
Asphalt Concrete	0.44
Crushed Stone Base	0.14

**Table 12: Structural Equivalent Coefficient**

The following flexible pavement sections are based on the design parameters presented above:

Minimum Recommended Thickness (in.)		Material
Standard Duty	Heavy Duty	
1.5	1.5	Surface Course
2.0	2.0	Binder Course
6.0	8.0	Crushed Stone Base

**Table 13: Asphalt Pavement Recommendations**

## 7.2 RIGID PAVEMENT

The following rigid pavement sections are based on the design parameters presented above. We assume an effective modulus of subgrade reaction ( $k$ ) of 125 pci, a concrete elastic modulus ( $E_c$ ) of  $3.6 \times 10^6$  psi, and a concrete modulus of rupture ( $S'_c$ ) of 650 psi.

Subsurface Exploration and Geotechnical Evaluation,  
New Erwin Elementary School, Erwin, North Carolina  
Project No: RD190564, January 15, 2020

Minimum Recommended Thickness (in.)		Material
Standard Duty	Heavy Duty	
5.0	5.0	Portland Cement Concrete, $f'_c=4000$ psi
4.0	6.0	Crushed Stone Base

**Table 14: Rigid Pavement Recommendations**

Concrete should be protected against moisture loss, rapid temperature fluctuations, and construction traffic for several days after placement. All pavements should be sloped for positive drainage. We recommended that the pavements be reinforced to hold any cracks that might develop tightly together and restrain their growth.

All pavement components must be placed and compacted in accordance with the applicable sections of the North Carolina Standard Specifications for Road and Bridge Construction. All subgrade, base and pavement construction operations should meet minimum requirements of this document.

## **8.0 SUBGRADE REHABILITATION**

Subgrade soils often become disturbed during the period between initial site grading and construction of surface improvements. The amount and depth of disturbance will vary with soil type, weather conditions, construction traffic, and drainage.

The engineer should evaluate the subgrade soils during final grading to verify the subgrade is suitable to receive pavement and/or concrete slab base materials. The final evaluation may include proofrolling or density tests.

Subgrade rehabilitation can become a point of controversy when different contractors are responsible for site grading and building construction. The construction documents should specifically state which contractor will be responsible for maintaining and rehabilitating the subgrade. Rehabilitation may include moisture conditioning and re-compacting soils. When deadlines or weather restrict grading operations, additional measures such as undercutting and replacing saturated soils or chemical stabilization can often be utilized.

## **9.0 CONSTRUCTION MONITORING**

Field verification of site conditions is an essential part of the services provided by the geotechnical consultant. In order to confirm our recommendations, it will be necessary for Building & Earth personnel to make periodic visits to the site during site grading. Typical construction monitoring services are listed below.

- Site stripping and subgrade evaluation, especially in areas covered by existing fill and where buildings and pavements have been removed
- Placement of controlled, engineered fill
- Foundation bearing surfaces, reinforcing steel and concrete
- Pavement subgrades
- All other items subject to IBC Special Inspections

## **10.0 CLOSING AND LIMITATIONS**

This report was prepared for Harnett County Schools, for specific application to the New Erwin Elementary School located in Erwin, North Carolina. The information in this report is not transferable. This report should not be used for a different development on the same property without first being evaluated by the engineer.

The recommendations in this report were based on the information obtained from our field exploration and laboratory analysis. The data collected is representative of the locations tested. Variations are likely to occur at other locations throughout the site. Engineering judgment was applied in regards to conditions between borings. It will be necessary to confirm the anticipated subsurface conditions during construction.

This report has been prepared in accordance with generally accepted standards of geotechnical engineering practice. No other warranty is expressed or implied. In the event that changes are made, or anticipated to be made, to the nature, design, or location of the project as outlined in this report, Building & Earth must be informed of the changes and given the opportunity to either verify or modify the conclusions of this report in writing, or the recommendations of this report will no longer be valid.

The scope of services for this project did not include any environmental assessment of the site or identification of pollutants or hazardous materials or conditions. If the owner is concerned about environmental issues Building & Earth would be happy to provide an additional scope of services to address those concerns.

This report is intended for use during design and preparation of specifications and may not address all conditions at the site during construction. Contractors reviewing this information should acknowledge that this document is for design information only.

An article published by the Geoprofessional Business Association (GBA), titled *Important Information About Your Geotechnical Report*, has been included in the Appendix. We encourage all individuals to become familiar with the article to help manage risk.

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## GEOTECHNICAL INVESTIGATION METHODOLOGIES

The subsurface exploration, which is the basis of the recommendations of this report, has been performed in accordance with industry standards. Detailed methodologies employed in the investigation are presented in the following sections.

### *DRILLING PROCEDURES – STANDARD PENETRATION TEST (ASTM D1586)*

At each boring location, soil samples were obtained at standard sampling intervals with a split-spoon sampler. The borehole was first advanced to the sample depth by augering and the sampling tools were placed in the open hole. The sampler was then driven 18 inches into the ground with a 140-pound automatic hammer free-falling 30 inches. The number of blows required to drive the sampler each 6-inch increment was recorded. The initial increment is considered the “seating” blows, where the sampler penetrates loose or disturbed soil in the bottom of the borehole.

The blows required to penetrate the final two (2) increments are added together and are referred to as the Standard Penetration Test (SPT) N-value. The N-value, when properly evaluated, gives an indication of the soil’s strength and ability to support structural loads. Many factors can affect the SPT N-value, so this result cannot be used exclusively to evaluate soil conditions.

The SPT testing was performed using a drill rig equipped with an automatic hammer. Automatic hammers mechanically control the height of the hammer drop, and doing so, deliver higher energy efficiency (90 to 99 % efficiency) than manual hammers (60 % efficiency) which are dropped using a manually operated rope and cathead system. Because historic data correlations were developed based on use of a manual hammer, it is necessary to adjust the N-values obtained using an automatic hammer to make these correlations valid. Therefore, an energy correction factor of 1.3 was applied to the recorded field N-values from the automatic hammer for the purpose of our evaluation. The N-values discussed or mentioned in this report and shown on the boring logs are recorded field values.

Samples retrieved from the boring locations were labeled and stored in plastic bags at the jobsite before being transported to our laboratory for analysis. The project engineer prepared Boring Logs summarizing the subsurface conditions at the boring locations.

### *BULK SAMPLING*

Bulk sample are obtained for the evaluation of the compaction characteristics of the site soils and for determination of the California Bearing Ratio (CBR). The bulk samples are obtained from manual excavations, backhoe test pits, or from auger cutting. Similar soils are normally combined to provide samples of adequate size for compaction or CBR testing.



## BORING LOG DESCRIPTION

Building & Earth Sciences, Inc. used the gINT software program to prepare the attached boring logs. The gINT program provides the flexibility to custom design the boring logs to include the pertinent information from the subsurface exploration and results of our laboratory analysis. The soil and laboratory information included on our logs is summarized below:

### *DEPTH AND ELEVATION*

The depth below the ground surface and the corresponding elevation are shown in the first two columns.

### *SAMPLE TYPE*

The method used to collect the sample is shown. The typical sampling methods include Split Spoon Sampling, Shelby Tube Sampling, Grab Samples, and Rock Core. A key is provided at the bottom of the log showing the graphic symbol for each sample type.

### *SAMPLE NUMBER*

Each sample collected is numbered sequentially.

### *BLOWS PER INCREMENT, REC%, RQD%*

When Standard Split Spoon sampling is used, the blows required to drive the sampler each 6-inch increment are recorded and shown in column 5. When rock core is obtained the recovery ratio (REC%) and Rock Quality Designation (RQD%) is recorded.

### *SOIL DATA*

Column 6 is a graphic representation of four different soil parameters. Each of the parameters use the same graph, however, the values of the graph subdivisions vary with each parameter. Each parameter presented on column 6 is summarized below:

- **N-value**- The Standard Penetration Test N-value, obtained by adding the number of blows required to drive the sampler the final 12 inches, is recorded. The graph labels range from 0 to 50.
- **Qu** – Unconfined Compressive Strength estimate from the Pocket Penetrometer test in tons per square foot (tsf). The graph labels range from 0 to 5 tsf.
- **Atterberg Limits** – The Atterberg Limits are plotted with the plastic limit to the left, and liquid limit to the right, connected by a horizontal line. The difference in the plastic and liquid limits is referred to as the Plasticity Index. The Atterberg Limits test results are also included in the Remarks column on the far right of the boring log. The Atterberg Limits graph labels range from 0 to 100%.
- **Moisture** – The Natural Moisture Content of the soil sample as determined in our laboratory.

### *SOIL DESCRIPTION*

The soil description prepared in accordance with ASTM D2488, Visual Description of Soil Samples. The Munsel Color chart is used to determine the soil color. Strata changes are indicated by a solid line, with the depth of the change indicated on the left side of the line and the elevation of the change indicated on the right side of the line. If subtle changes within a soil type occur, a broken line is used. The Boring Termination or Auger Refusal depth is shown as a solid line at the bottom of the boring.

### *GRAPHIC*

The graphic representation of the soil type is shown. The graphic used for each soil type is related to the Unified Soil Classification chart. A chart showing the graphic associated with each soil classification is included.

### *REMARKS*

Remarks regarding borehole observations, and additional information regarding the laboratory results and groundwater observations.



## SOIL CLASSIFICATION METHODOLOGY

Major Divisions			Symbols		Group Name & Typical Description
			Lithology	Group	
<b>Coarse Grained Soils</b>  More than 50% of material is larger than No. 200 sieve size	<b>Gravel and Gravelly Soils</b>  More than 50% of coarse fraction is larger than No. 4 sieve	<b>Clean Gravels</b>  (Less than 5% fines)		<b>GW</b>	Well-graded gravels, gravel – sand mixtures, little or no fines
				<b>GP</b>	Poorly-graded gravels, gravel – sand mixtures, little or no fines
		<b>Gravels with Fines</b>  (More than 12% fines)		<b>GM</b>	Silty gravels, gravel – sand – silt mixtures
				<b>GC</b>	Clayey gravels, gravel – sand – clay mixtures
	<b>Sand and Sandy Soils</b>  More than 50% of coarse fraction is smaller than No. 4 sieve	<b>Clean Sands</b>  (Less than 5% fines)		<b>SW</b>	Well-graded sands, gravelly sands, little or no fines
				<b>SP</b>	Poorly-graded sands, gravelly sands, little or no fines
		<b>Sands with Fines</b>  (More than 12% fines)		<b>SM</b>	Silty sands, sand – silt mixtures
				<b>SC</b>	Clayey sands, sand – clay mixtures
<b>Fine Grained Soils</b>  More than 50% of material is smaller than No. 200 sieve size	<b>Silts and Clays</b>  Liquid Limit less than 50	<b>Inorganic</b>		<b>ML</b>	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity
				<b>CL</b>	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		<b>Organic</b>		<b>OL</b>	Organic silts and organic silty clays of low plasticity
	<b>Silts and Clays</b>  Liquid Limit greater than 50 sieve	<b>Inorganic</b>		<b>MH</b>	Inorganic silts, micaceous or diatomaceous fine sand, or silty soils
				<b>CH</b>	Inorganic clays of high plasticity
		<b>Organic</b>		<b>OH</b>	Organic clays of medium to high plasticity, organic silts
<b>Highly Organic Soils</b>				<b>PT</b>	Peat, humus, swamp soils with high organic contents

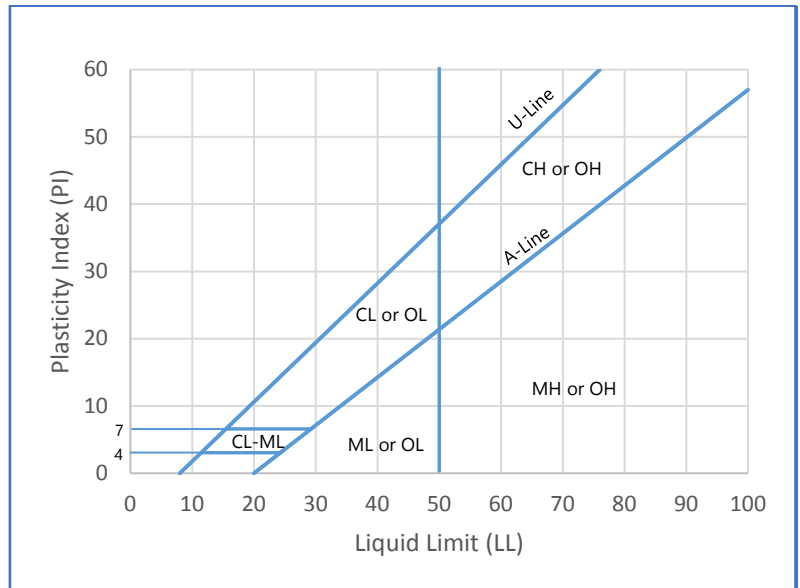
Table 1: Soil Classification Chart (based on ASTM D2487)

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**SOIL CLASSIFICATION METHODOLOGY**

Building & Earth Sciences classifies soil in general accordance with the Unified Soil Classification System (USCS) presented in ASTM D2487. Table 1 and Figure 1 exemplify the general guidance of the USCS. Soil consistencies and relative densities are presented in general accordance with Terzaghi, Peck, & Mesri's (1996) method, as shown on Table 2, when quantitative field and/or laboratory data is available. Table 2 includes Consistency and Relative Density correlations with N-values obtained using either a manual hammer (60 percent efficiency) or automatic hammer (90 percent efficiency). The *Blows Per Increment* and *SPT N-values* displayed on the boring logs are the unaltered values measured in the field. When field and/or laboratory data is not available, we may classify soil in general accordance with the Visual Manual Procedure presented in ASTM D2488.



**Figure 1: Plasticity Chart (based on ASTM D2487)**

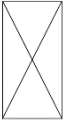


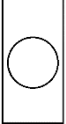
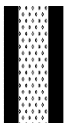



Non-cohesive: Coarse-Grained Soil		Cohesive: Fine-Grained Soil				
SPT Penetration (blows/foot)		Relative Density	SPT Penetration (blows/foot)		Consistency	Estimated Range of Unconfined Compressive Strength (tsf)
			Automatic Hammer*	Manual Hammer		
Automatic Hammer*	Manual Hammer		< 2	< 2	Very Soft	< 0.25
0 - 3	0 - 4	Very Loose	2 - 3	2 - 4	Soft	0.25 – 0.50
3 - 8	4 - 10	Loose	3 - 6	4 - 8	Medium Stiff	0.50 – 1.00
8 - 23	10 - 30	Medium Dense	6 - 12	8 - 15	Stiff	1.00 – 2.00
23 - 38	30 - 50	Dense	12 - 23	15 - 30	Very Stiff	2.00 – 4.00
> 38	> 50	Very Dense	> 23	> 30	Hard	> 4.00

**Table 2: Soil Consistency and Relative Density (based on Terzaghi, Peck & Mesri, 1996)**

\* - Modified based on 80% hammer efficiency

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


**KEY TO LOGS**

 Standard Penetration Test ASTM D1586 or AASHTO T-206	 Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399
 Shelby Tube Sampler ASTM D1587	 No Sample Recovery
 Rock Core Sample ASTM D2113	 Groundwater at Time of Drilling
 Auger Cuttings	 Groundwater as Indicated

**Table 1: Symbol Legend**

Soil	Particle Size	U.S. Standard
<b>Boulders</b>	Larger than 300 mm	N.A.
<b>Cobbles</b>	300 mm to 75 mm	N.A.
<b>Gravel</b>	75 mm to 4.75 mm	3-inch to #4 sieve
Coarse	75 mm to 19 mm	3-inch to ¾-inch sieve
Fine	19 mm to 4.75 mm	¾-inch to #4 sieve
<b>Sand</b>	4.75 mm to 0.075 mm	#4 to #200 Sieve
Coarse	4.75 mm to 2 mm	#4 to #10 Sieve
Medium	2 mm to 0.425 mm	#10 to #40 Sieve
Fine	0.425 mm to 0.075 mm	#40 to #200 Sieve
<b>Fines</b>	Less than 0.075 mm	Passing #200 Sieve
Silt	Less than 5 µm	N.A.
Clay	Less than 2 µm	N.A.

**Table 2: Standard Sieve Sizes**

<b>N-Value</b> 	Standard Penetration Test Resistance calculated using ASTM D1586 or AASHTO T-206. Calculated as sum of original, field recorded values.	<b>Atterberg Limits</b> 	A measure of a soil's plasticity characteristics in general accordance with ASTM D4318. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL).
<b>Qu</b> 	Unconfined compressive strength, typically estimated from a pocket penetrometer. Results are presented in tons per square foot (tsf).	<b>% Moisture</b> 	Percent natural moisture content in general accordance with ASTM D2216.

**Table 3: Soil Data**

Hollow Stem Auger	Flights on the outside of the shaft advance soil cuttings to the surface. The hollow stem allows sampling through the middle of the auger flights.
Mud Rotary / Wash Bore	A cutting head advances the boring and discharges a drilling fluid to support the borehole and circulate cuttings to the surface.
Solid Flight Auger	Flights on the outside bring soil cuttings to the surface. Solid stem requires removal from borehole during sampling.
Hand Auger	Cylindrical bucket (typically 3-inch diameter and 8 inches long) attached to a metal rod and turned by human force.

**Table 4: Soil Drilling Methods**

Descriptor	Meaning
Trace	Likely less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

**Table 5: Descriptors**

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**KEY TO LOGS**

<b>Manual Hammer</b>	The operator tightens and loosens the rope around a rotating drum assembly to lift and drop a sliding, 140-pound hammer falling 30 inches.
<b>Automatic Trip Hammer</b>	An automatic mechanism is used to lift and drop a sliding, 140-pound hammer falling 30 inches.
<b>Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399</b>	Uses a 15-pound steel mass falling 20 inches to strike an anvil and cause penetration of a 1.5-inch diameter cone seated in the bottom of a hand augered borehole. The blows required to drive the embedded cone a depth of 1-3/4 inches have been correlated by others to N-values derived from the Standard Penetration Test (SPT).

**Table 6: Sampling Methods**

<b>Non-plastic</b>	A 1/8-inch thread cannot be rolled at any water content.
<b>Low</b>	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
<b>Medium</b>	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
<b>High</b>	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

**Table 7: Plasticity**

<b>Dry</b>	Absence of moisture, dusty, dry to the touch.
<b>Moist</b>	Damp but no visible water.
<b>Wet</b>	Visible free water, usually soil is below water table.

**Table 8: Moisture Condition**

<b>Stratified</b>	Alternating layers of varying material or color with layers at least 1/2 inch thick.
<b>Laminated</b>	Alternating layers of varying material or color with layers less than 1/4 inch thick.
<b>Fissured</b>	Breaks along definite planes of fracture with little resistance to fracturing.
<b>Slickensides</b>	Fracture planes appear polished or glossy, sometimes striated.
<b>Blocky</b>	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
<b>Lensed</b>	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
<b>Homogeneous</b>	Same color and appearance throughout.

**Table 9: Structure**

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**KEY TO HATCHES**

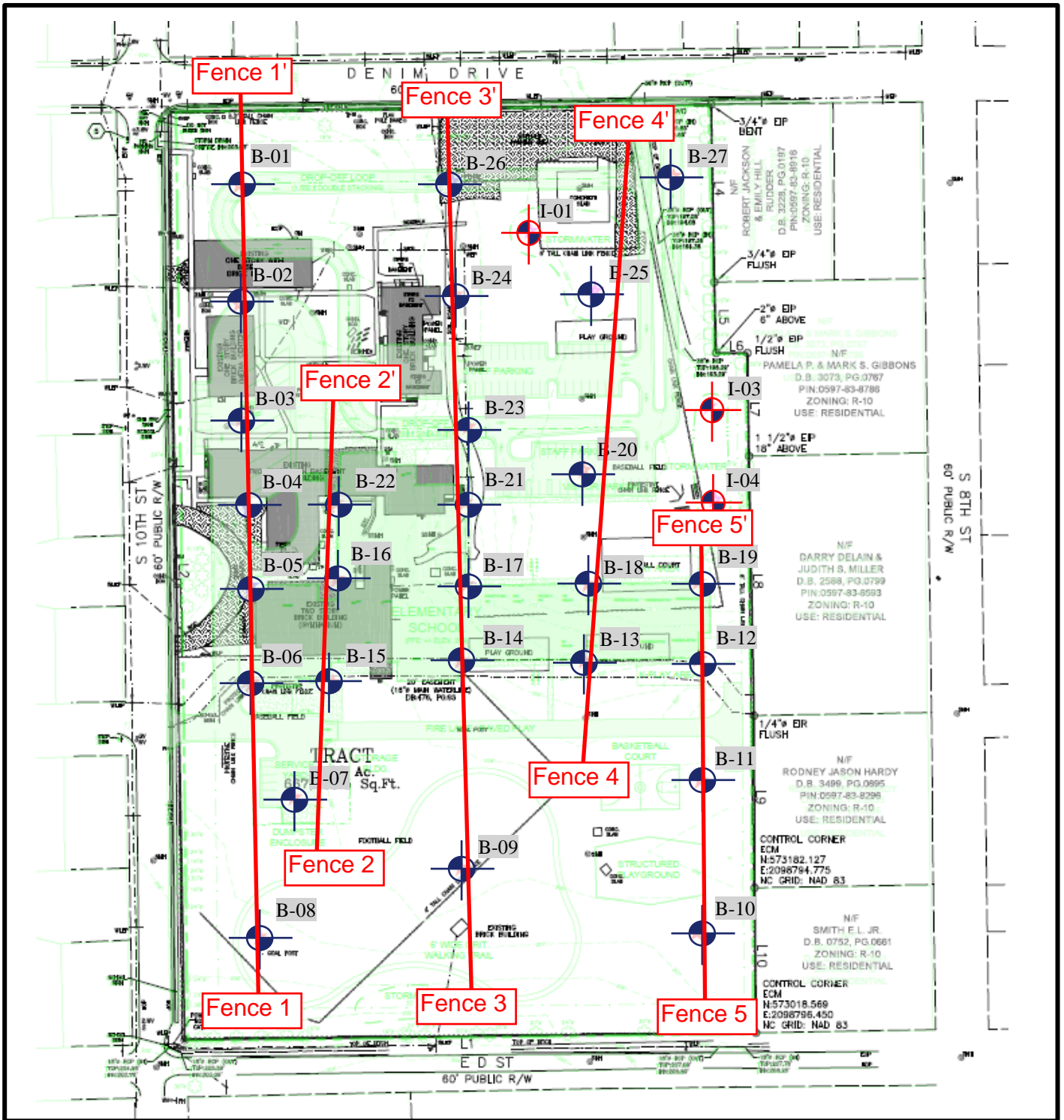
Hatch	Description	Hatch	Description	Hatch	Description
	<b>GW</b> - Well-graded gravels, gravel – sand mixtures, little or no fines		Asphalt		Clay with Gravel
	<b>GP</b> - Poorly-graded gravels, gravel – sand mixtures, little or no fines		Aggregate Base		Sand with Gravel
	<b>GM</b> - Silty gravels, gravel – sand – silt mixtures		Topsoil		Silt with Gravel
	<b>GC</b> - Clayey gravels, gravel – sand – clay mixtures		Concrete		Gravel with Sand
	<b>SW</b> - Well-graded sands, gravelly sands, little or no fines		Coal		Gravel with Clay
	<b>SP</b> - Poorly-graded sands, gravelly sands, little or no fines		<b>CL-ML</b> - Silty Clay		Gravel with Silt
	<b>SM</b> - Silty sands, sand – silt mixtures		Sandy Clay		Limestone
	<b>SC</b> - Clayey sands, sand – clay mixtures		Clayey Chert		Chalk
	<b>ML</b> - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity		Low and High Plasticity Clay		Siltstone
	<b>CL</b> - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		Low Plasticity Silt and Clay		Till
	<b>OL</b> - Organic silts and organic silty clays of low plasticity		High Plasticity Silt and Clay		Sandy Clay with Cobbles and Boulders
	<b>MH</b> - Inorganic silts, micaceous or diatomaceous fine sand, or silty soils		Fill		Sandstone with Shale
	<b>CH</b> - Inorganic clays of high plasticity		Weathered Rock		Coral
	<b>OH</b> - Organic clays of medium to high plasticity, organic silts		Sandstone		Boulders and Cobbles
	<b>PT</b> - Peat, humus, swamp soils with high organic contents		Shale		Soil and Weathered Rock

**Table 1: Key to Hatches Used for Boring Logs and Soil Profiles**





## **BORING LOCATION PLAN**

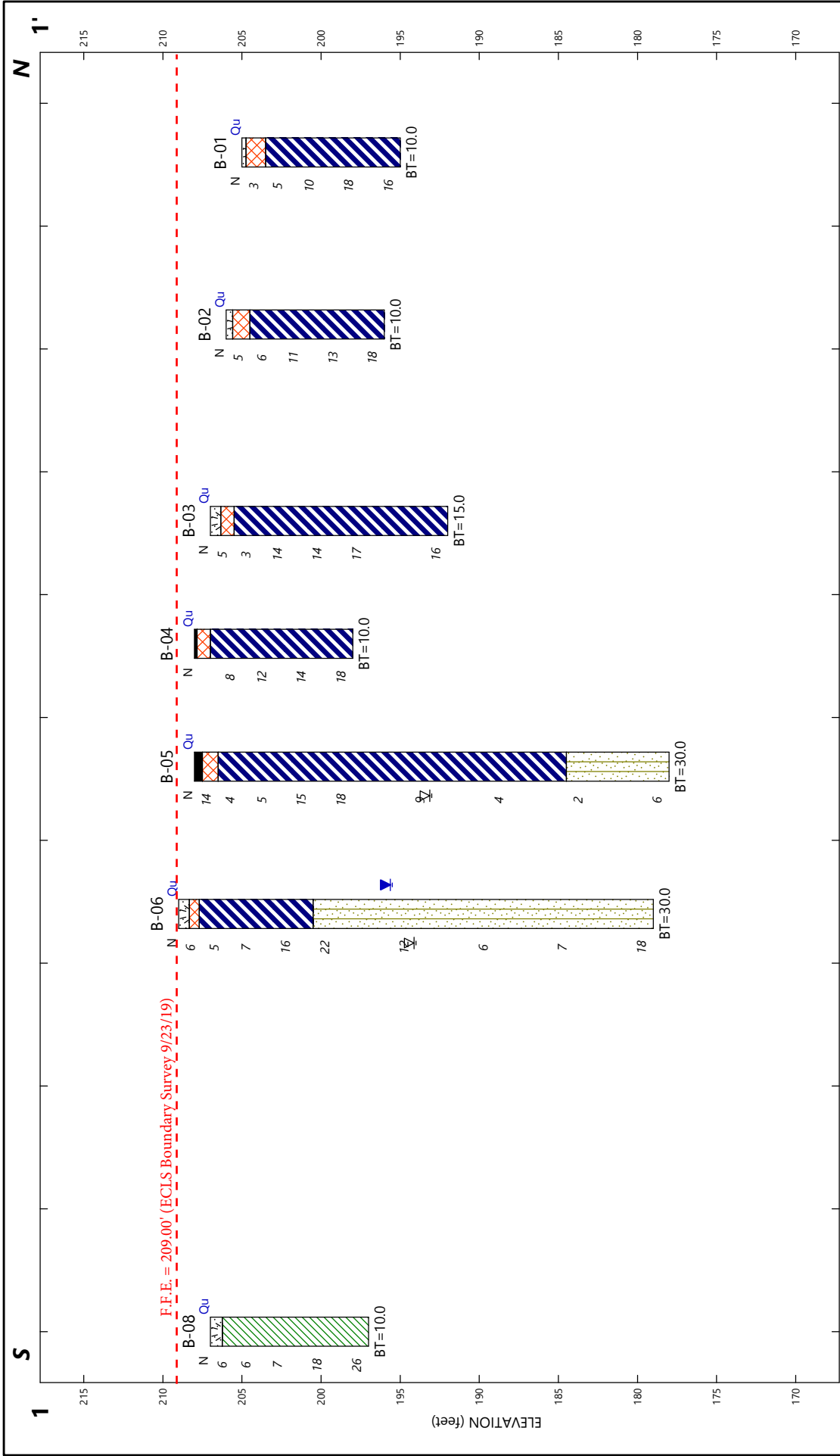


Approximate Boring Location
 


 SHWT & Infiltration Location

Test Location Map			
<b>BES Project #:</b>	RD190564	<b>Client:</b>	Harnett County Schools
<b>Drawing Source:</b>	Boundary Survey	<b>Project:</b>	New Erwin Elementary School
<div style="background-color: #8B4513; color: white; padding: 10px; font-weight: bold; font-size: 1.2em;">BUILDING &amp; EARTH</div>		<b>Address:</b>	301 S. 10 <sup>th</sup> Street
		<b>City:</b>	Erwin, North Carolina
		Figure 1	

## **SUBSURFACE SOIL PROFILES**



**Building & Earth Sciences, Inc.**  
 610 Spring Branch Rd., Dunn, NC 28834  
 HCS - Erwin Elementary School  
 Erwin, NC

**Fence 1: Subsurface Profile**  
**See Boring Location Plan**

PROJECT NO: RD190564 PLATE NO: A-1 DATE: 1/8/20

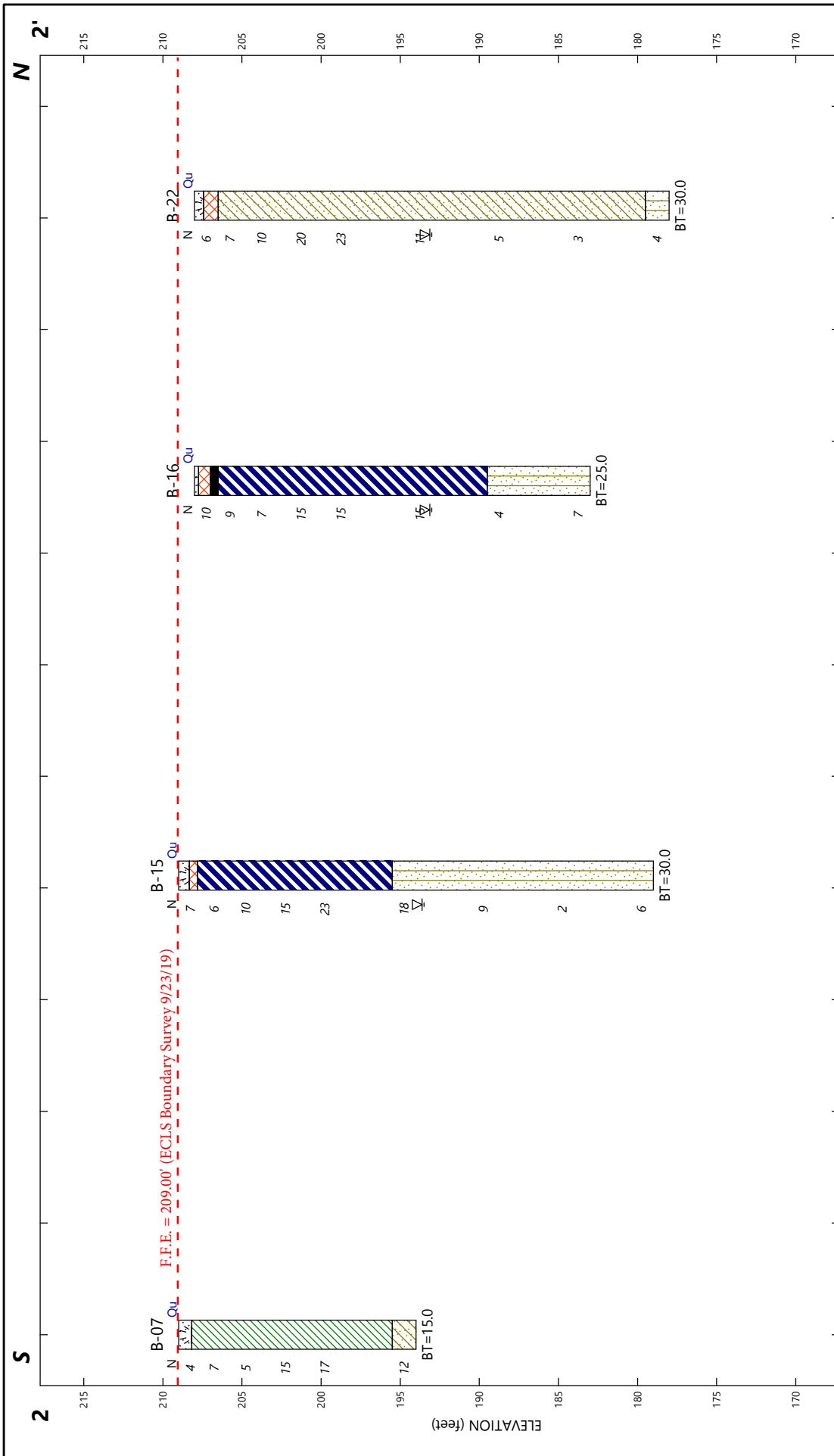
**BUILDING & EARTH**  
 Geotechnical, Environmental, and Materials Engineers

**Legend**

BT = Boring Termination, TPT = Test Pit Terminated  
 AR = Auger Refusal, ER = Excavation Refusal  
 N = Standard Penetration Test N-Value  
 Qu = Unconfined compressive strength estimate from pocket penetrometer test (tsf)  
 ▽ = Water Level Reading at time of drilling  
 ▾ = Water Level Reading after drilling

**Key to Hatches**

- Fill
- USCS High Plasticity Clay
- USCS Low Plasticity Clay
- USCS Silty Sand
- Topsoil
- Asphalt



**Building & Earth Sciences, Inc.**  
610 Spring Branch Rd., Dunn, NC 28834

HCS - Erwin Elementary School  
Erwin, NC

**Fence 2: Subsurface Profile**  
See Boring Location Plan

PROJECT NO: RD190564    PLATE NO: A-2    DATE: 1/8/20

Geotechnical, Environmental, and Materials Engineers

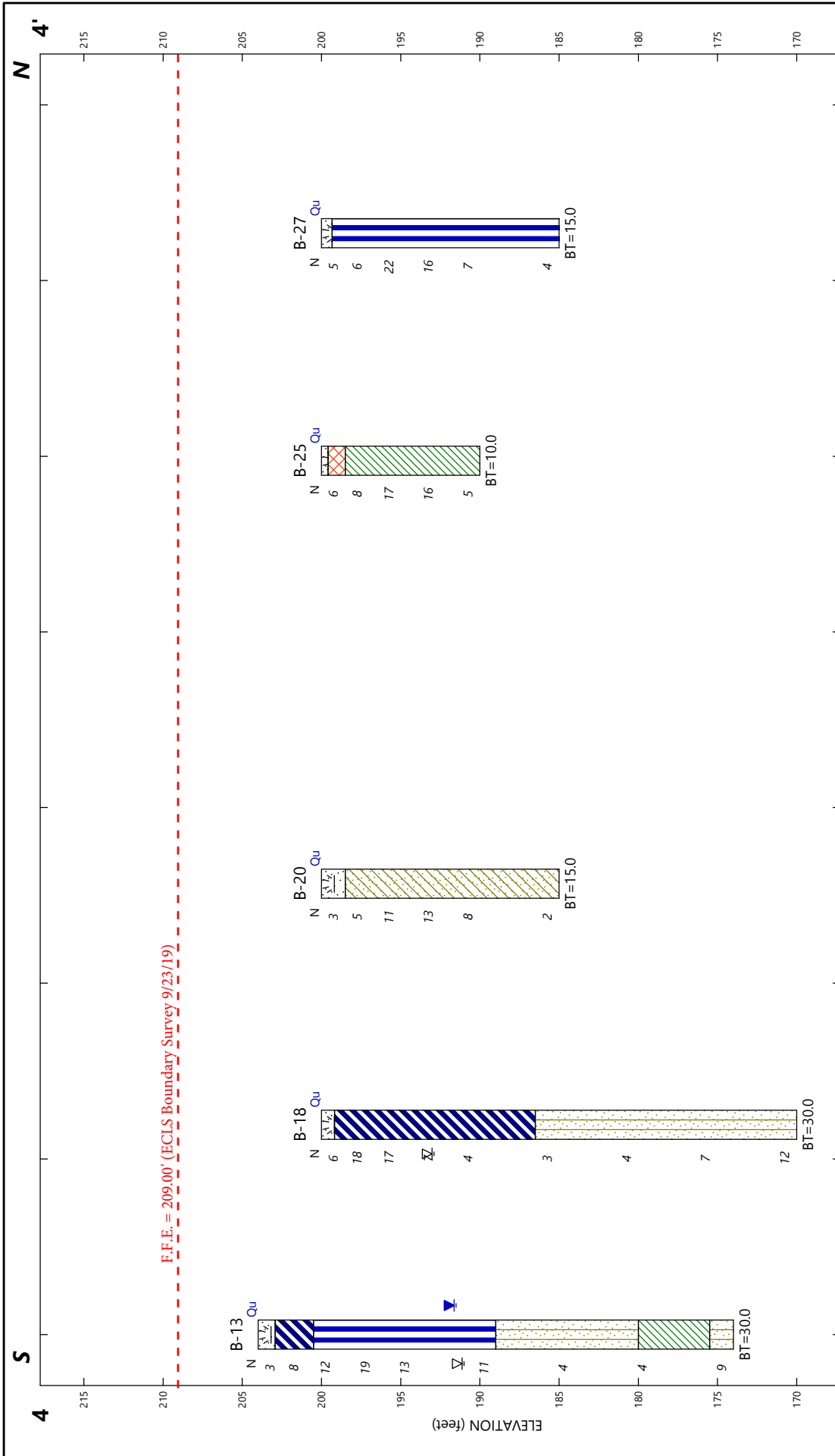
**Legend**

BT=Boring Termination, TPT=Test Pit Terminated  
 AR=Auger Refusal, ER=Excavation Refusal  
 N=Standard Penetration Test N-Value  
 Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)  
 ▽ Water Level Reading at time of drilling.  
 ▾ Water Level Reading after drilling.

**Key to Hatches**

	Topsoil		USCS Low Plasticity Clay		USCS Clayey Sand
	Fill		USCS High Plasticity Clay		USCS Silty Sand
	Asphalt				



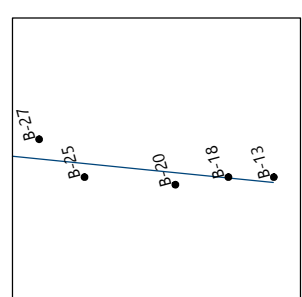


**Legend**

- BT= Boring Termination, TPT= Test Pit Terminated
- AR= Auger Refusal, ER= Excavation Refusal
- N= Standard Penetration Test N-Value
- Qu= Unconfined compressive strength estimate from pocket penetrometer test (tsf)
- ▽ = Water Level Reading at time of drilling.
- ▶ = Water Level Reading after drilling.

**Key to Hatches**

- Topsoil
- USCS Silty Sand
- Fill
- USCS High Plasticity Clay
- USCS Low Plasticity Clay
- USCS Elastic Silt
- USCS Clayey Sand

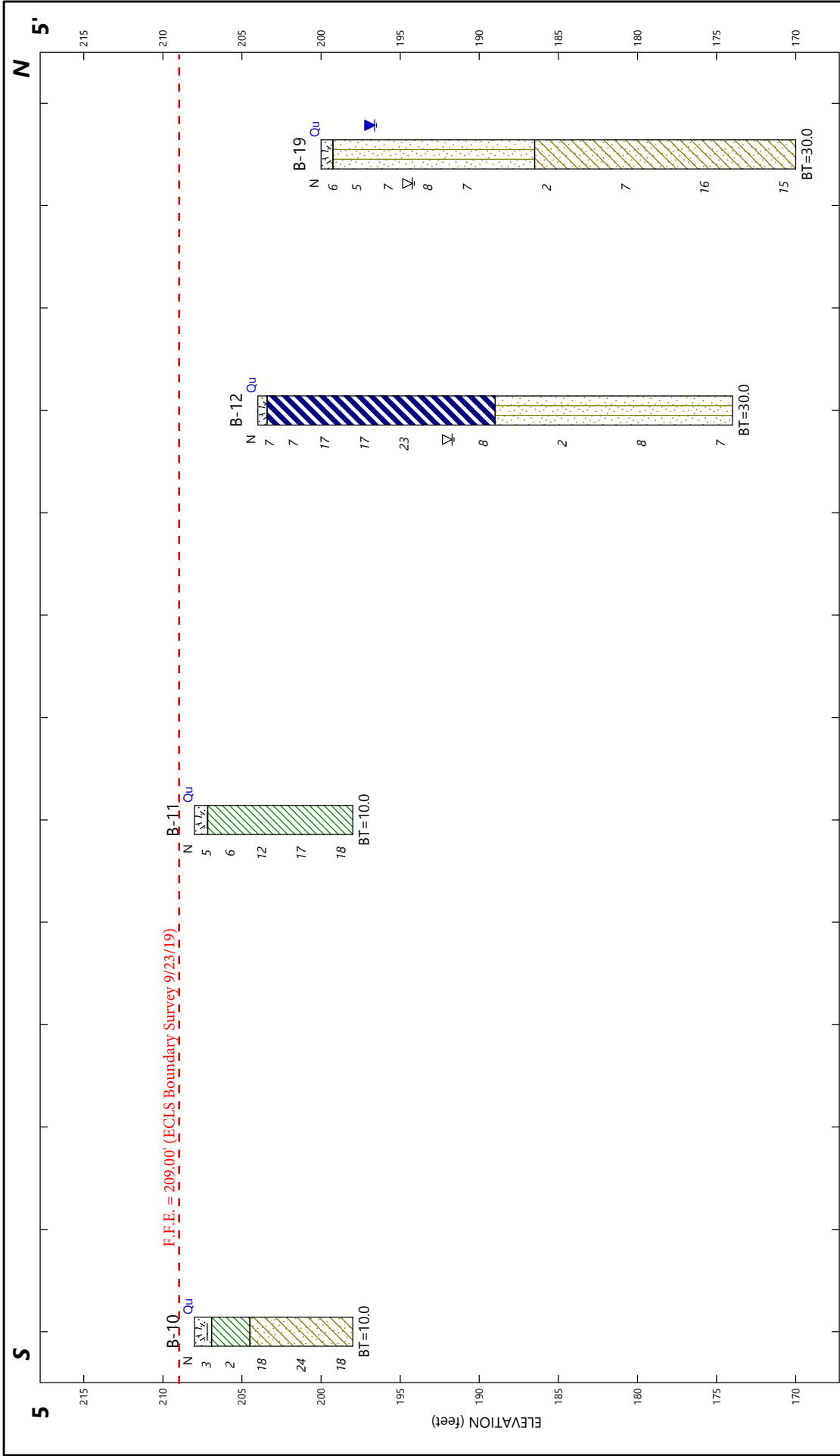


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 610 Spring Branch Rd., Dunn, NC 28834  
 HCS - Erwin Elementary School  
 Erwin, NC

**Fence 4: Subsurface Profile**  
 See Boring Location Plan

PROJECT NO: RD190564 PLATE NO: A-4 DATE: 1/8/20

**BUILDING & EARTH**  
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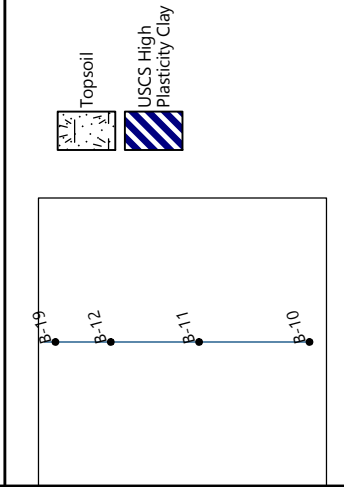


**Legend**

BT=Boring Termination, TPT=Test Pit Terminated  
 AR=Auger Refusal, ER=Excavation Refusal  
 N=Standard Penetration Test N-Value  
 Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)  
 ▽ Water Level Reading at time of drilling.  
 ▾ Water Level Reading after drilling.

**Key to Hatches**

- Topsoil
- USCS High Plasticity Clay
- USCS Low Plasticity Clay
- USCS Silty Sand
- USCS Clayey Sand



**Building & Earth Sciences, Inc.**  
 610 Spring Branch Rd., Dunn, NC 28334  
 HCS - Erwin Elementary School  
 Erwin, NC

**Fence 5: Subsurface Profile**  
 See Boring Location Plan

PROJECT NO: RD190564 PLATE NO: A-5 DATE: 1/8/20

**BUILDING & EARTH**  
 Geotechnical, Environmental, and Materials Engineers



## **BORING LOGS**



**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

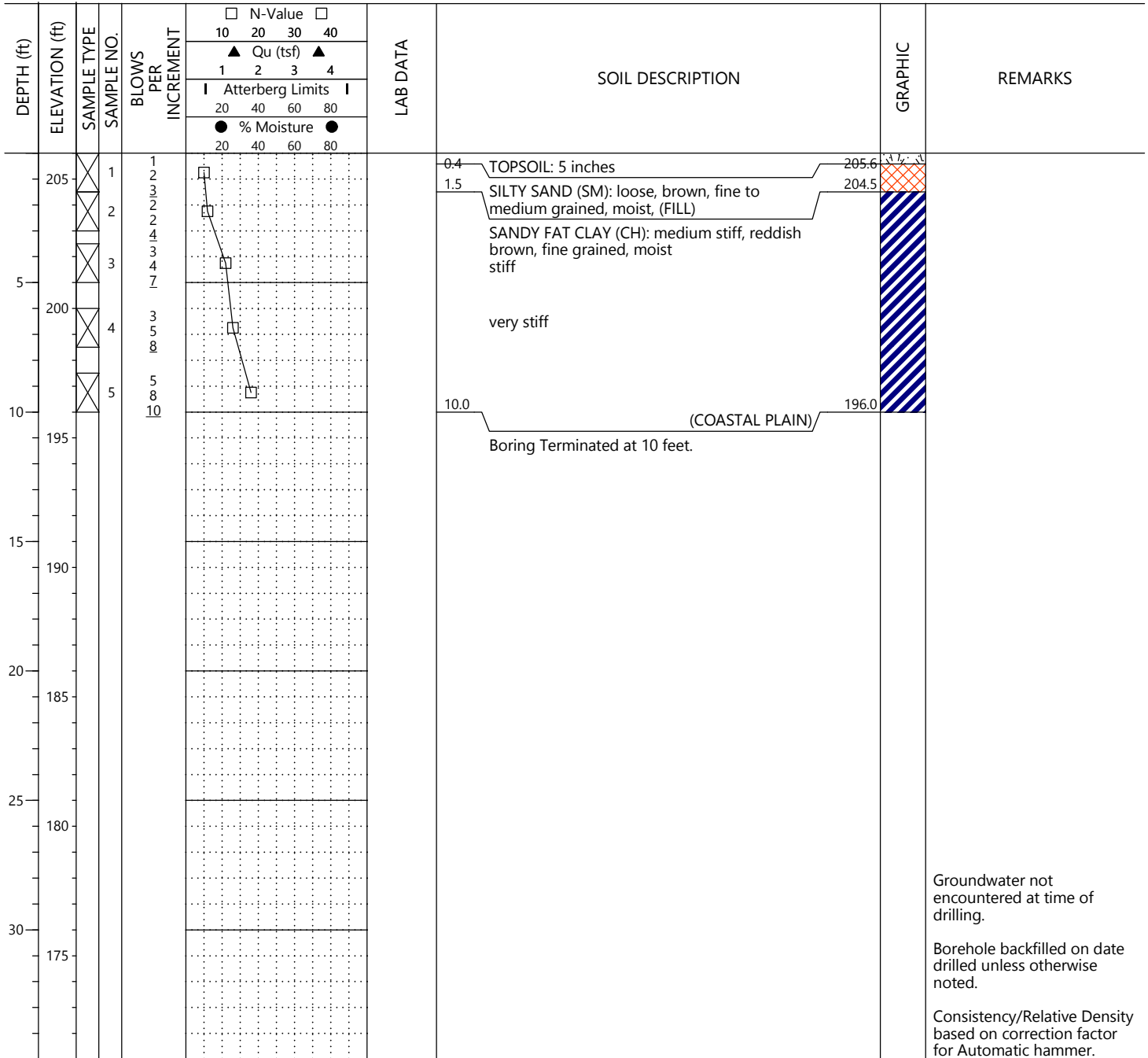
Designation: B-02

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 206  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

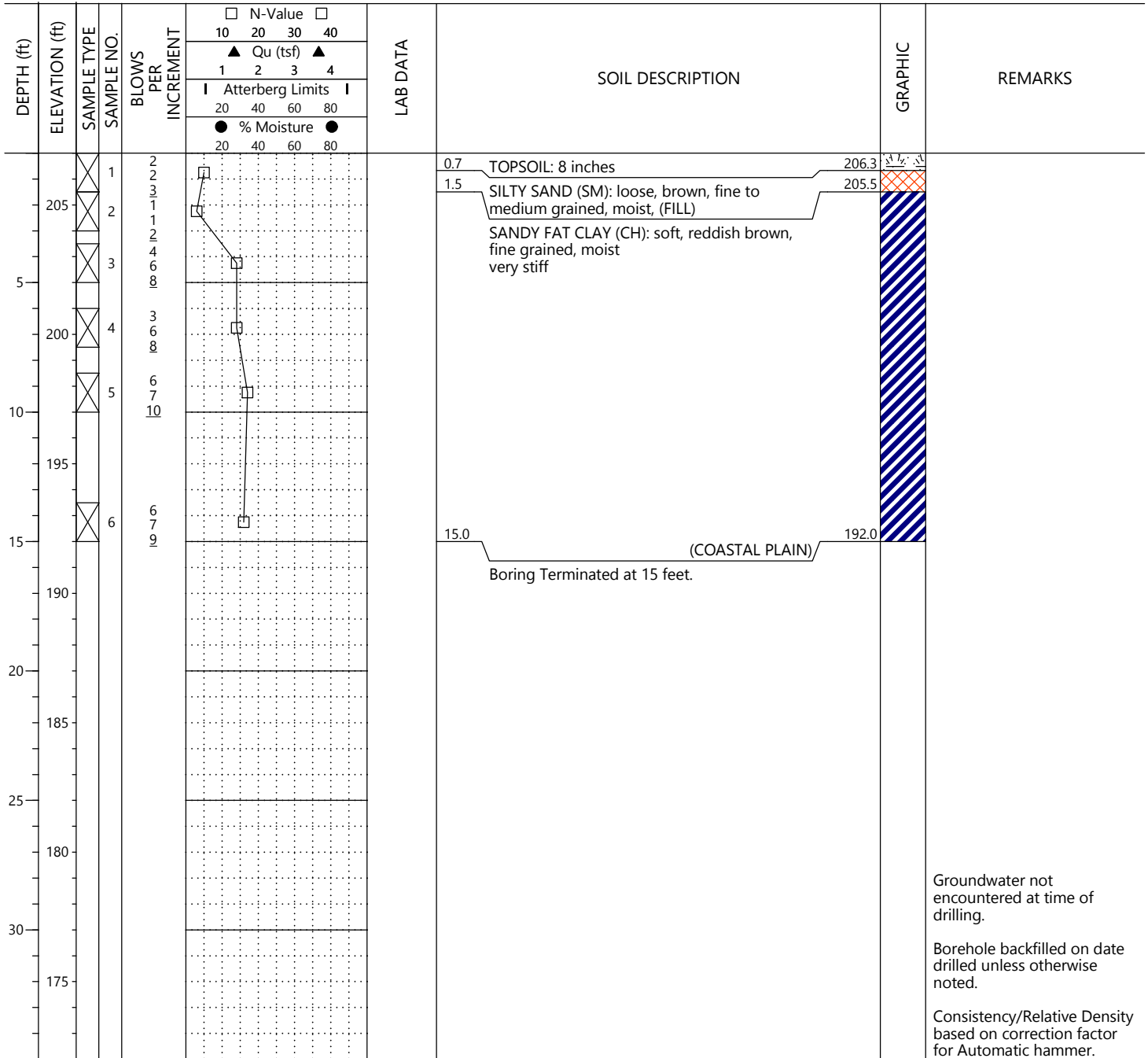
Designation: B-03

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 207  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

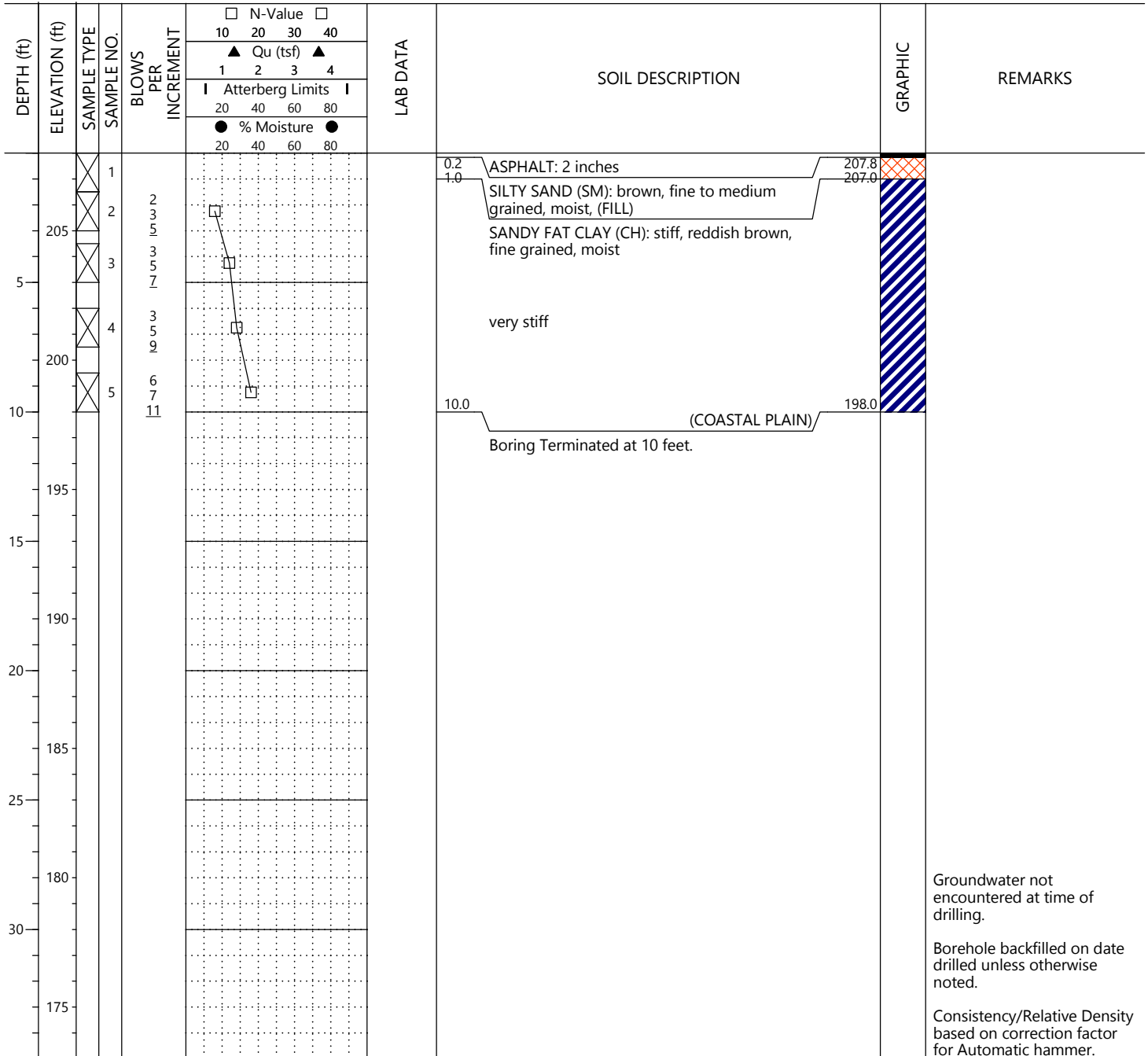
Designation: B-04

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 208  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

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Office: (910) 292-2085

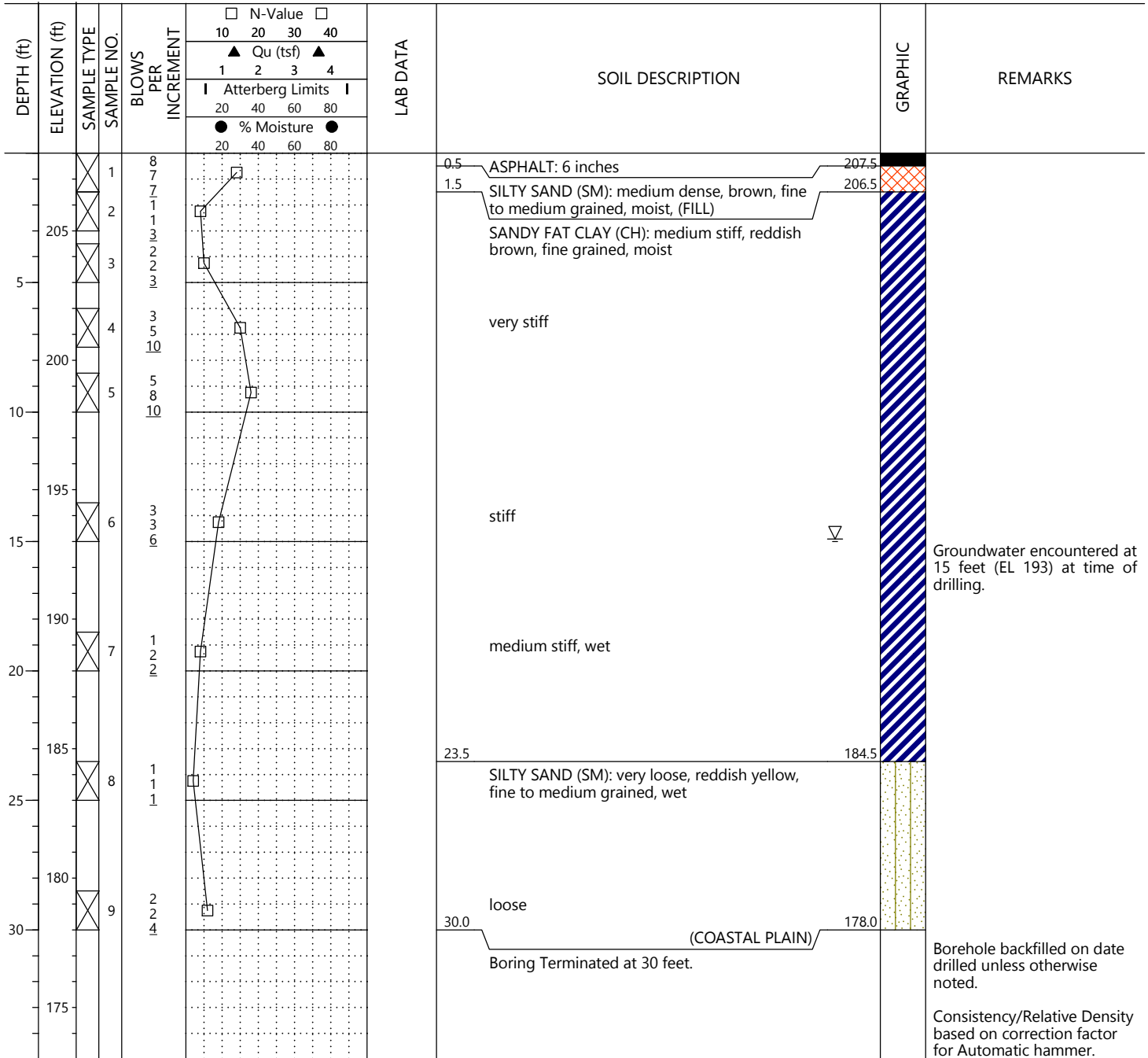
Designation: B-05

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 208  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-06

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/17/19  
WEATHER: 65, Rain  
ELEVATION: 209  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.7	208.3							TOPSOIL: 8 inches			
1.3	207.7							SILTY SAND (SM): loose, brown, fine to medium grained, moist, (FILL)			
2								SANDY FAT CLAY (CH): medium stiff, reddish brown, fine grained, moist stiff			
3								very stiff			
4											
6											
8.5	200.5							SILTY SAND (SM): medium dense, reddish yellow, fine to medium grained, moist			
10											
15								yellowish brown, wet		Groundwater encountered at 15 feet (EL 194) at time of drilling and stabilized at 13.5 feet (EL 195.5).	
20								loose			
25											
30.0	179.0							medium dense			
								(COASTAL PLAIN)			
								Boring Terminated at 30 feet.		Borehole backfilled on date drilled unless otherwise noted.	
										Consistency/Relative Density based on correction factor for Automatic hammer.	

SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-07

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/17/19  
WEATHER: 65, Rain  
ELEVATION: 209  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.8	208.2							TOPSOIL: 10 inches			
2								SANDY LEAN CLAY (CL): medium stiff, reddish brown, fine grained, moist stiff			
3								medium stiff			
4								very stiff			
5											
13.5	195.5							CLAYEY SAND (SC): medium dense, reddish yellow, fine to medium grained, moist (COASTAL PLAIN)			
15.0	194.0							Boring Terminated at 15 feet.			
15											
190											
185											
180											
30										Groundwater not encountered at time of drilling.	
										Borehole backfilled on date drilled unless otherwise noted.	
										Consistency/Relative Density based on correction factor for Automatic hammer.	

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH



**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-08

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/17/19  
WEATHER: 65, Rain  
ELEVATION: 207  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.8	206.3		1	2					TOPSOIL: 9 inches		
205			2	2					SANDY LEAN CLAY (CL): medium stiff, reddish brown, fine grained, moist		
5			3	2					stiff		
200			4	5					very stiff		
10			5	11					hard		
10.0	197.0			15					(COASTAL PLAIN)		
									Boring Terminated at 10 feet.		
195											
15											
190											
20											
185											
25											
180											
30											
175											

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

Groundwater not encountered at time of drilling.

Borehole backfilled on date drilled unless otherwise noted.

Consistency/Relative Density based on correction factor for Automatic hammer.

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-09

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/17/19  
WEATHER: 65, Rain  
ELEVATION: 209  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.8	208.3		1	2							
			2	3							
205			3	3							
5			4	5							
			5	7							
200				10							
10				12							
				12							
195											
15											
190											
20											
185											
25											
180											
30											
175											

Sample BULK  
LL: 33  
PL: 16  
PI: 17  
M: 20.6%  
F: 59%

0.8 TOPSOIL: 9 inches 208.3  
SANDY LEAN CLAY (CL): medium stiff, reddish brown, fine grained, moist stiff  
very stiff  
10.0 hard 199.0  
(COASTAL PLAIN)  
Boring Terminated at 10 feet.

Groundwater not encountered at time of drilling.  
Borehole backfilled on date drilled unless otherwise noted.  
Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-10

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 208  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
1.1	206.9		1	1						TOPSOIL: 13 inches	
3.5	204.5		2	1						SANDY LEAN CLAY (CL): soft, reddish brown, fine grained, moist	
6			3	4						CLAYEY SAND (SC): medium dense, reddish brown, fine to medium grained, moist	
9.9			4	6						dense	
10.0	198.0		5	9						medium dense (COASTAL PLAIN) Boring Terminated at 10 feet.	

SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-11

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 208  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.8	207.2		1	2					TOPSOIL: 10 inches		
2	205		2	2					SANDY LEAN CLAY (CL): medium stiff, reddish brown, fine to medium grained, moist		
4			3	4				stiff			
5			4	5					very stiff		
10	200		5	12				10.0			
									(COASTAL PLAIN)	198.0	
									Boring Terminated at 10 feet.		
15	195										
20	190										
25	185										
30	180									Groundwater not encountered at time of drilling.	
										Borehole backfilled on date drilled unless otherwise noted.	
	175									Consistency/Relative Density based on correction factor for Automatic hammer.	

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

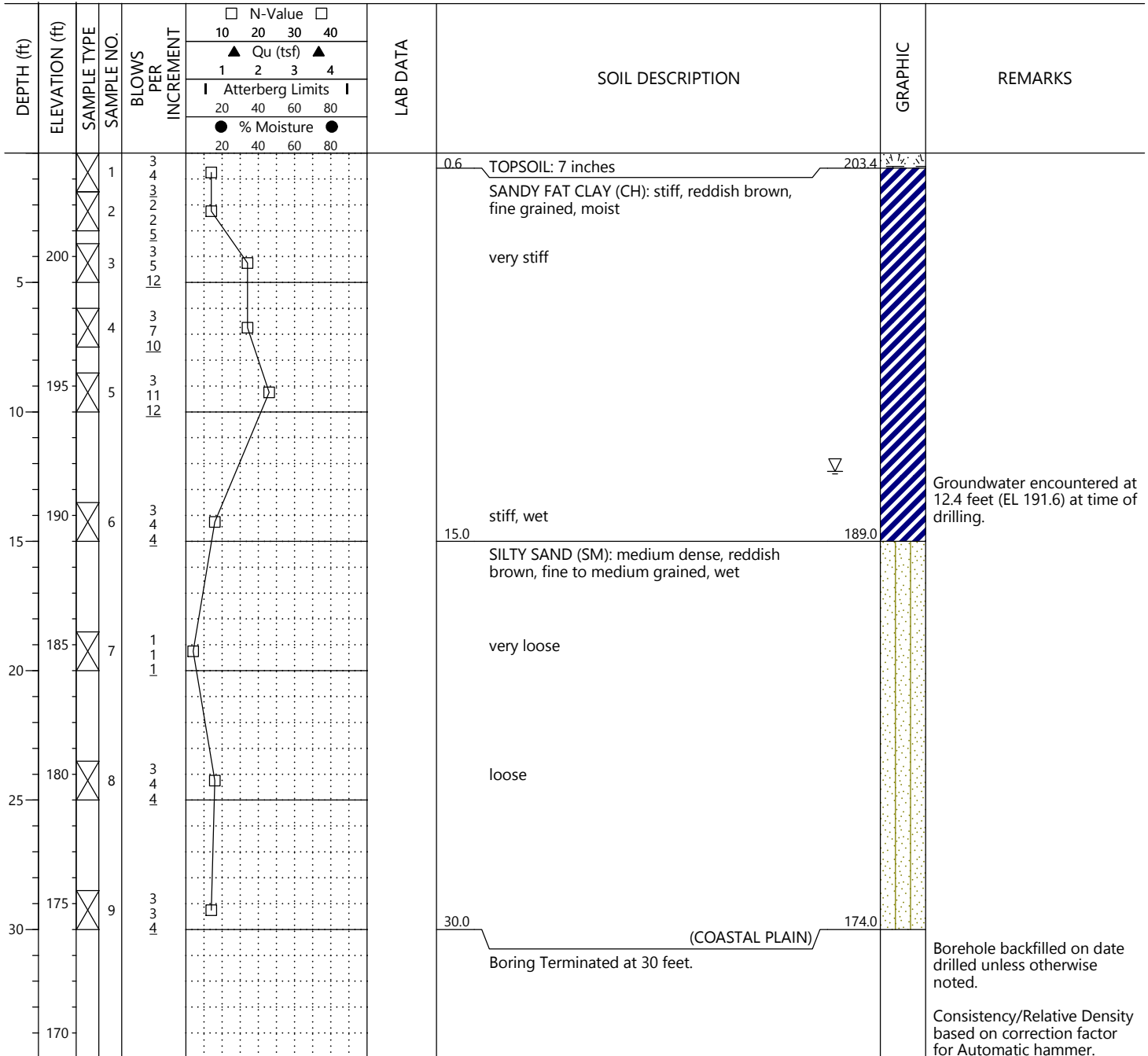
Designation: B-12

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 204  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
**▽** GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
**▽** STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-13

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 204  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
1.1	202.9							TOPSOIL: 13 inches			
3.5	200.5							SANDY FAT CLAY (CH): soft, reddish brown, fine grained, moist stiff			
3								ELASTIC SILT (MH): stiff, reddish brown, fine to medium grained, moist			
4								very stiff			
5											
6											
15.0	189.0							stiff		Groundwater encountered at 13 feet (EL 191) at time of drilling and stabilized at 12.5 feet (EL 191.5).	
								SILTY SAND (SM): medium dense, light reddish brown, fine to medium grained, wet			
								very loose			
24.0	180.0										
								SANDY LEAN CLAY (CL): medium stiff, grayish brown, fine grained, wet			
28.5	175.5										
30.0	174.0							SILTY SAND (SM): medium dense, yellowish brown, fine to medium grained, wet (COASTAL PLAIN)			
								Boring Terminated at 30 feet.		Borehole backfilled on date drilled unless otherwise noted.  Consistency/Relative Density based on correction factor for Automatic hammer.	

SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-14

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 207  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.7	206.3							TOPSOIL: 8 inches			
205			1	2				SANDY FAT CLAY (CH): medium stiff, reddish brown, fine grained, moist  very stiff			
			2	2							
			3	7							
5			4	11				6.0	201.0		
			5	7							
200			6	12				CLAYEY SAND (SC): medium dense, reddish brown, fine to medium grained, moist			
			7	4							
10			8	5				14.0	193.0	Groundwater encountered at 13 feet (EL 194) at time of drilling.	
			9	4							
195			10	4				loose			
			11	4							
15			12	4				SILTY SAND (SM): loose, reddish brown, fine to medium grained, wet			
			13	4							
190			14	1				very loose			
			15	1							
20			16	1				24.0	183.0		
			17	1							
185			18	1				SANDY FAT CLAY (CH): medium stiff, gray, fine grained, wet			
			19	2							
25			20	2				SILTY SAND (SM): medium dense, light gray, fine to coarse grained, wet, with gravel			
			21	2							
180			22	5				30.0	177.0	Borehole backfilled on date drilled unless otherwise noted.	
			23	6							
30			24	9				(COASTAL PLAIN)		Consistency/Relative Density based on correction factor for Automatic hammer.	
			25	9							
175			26					Boring Terminated at 30 feet.			

SAMPLE TYPE Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
- STABILIZED GROUNDWATER LEVEL
- REC** RECOVERY
- RQD** ROCK QUALITY DESIGNATION
- UD** UNDISTURBED
- Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH
- LL:** LIQUID LIMIT
- M:** NATURAL MOISTURE CONTENT
- PL:** PLASTIC LIMIT
- F:** PERCENT PASSING NO. 200 SIEVE
- PI:** PLASTICITY INDEX

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
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Office: (910) 292-2085

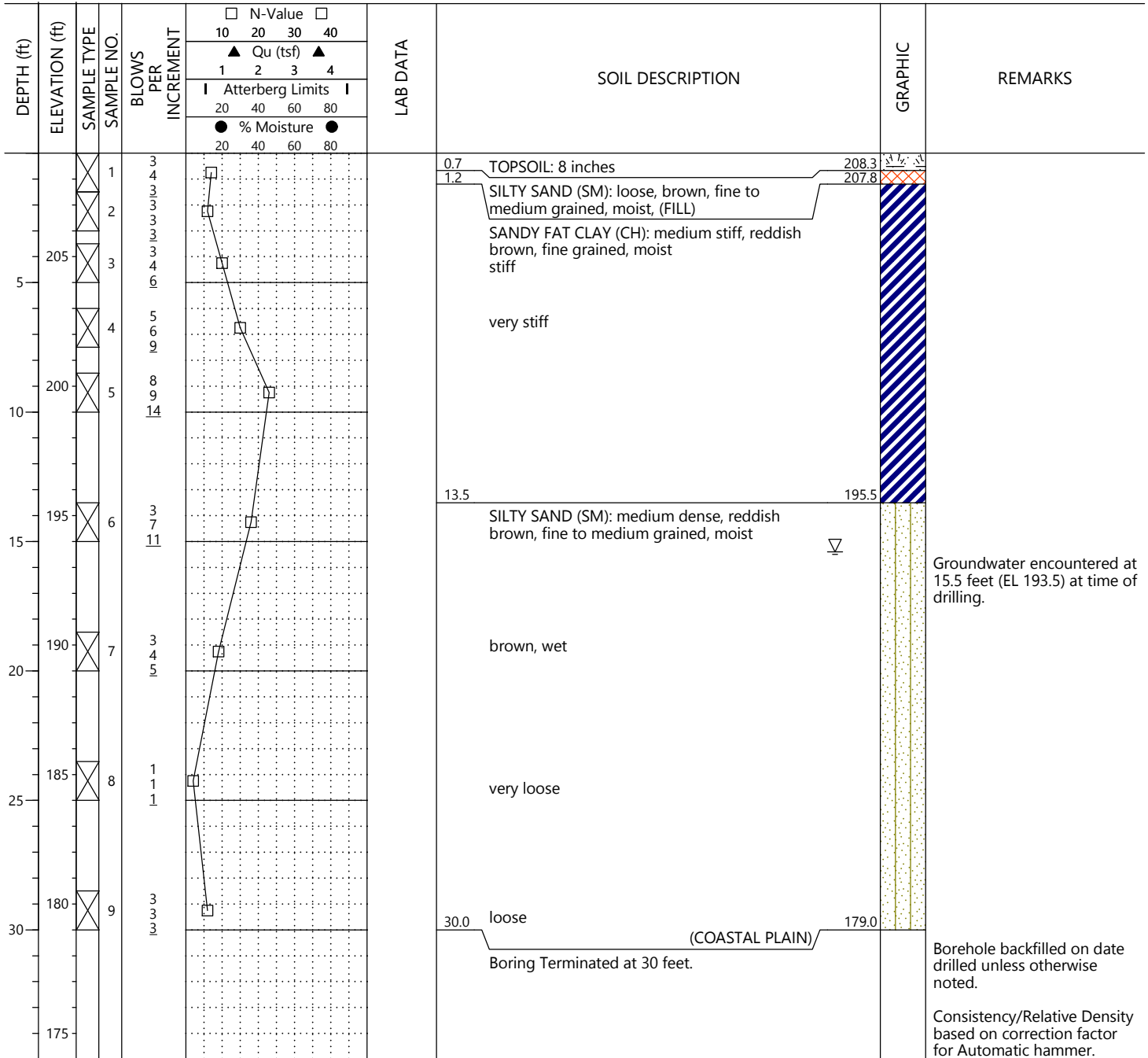
Designation: B-15

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 209  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
- STABILIZED GROUNDWATER LEVEL
- REC** RECOVERY
- RQD** ROCK QUALITY DESIGNATION
- UD** UNDISTURBED
- Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH
- LL:** LIQUID LIMIT
- M:** NATURAL MOISTURE CONTENT
- PL:** PLASTIC LIMIT
- F:** PERCENT PASSING NO. 200 SIEVE
- PI:** PLASTICITY INDEX



**BUILDING & EARTH**

**LOG OF BORING**

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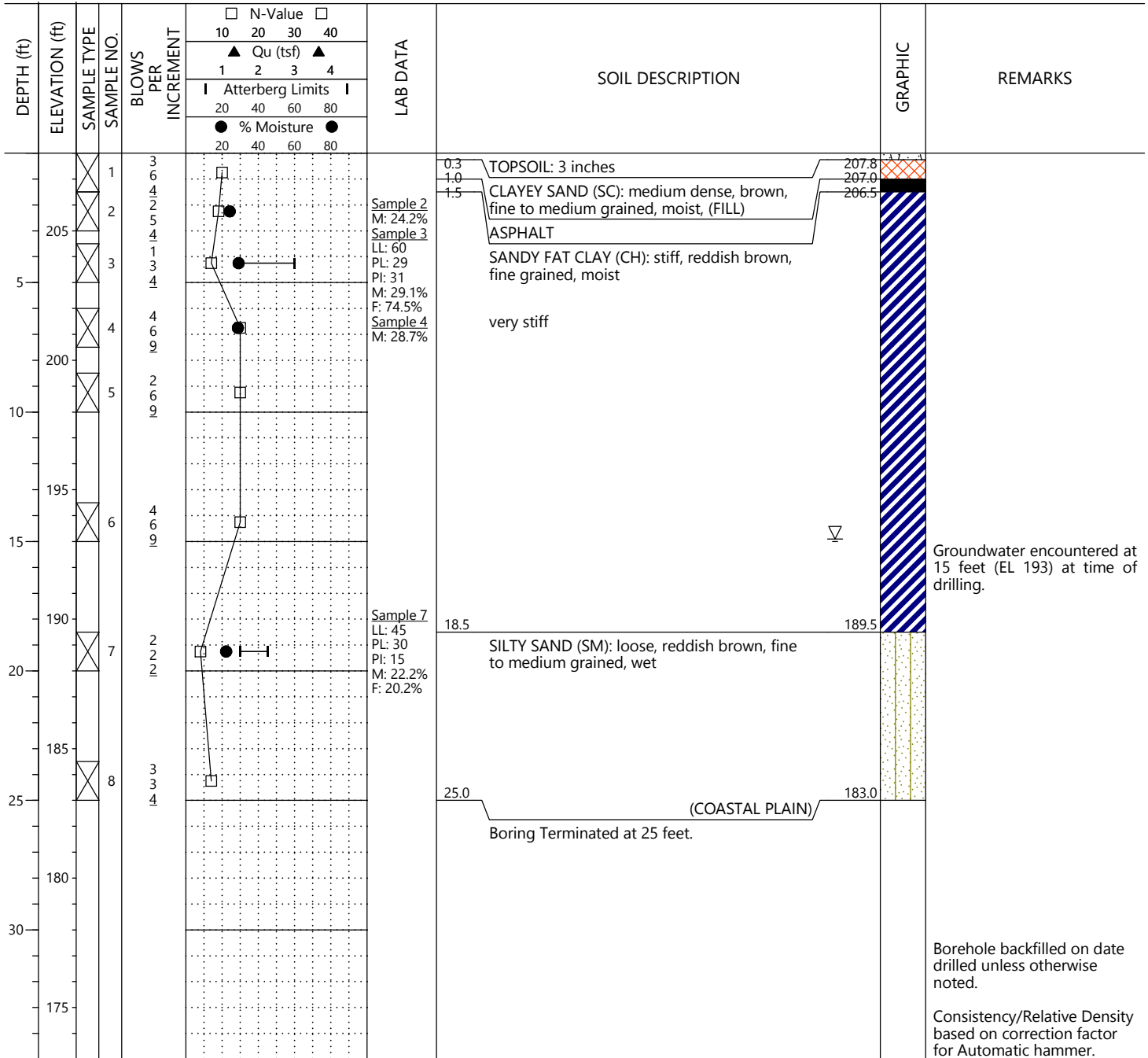
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Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 208  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

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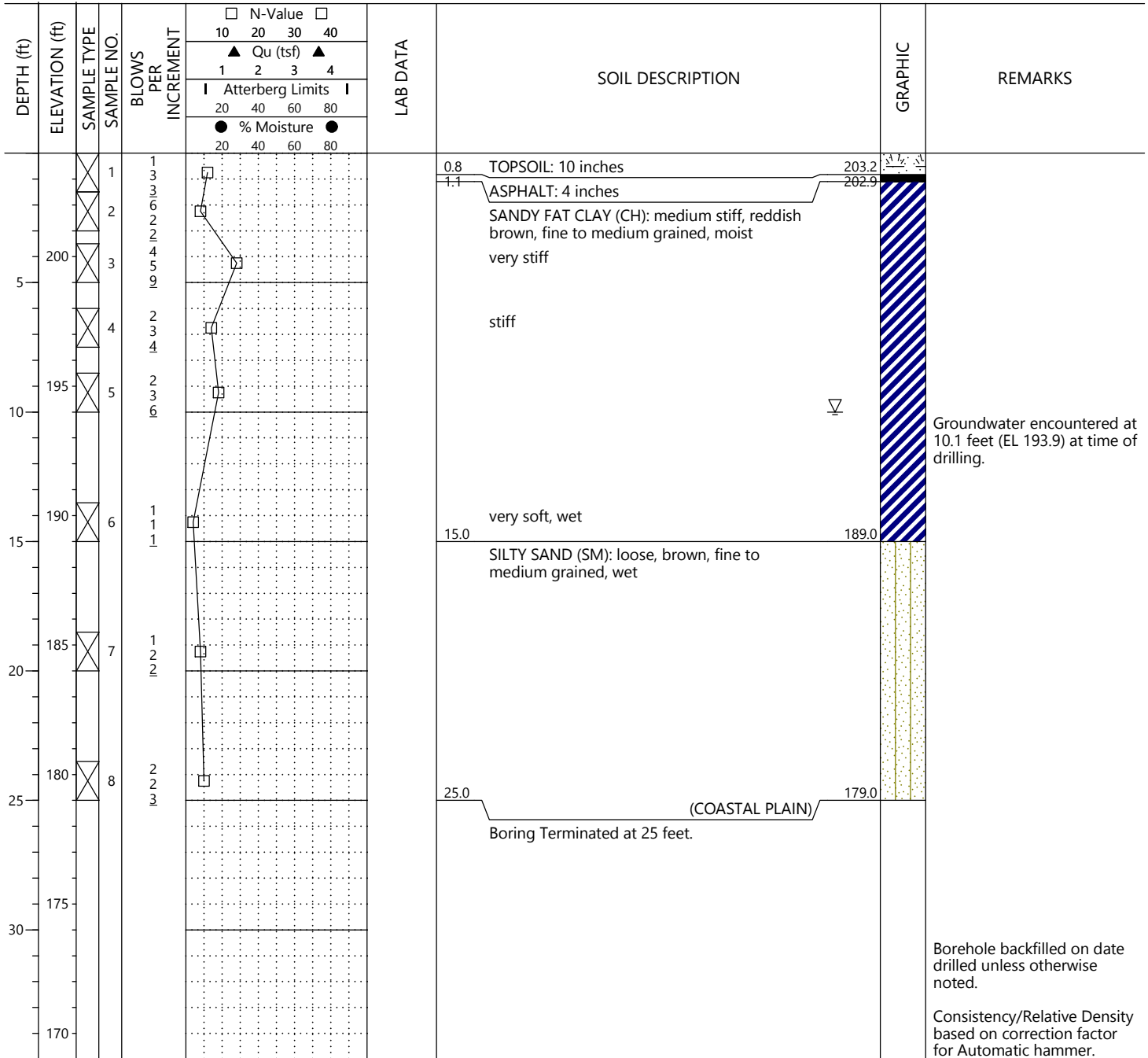
Designation: B-17

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 204  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
- STABILIZED GROUNDWATER LEVEL
- REC** RECOVERY
- RQD** ROCK QUALITY DESIGNATION
- UD** UNDISTURBED
- Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH
- LL:** LIQUID LIMIT
- M:** NATURAL MOISTURE CONTENT
- PL:** PLASTIC LIMIT
- F:** PERCENT PASSING NO. 200 SIEVE
- PI:** PLASTICITY INDEX

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-18

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Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 200  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.8	199.2							TOPSOIL: 10 inches			
2			1	2				SANDY FAT CLAY (CH): medium stiff, reddish brown, fine grained, moist very stiff		Groundwater encountered at 7.1 feet (EL 192.9) at time of drilling.	
4			2	4							
5	195		3	5				stiff		Groundwater encountered at 7.1 feet (EL 192.9) at time of drilling.	
7			4	4							
10	190		5	2				medium stiff, wet		Groundwater encountered at 7.1 feet (EL 192.9) at time of drilling.	
12			6	2							
15	185		6	1				SILTY SAND (SM): very loose, brown, fine to medium grained, wet		Borehole backfilled on date drilled unless otherwise noted.	
17			7	2							
20	180		7	1				loose		Borehole backfilled on date drilled unless otherwise noted.	
22			8	2							
25	175		8	2				medium dense		Borehole backfilled on date drilled unless otherwise noted.	
27			9	4							
30	170		9	5				(COASTAL PLAIN)		Borehole backfilled on date drilled unless otherwise noted.	
30				7							
	165							Boring Terminated at 30 feet.		Consistency/Relative Density based on correction factor for Automatic hammer.	

SAMPLE TYPE Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
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Office: (910) 292-2085

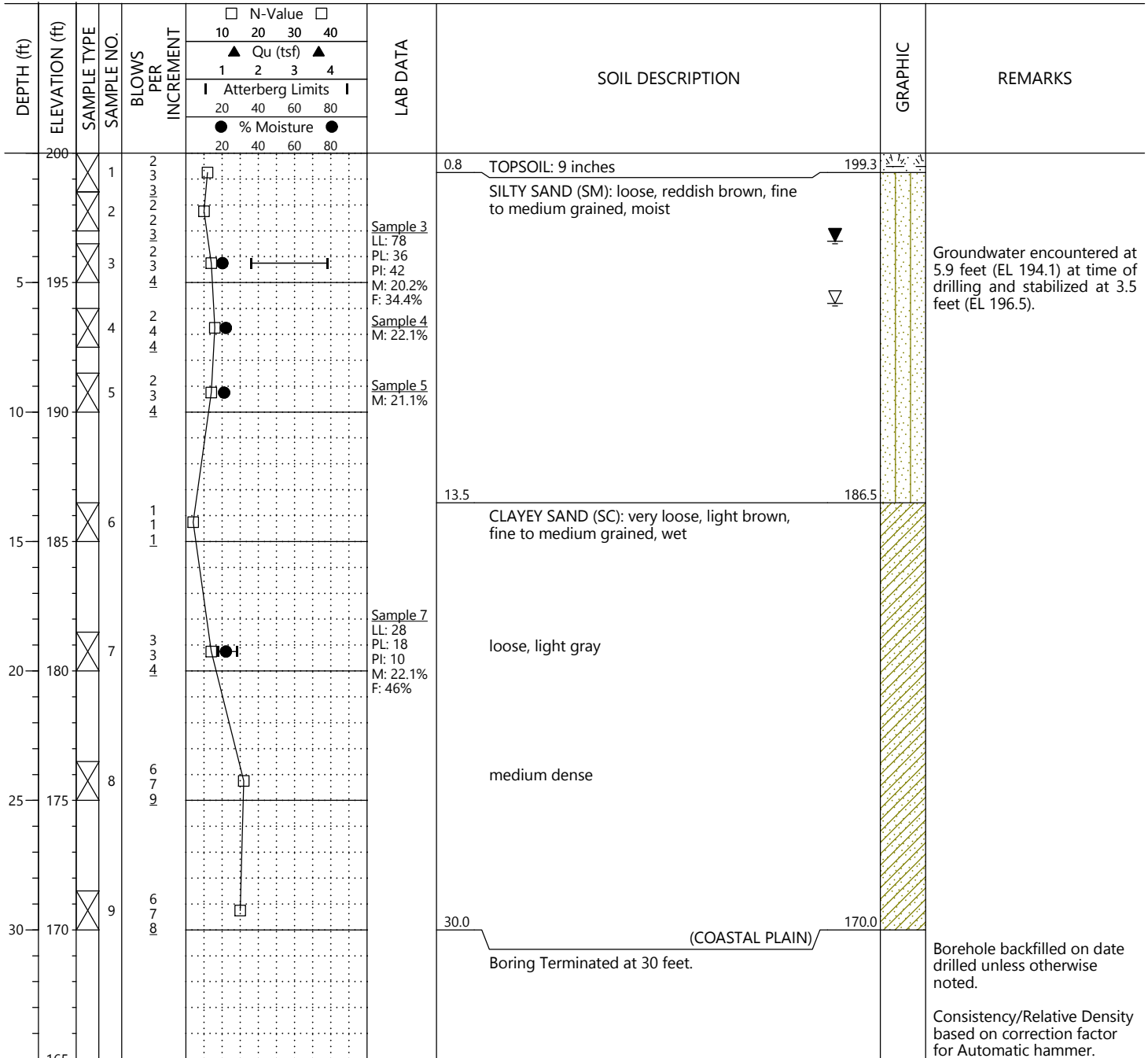
Designation: B-19

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 200  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT      **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION      **PL:** PLASTIC LIMIT      **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING      **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

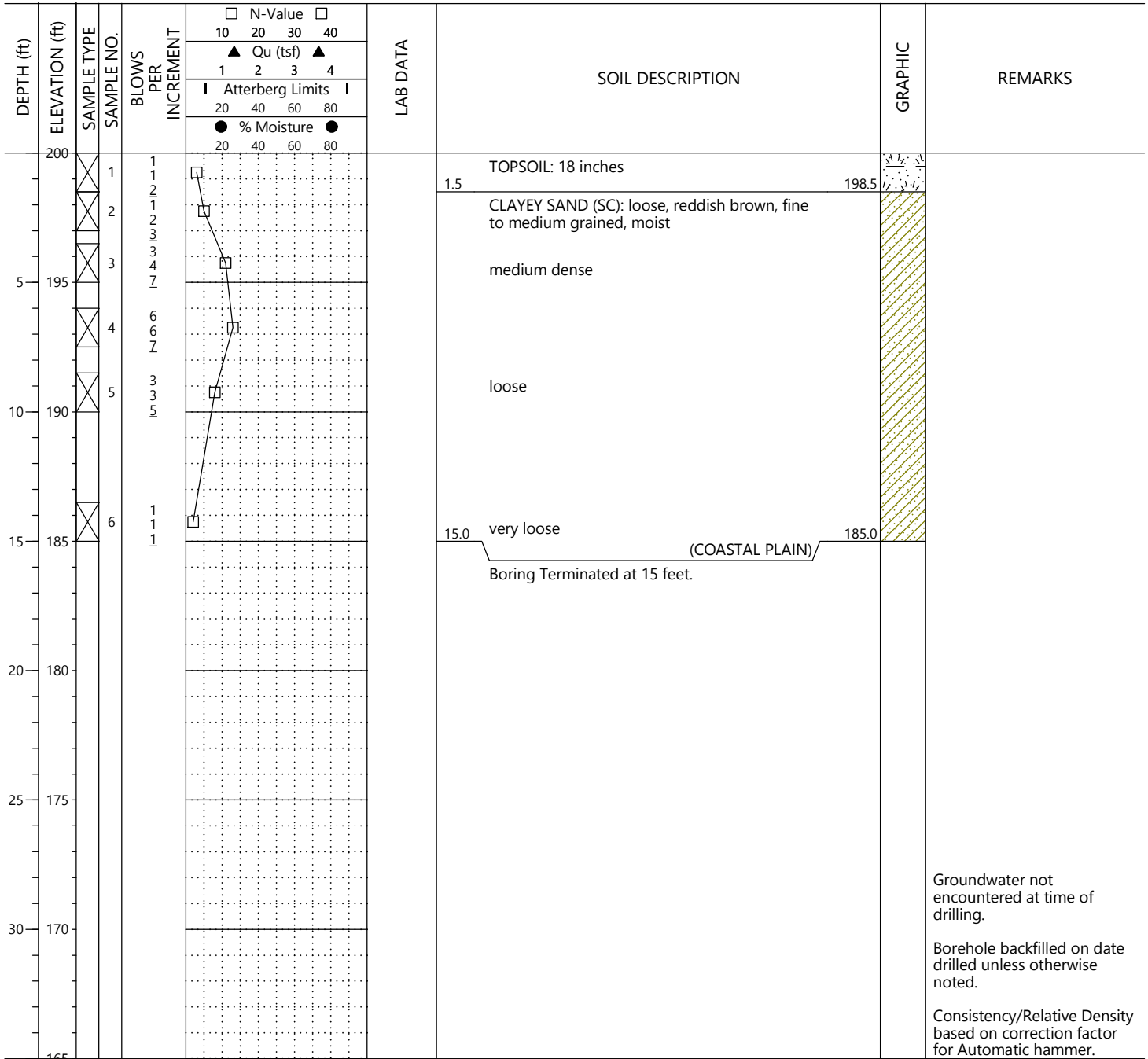
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Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 200  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

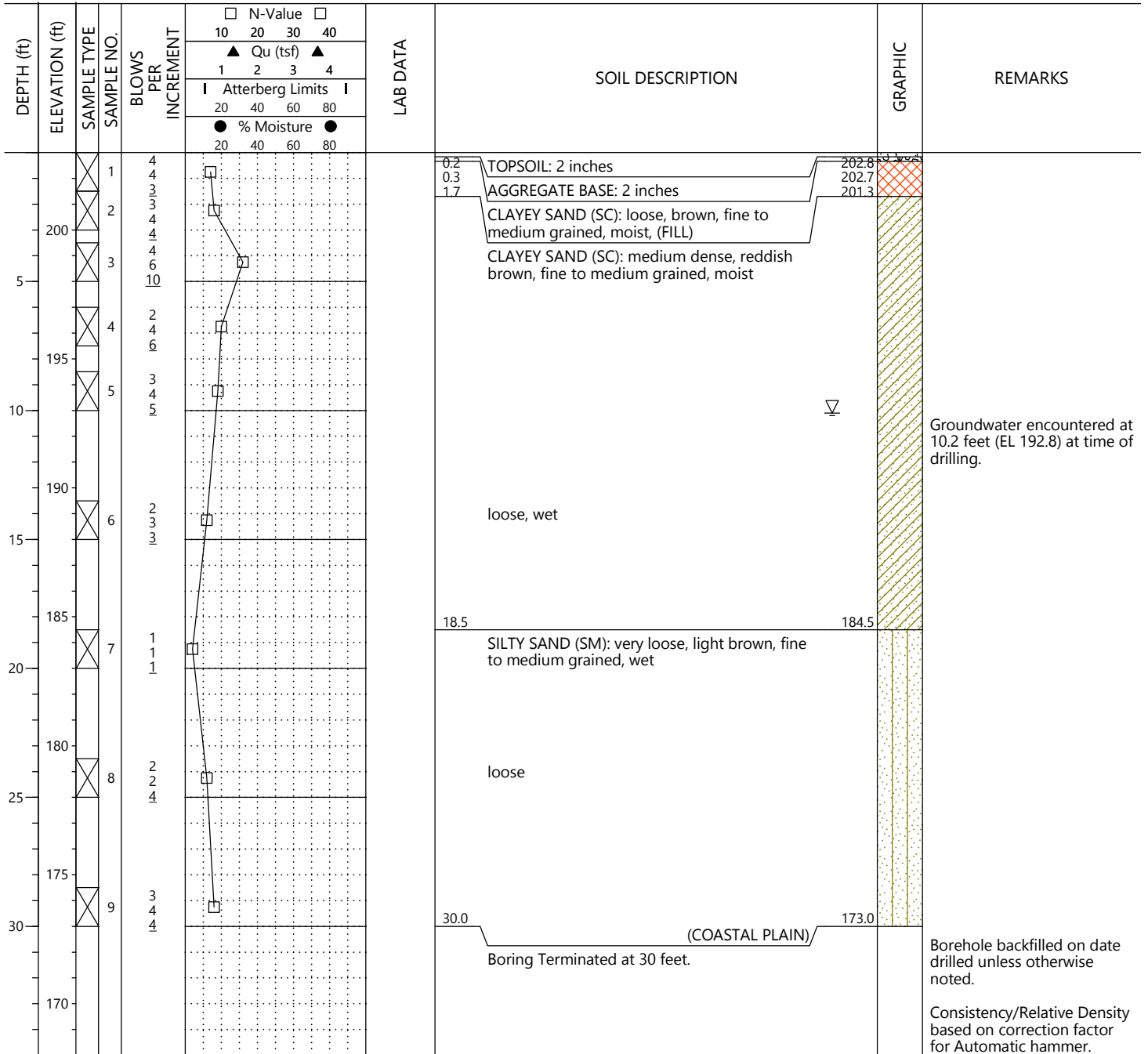
Designation: B-21

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/19/19  
WEATHER: 44, Sunny  
ELEVATION: 203  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin



SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-22

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 208  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.6	207.4										
1.5	206.5										
205			1	3							
			2	3							
			3	4							
5			4	4							
			5	6							
200			6	4							
			7	7							
			8	13							
10			9	5							
			10	9							
			11	14							
15			12	4							
			13	4							
			14	7							
195			15	4							
			16	4							
			17	7							
20			18	2							
			19	3							
			20	2							
185			21	2							
			22	2							
25			23	1							
			24	3							
			25	2							
180			26	1							
			27	2							
			28	2							
30			29	2							
			30	2							
175											

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-23

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 203  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.6	202.4							TOPSOIL: 7 inches			
1.7	201.3							SILTY SAND (SM): loose, brown, fine to medium grained, moist, (FILL)			
								CLAYEY SAND (SC): loose, reddish brown, fine to medium grained, moist dense			
								medium dense			
10.0	193.0							(COASTAL PLAIN)			
								Boring Terminated at 10 feet.			
										Groundwater not encountered at time of drilling.	
										Borehole backfilled on date drilled unless otherwise noted.	
										Consistency/Relative Density based on correction factor for Automatic hammer.	

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH



**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-24

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 202  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
0.6	201.4		1	2				TOPSOIL: 7 inches			
2.0	200.0		2	2				CLAYEY SAND (SC): loose, brown, fine to medium grained, moist, (FILL)			
			3	2				CLAYEY SAND (SC): loose, light brown, fine to medium grained, moist reddish yellow			
7.0	195.0		4	3				medium dense			
			5	6				SANDY LEAN CLAY (CL): very stiff, pinkish white, fine grained, moist			
10.0	192.0			10				(COASTAL PLAIN)			
Boring Terminated at 10 feet.											
Groundwater not encountered at time of drilling.											
Borehole backfilled on date drilled unless otherwise noted.											
Consistency/Relative Density based on correction factor for Automatic hammer.											

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-25

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 200  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
200			1	2					0.4	TOPSOIL: 5 inches	199.6
			2	2					1.5	CLAYEY SAND (SC): loose, brown, fine to medium grained, moist, (FILL)	198.5
			3	3						SANDY LEAN CLAY (CL): stiff, reddish brown, fine to medium grained, moist very stiff	
5	195		4	4							
			5	3							
10	190			2					10.0	medium stiff	190.0
				2						(COASTAL PLAIN)	
				2						Boring Terminated at 10 feet.	
15	185										
20	180										
25	175										
30	170										
35	165										

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

Groundwater not encountered at time of drilling.  
Borehole backfilled on date drilled unless otherwise noted.  
Consistency/Relative Density based on correction factor for Automatic hammer.

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-26

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 202  
DRILL CREW: Building & Earth  
LOGGED BY: M.Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
200	202	Split Spoon	1	3					0.6	TOPSOIL: 7 inches	201.4
			2	2					0.9	AGGREGATE BASE: 4 inches	201.1
5			3	10						CLAYEY SAND (SC): very loose, reddish brown, fine to medium grained, moist medium dense	
10	195		4	7							
			5	6					10.0	(COASTAL PLAIN)	192.0
										Boring Terminated at 10 feet.	
15	190										
20	185										
25	180										
30	175										
	170										

SAMPLE TYPE  Split Spoon

- N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT    **M:** NATURAL MOISTURE CONTENT
- % MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION    **PL:** PLASTIC LIMIT    **F:** PERCENT PASSING NO. 200 SIEVE
- GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING    **UD** UNDISTURBED      **PI:** PLASTICITY INDEX
- STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

**BUILDING & EARTH**

**LOG OF BORING**

610 Spring Branch Rd.  
Dunn, NC 28334  
Office: (910) 292-2085

Designation: B-27

Sheet 1 of 1

Geotechnical, Environmental, and Materials Engineers

PROJECT NAME: HCS - Erwin Elementary School  
PROJECT NUMBER: RD190564  
DRILLING METHOD: Hollow Stem Auger  
EQUIPMENT USED: GeoProbe 3230 DT  
HAMMER TYPE: Automatic  
BORING LOCATION: See Boring Location Map

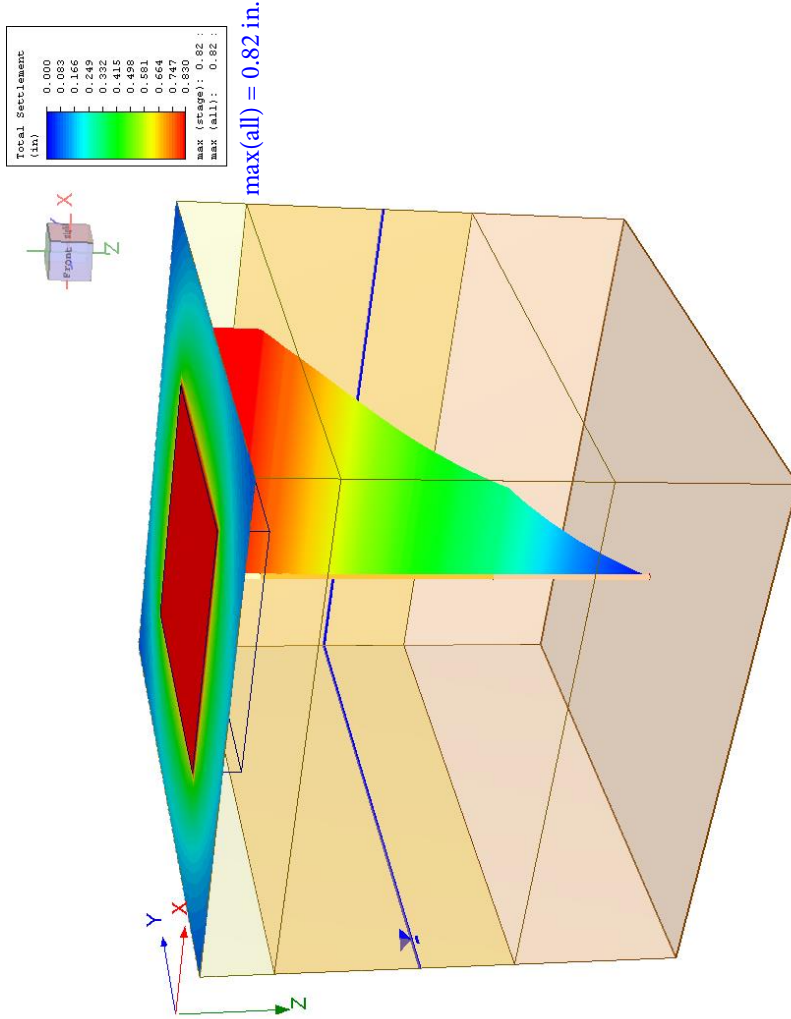
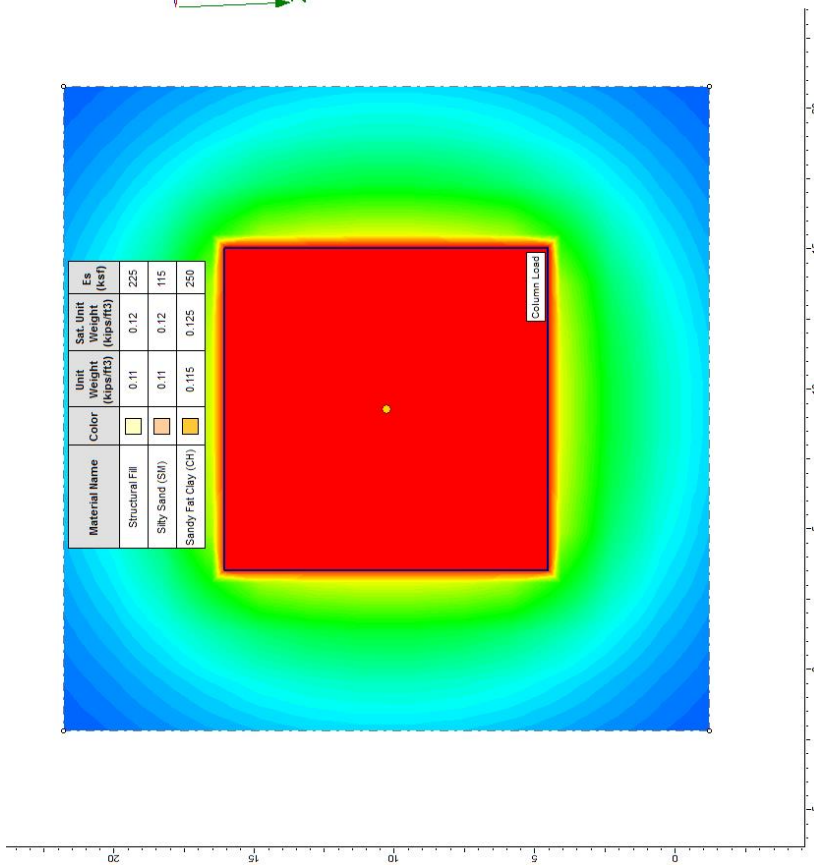
LOCATION: Erwin, NC  
DATE DRILLED: 12/20/19  
WEATHER: 55, Sunny  
ELEVATION: 200  
DRILL CREW: Building & Earth  
LOGGED BY: M. Lumpkin

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value □	▲ Qu (tsf) ▲	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80			
200			1	2					0.7	TOPSOIL: 8 inches	199.3
			2	2						ELASTIC SILT (MH): medium stiff, brown, fine to medium grained, moist	
			3	3						very stiff, reddish brown	
5	195		4	3						stiff	
			5	3						medium stiff	
10	190		6	2					15.0	(COASTAL PLAIN)	185.0
15	185			2						Boring Terminated at 15 feet.	
20	180										
25	175										
30	170										
35	165										

SAMPLE TYPE  Split Spoon

**N-VALUE** STANDARD PENETRATION RESISTANCE (AASHTO T-206)      **REC** RECOVERY      **LL:** LIQUID LIMIT      **M:** NATURAL MOISTURE CONTENT  
**% MOISTURE** PERCENT NATURAL MOISTURE CONTENT      **RQD** ROCK QUALITY DESIGNATION      **PL:** PLASTIC LIMIT      **F:** PERCENT PASSING NO. 200 SIEVE  
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING      **UD** UNDISTURBED      **PI:** PLASTICITY INDEX  
 STABILIZED GROUNDWATER LEVEL      **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

## **SETTLEMENT DATA**



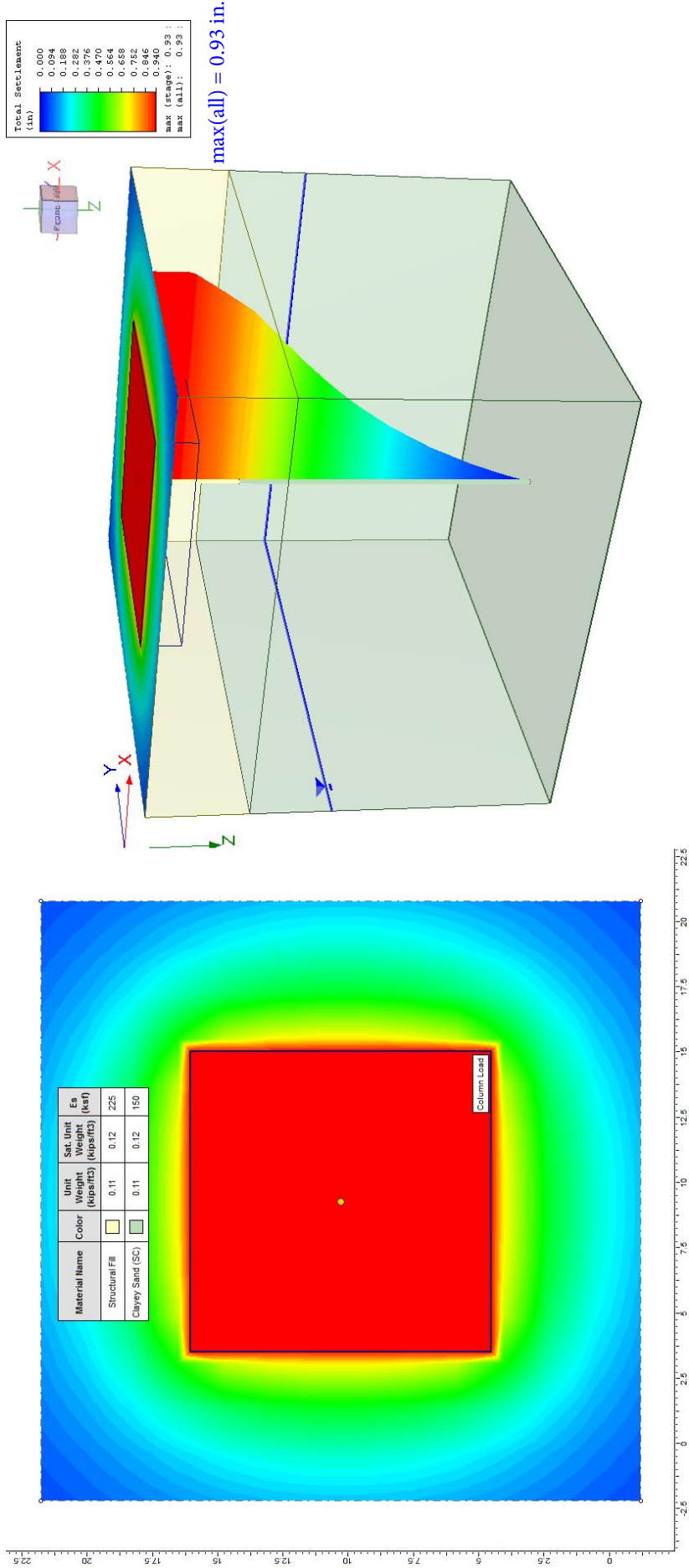
**New Erwin Elementary School**

**Footing Settlement (2,000 psf)  
3 ft. Structural Fill (Based on B-15)**

Project No.: RD190564

January 9, 2020





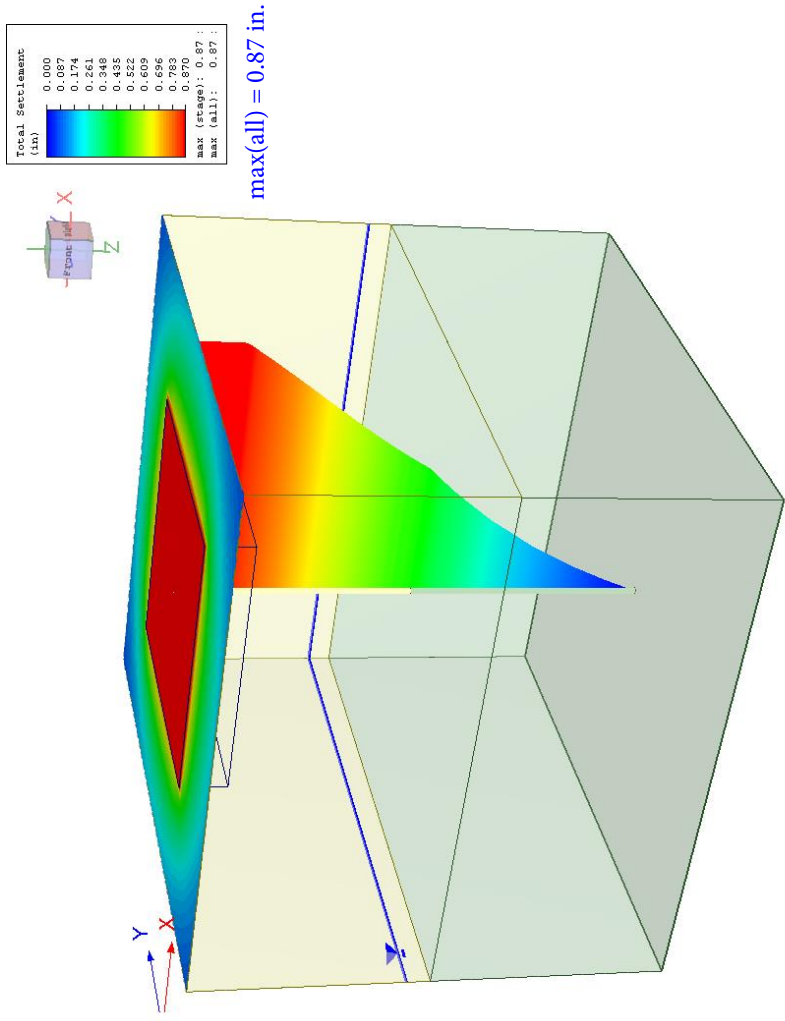
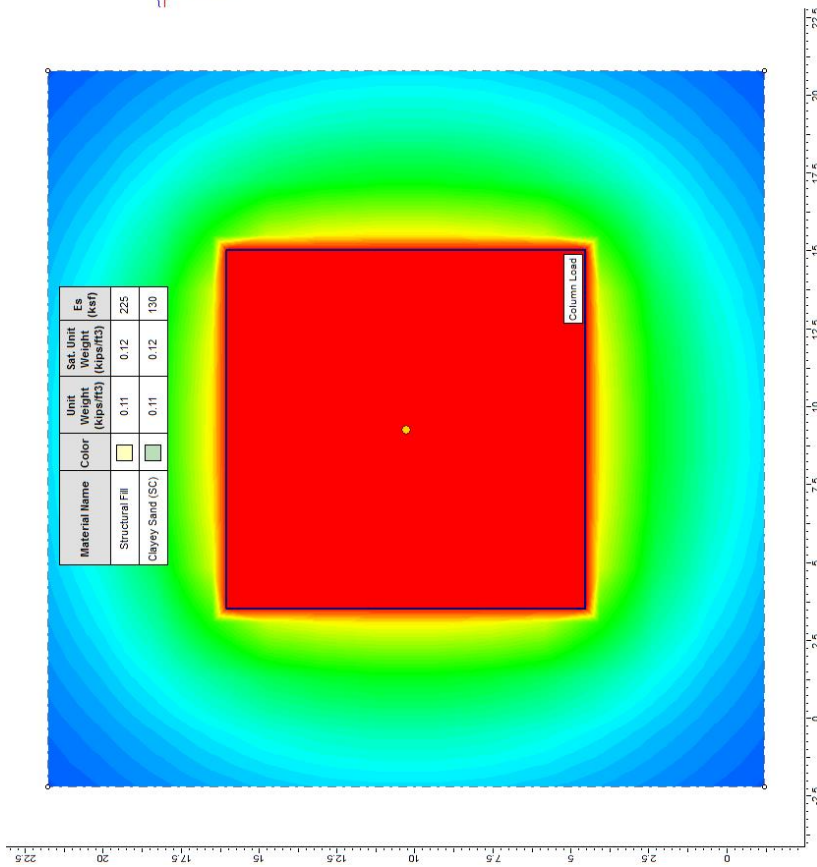
**Footing Settlement (2,000 psf)  
5 ft. Structural Fill (Based on B-22)**

**New Erwin Elementary School**

January 9, 2020

Project No.: RD190564





**New Erwin Elementary School**

Project No.: RD190564

January 9, 2020

**Footing Settlement (2,000 psf)  
10 ft. Structural Fill (Based on B-19)**



## **ReMi SEISMIC DATA**

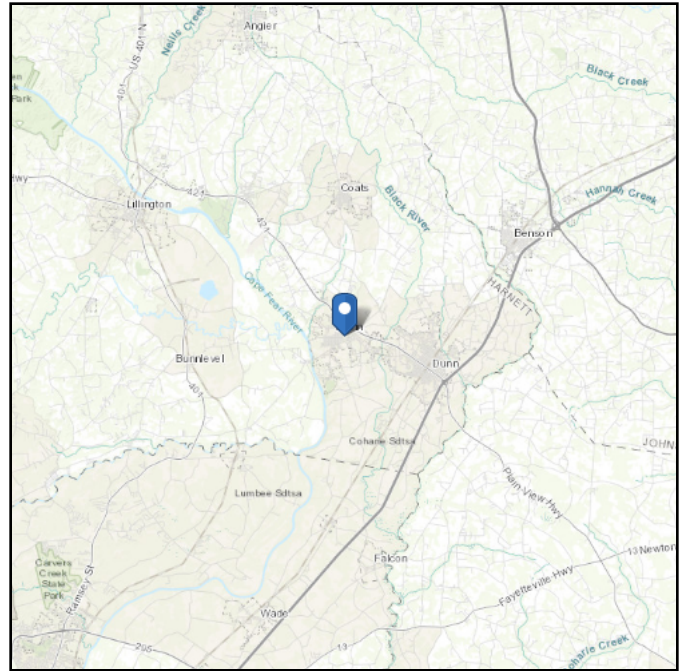


# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-16  
**Risk Category:** III  
**Soil Class:** D - Default (see  
Section 11.4.3)

**Elevation:** 205.43 ft (NAVD 88)  
**Latitude:** 35.325456  
**Longitude:** -78.669961





**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

$S_s$ :	0.133	$S_{D1}$ :	0.104
$S_1$ :	0.065	$T_L$ :	8
$F_a$ :	1.6	PGA :	0.064
$F_v$ :	2.4	PGA <sub>M</sub> :	0.103
$S_{MS}$ :	0.212	$F_{PGA}$ :	1.6
$S_{M1}$ :	0.156	$I_e$ :	1.25
$S_{DS}$ :	0.142	$C_v$ :	0.7

**Seismic Design Category**  
**Data Accessed:**

**B**  
Tue Dec 31 2019

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.



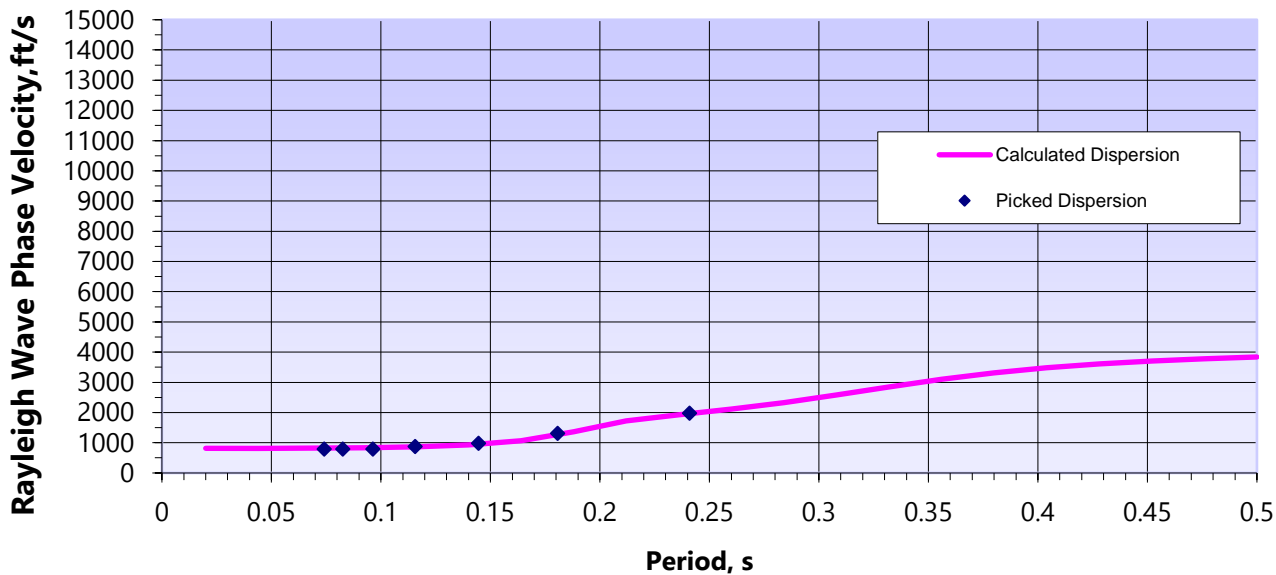
The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

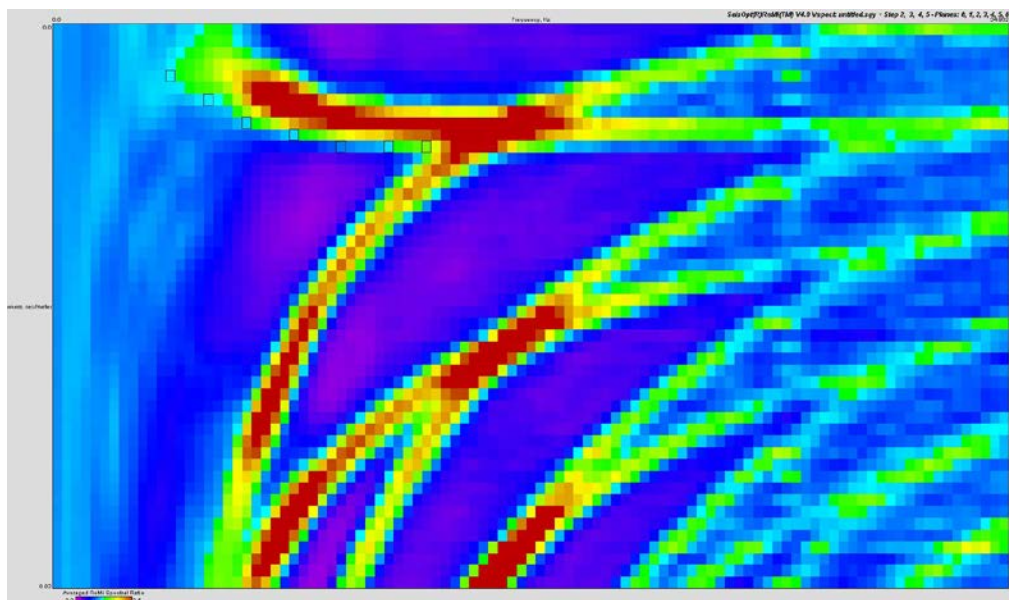
In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

**HCS-Erwin ES, Erwin, NC**

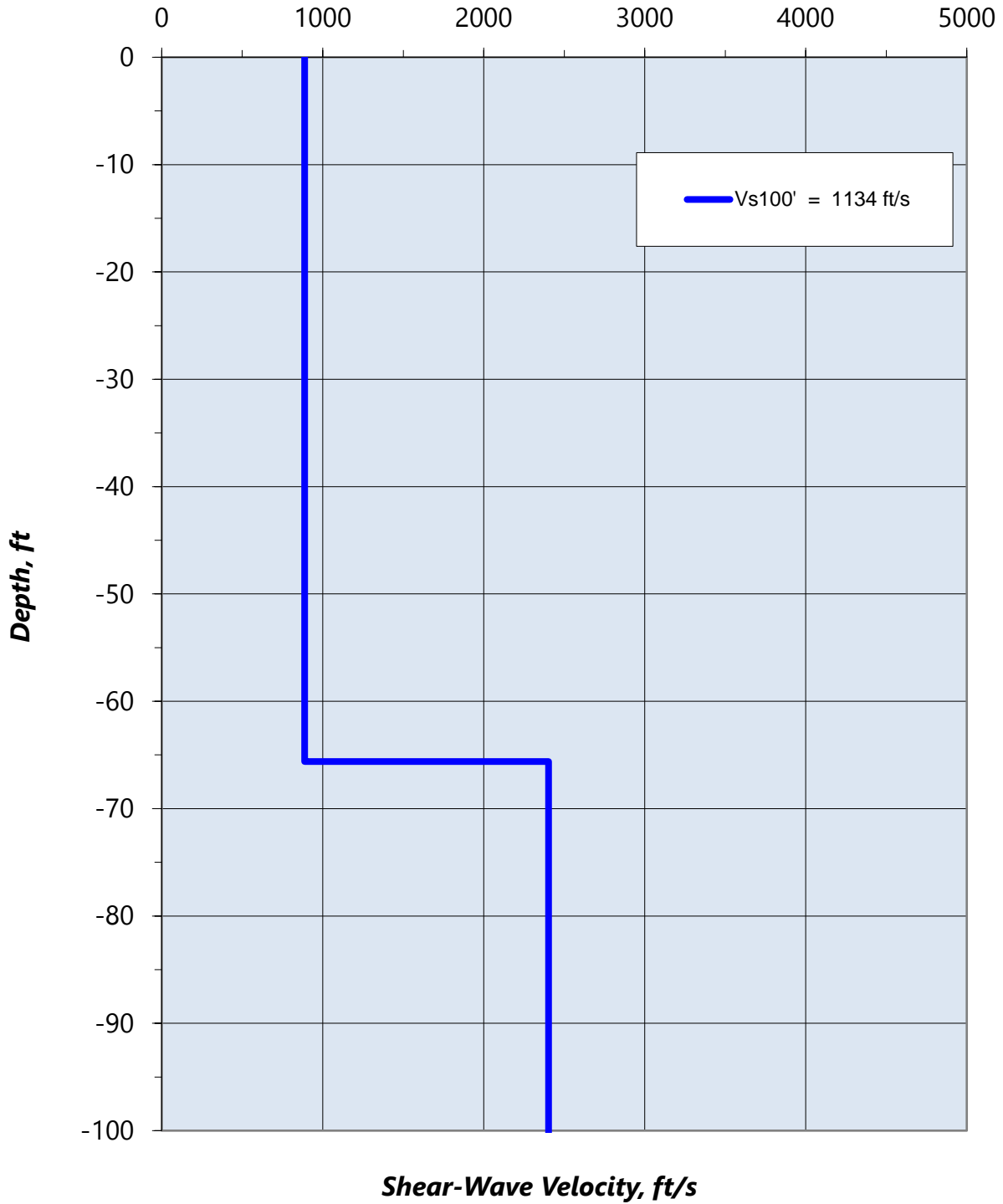
**Dispersion Curve Showing Picks and Fit**



**p-f Image with Dispersion Modeling Picks**



**HCS-ERWIN ES, Erwin, NC**



## **SHWT AND INFILTRATION DATA**

# Southeastern Soil & Environmental Associates, Inc.

P.O. Box 9321  
Fayetteville, NC 28311  
Phone/Fax (910) 822-4540  
Email mike@southeasternsoil.com

January 9, 2020

Mr. Kurt Miller, PE  
Building and Earth Sciences, LLP  
610 Spring Branch Road  
Dunn, NC 28334

Re: Seasonal High-Water Table (SHWT) evaluation for potential stormwater retention/treatment areas, BES Project # RD 21663, Erwin Elementary School, 301 S. 10<sup>th</sup> Street, Erwin, North Carolina

Dear Mr. Miller,

An evaluation of soil properties on a portion of the aforementioned property has been conducted at your request. A map showing the test locations is attached. The purpose of the investigation was to determine soil water table depths for use in stormwater retention/treatment design.

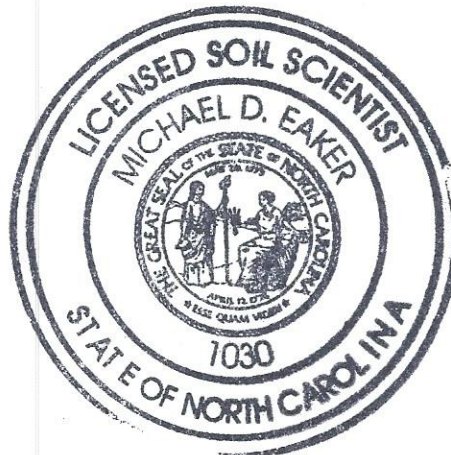
Soils at the test site appear to be most similar to the Norfolk (borings I-01, I-02) and Goldsboro (I-03, I-04) soil series (see attached boring logs). Four soil borings were advanced to a depth of at least 5.0 feet below the soil surface. The shallowest Seasonal High-Water Table (SHWT) as determined by evidence of colors of chroma 2 or less was encountered at 20 inches below the ground surface (boring I-03). The attached chart shows each boring with SHWT depths.

I trust this is the information you require at this time.

Sincerely,



Mike Eaker  
President





# Southeastern Soil & Environmental Associates, Inc.

P.O. Box 9321  
Fayetteville, NC 28311  
Phone/Fax (910) 822-4540  
Email mike@southeasternsoil.com

SHWT depths, BES Project RD21663, Erwin Elementary School, 301 S.  
10<sup>th</sup> Street, Erwin, NC

<u>BORING</u>	<u>SHWT DEPTH (inches)</u>	<u>Observed Water (inches)</u>
I-01	60	60
I-02	32	53
I-03	20	33
I-04	23	36

# Southeastern Soil & Environmental Associates, Inc.

P.O. Box 9321  
Fayetteville, NC 28311  
Phone/Fax (910) 822-4540  
Email mike@southeasternsoil.com

## Soil Boring Log (# -01), BES Project RD 21663, Erwin Elementary School, 301 S. 10<sup>th</sup> Street, Erwin, NC

This map unit consists of moderately well drained soils that formed in loamy and clayey marine sediments on uplands. Slopes range from 0 to 2 percent. Landscape position is a linear slope.

0 to 19 inches; mixed sand and clay fill material.

A - 19 to 23 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; very friable; common fine and medium roots; abrupt smooth boundary.

Bt - 23 to 44 inches; light yellowish brown (2.5Y 5/6) silty clay loam to sandy clay loam; moderate medium to weak fine subangular blocky structure; firm; gradual wavy boundary.

BC - 44 to 60 inches; red (2.5YR 4/8) silty clay loam; many medium prominent yellowish brown (10YR 5/6) and few prominent light brownish gray (10YR 6/2) mottles; weak fine subangular structure; firm; gradual wavy boundary.

C1 - 60 to 82 inches; red (2.5YR 4/8) silty clay loam; many medium prominent yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; weak fine subangular structure; firm; gradual wavy boundary.

C2g - 82 to 90 inches; white (8N/) clay loam; many medium prominent red (2.5YR 4/8) mottles; massive structure; firm; gradual wavy boundary.

C3 - 90 to 109 inches; mixed yellowish brown (10YR 5/8), red (2.5YR 4/8) and white (8N/) sandy loam; massive structure; friable; gradual wavy boundary.

4g - 109 to 115 inches; white (8N/) sandy clay loam; many medium prominent red (2.5YR 4/8) and yellowish brown (10YR 5/8) mottles; massive structure; firm.

SHWT @ 60 inches in boring # -01 (10YR 6/2)

# Southeastern Soil & Environmental Associates, Inc.

P.O. Box 9321  
Fayetteville, NC 28311  
Phone/Fax (910) 822-4540  
Email mike@southeasternsoil.com

## Soil Boring Log (#02), BES Project RD 21663, Erwin Elementary School, 301 S. 10<sup>th</sup> Street, Erwin, NC

This map unit consists of moderately well drained soils that formed in loamy and clayey marine sediments on uplands. Slopes range from 0 to 2 percent. Landscape position is a linear slope.

0 to 8 inches; mixed sand and clay fill material.

A - 8 to 17 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; common fine and medium roots; abrupt smooth boundary.

Bt - 17 to 29 inches; brownish yellow (10YR 6/6) clay loam to clay; moderate medium to weak fine subangular blocky structure; firm; gradual wavy boundary.

BC - 29 to 32 inches; brownish yellow (10YR 6/6) clay; many medium prominent reddish yellow (7.5YR 6/6) and few prominent pale brown (10YR 6/3) mottles; weak fine subangular structure; firm; gradual wavy boundary.

C1 - 32 to 46 inches; mottled light gray (10YR 7/2) and reddish yellow (7.5YR 6/8) clay; weak fine subangular structure; firm; gradual wavy boundary.

C2 - 46 to 78 inches; mottled light yellowish brown (10YR 6/4) red (2.5YR 5/6) and light gray (10YR 7/2) clay; massive structure; firm; gradual wavy boundary.

C3 - 78 to 95 inches; mottled light yellowish brown (10YR 6/4) red (2.5YR 5/6) and light gray (10YR 7/2) clay; massive parting to angular blocky structure; very firm; gradual wavy boundary.

C4g - 95 to 100 inches; white (8N/) silty clay loam; many medium prominent brownish yellow (10YR 6/6) and yellowish brown (10YR 5/8) mottles; massive structure; firm.

SHWT @ 32 inches in boring #02 (10YR 7/2)

# Southeastern Soil & Environmental Associates, Inc.

P.O. Box 9321  
Fayetteville, NC 28311  
Phone/Fax (910) 822-4540  
Email mike@southeasternsoil.com

## Typical Soil Boring Log (I-03, I-04), BES Project RD 21663, Erwin Elementary School, 301 S. 10<sup>th</sup> Street, Erwin, NC

This map unit consists of moderately well drained soils that formed in loamy and clayey marine sediments on uplands. Slopes range from 0 to 2 percent. Landscape position is a linear slope.

A - 0 to 2 inches; very dark gray (10YR 3/1) loamy sand; weak fine granular structure; very friable; common fine and medium roots; abrupt smooth boundary.

Bt - 2 to 17 inches; light yellowish brown (2.5Y 5/6) silty clay loam; weak fine subangular blocky structure; firm; gradual wavy boundary.

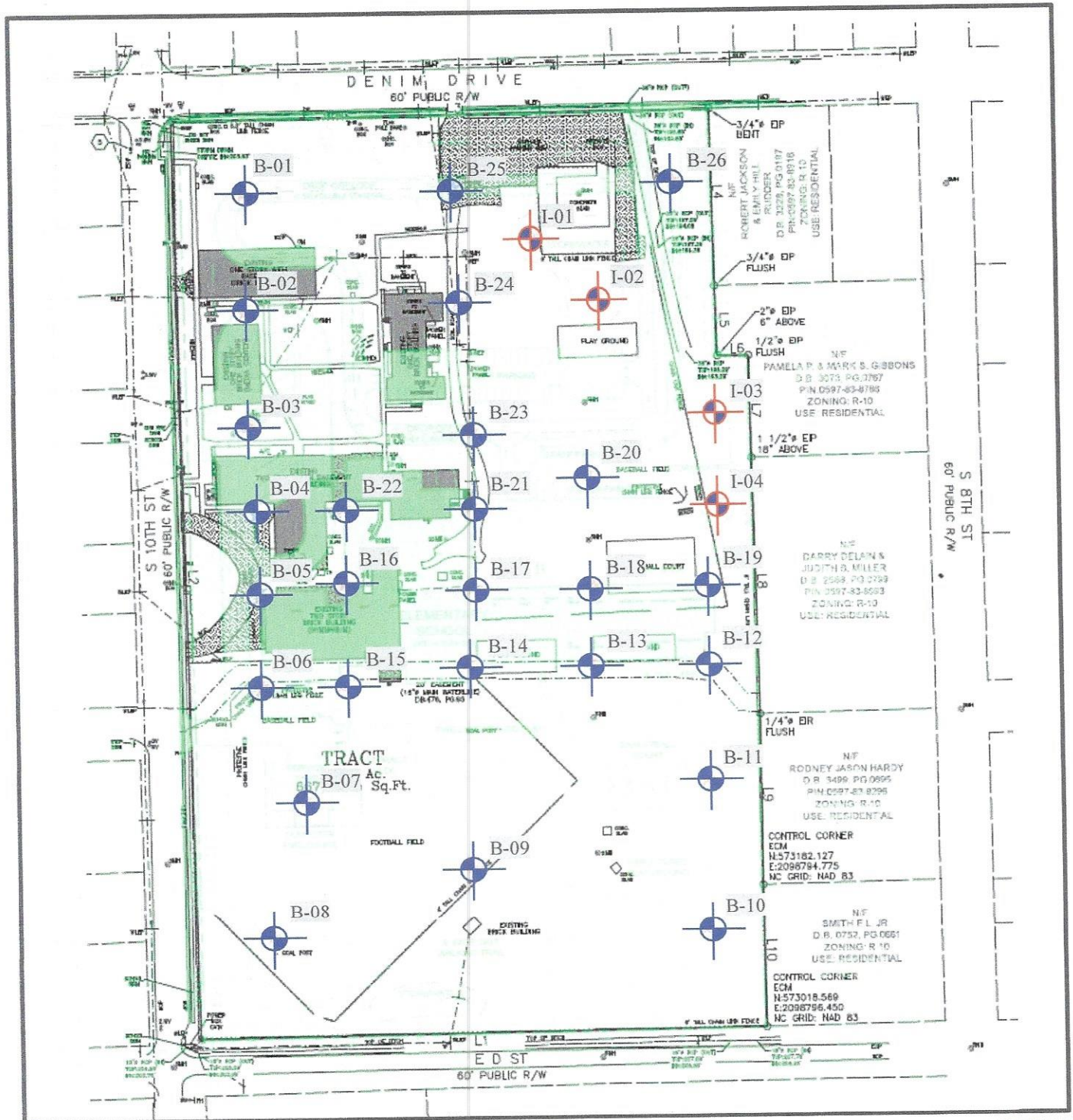
BC - 17 to 23 inches; yellowish brown (10YR 5/4) silty clay; many medium prominent strong brown (7.5YR 5/6) mottles; weak fine subangular structure; firm; gradual wavy boundary.

C1 - 23 to 59 inches; mottled light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) silty clay loam to sandy loam; massive structure; firm to friable; gradual wavy boundary.

C2 - 59 to 66 inches; mottled light yellowish brown (10YR 6/4), red (2.5YR 5/6) and white (N8/) silty clay loam; massive structure.

SHWT @ 20 inches in boring I-03 (10YR 6/2)

SHWT @ 23 inches in boring I-04 (10YR 6/2)



Approximate Boring Location

SHWT & Infiltration Location



**Test Location Map**

<b>BES Project #:</b>	RD21663	<b>Client:</b>	SFLA Architects
<b>Drawing Source:</b>	Boundary Survey	<b>Project:</b>	New Erwin Elementary School
		<b>Address:</b>	301 S. 10 <sup>th</sup> Street
		<b>City:</b>	Erwin, North Carolina

**Figure 1**



**Compact Constant Head Permeameter - ASTM D-5126 {4.1.6}**  
**In-situ Field Saturated Conductivity of Soils in the Vadose Zone via Amoozemeter**

Project Name: HCS - Erwin Elementary Project Number: RD190564  
 Client Name: SFLA Architects/ Harnett County Schools Report Number: 1 of 3  
 Technician: M.Lumpkin Date: 1/10/2020

**Test Constants**

Liquid Used: Municipal Water Depth of Water Table: 60" Water Temp (°F): 65 °F  
 Test Location: I-01 Depth of Observed Water: NA inches

Constants:	Capacity	Liquid Containers	
		setting	Rate cm <sup>3</sup> /cm
Sight Tube	1L	1 On	20.000
Storage Tube	5L	2 On	105.000

Flow rate used: 105 Hole Diameter: 3 inches  
 Start Saturation: 15:40 Water Head: 27.6 inches  
 Hole Radius: 1.500 Hole Depth: 36 inches

**Test Data**

Trial #	Date	Time	Elapsed Time (hrs)		Flow Readings			Flow Rate in <sup>3</sup> /hr	Conductivity K <sub>sat</sub> in/hr	Remarks: Weather conditions, etc.	
			Δ	Total	Reading	Tube Flow	Flow cm <sup>3</sup>				
1	S	1/10	11 :33	0.62	0.62	41.2	105	105	10.39	0.01	
	E	1/10	12 :10			40.2					
2	S	1/10	12 :10	1.07	1.68	40.2	105	105	6.01	0.00	
	E	1/10	13 :14			39.2					
3	S	1/10	13 :14	1.07	2.75	39.2	105	105	6.01	0.00	
	E	1/10	14 :18			38.2					
4	S	1/10	14 :18	1.07	3.82	38.2	105	105	6.01	0.00	
	E	1/10	15 :22			37.2					
5	S										
	E										
6	S										
	E										
7	S										
	E										
8	S										
	E										
9	S										
	E										
10	S										
	E										
11	S										
	E										
12	S										
	E										
13	S										
	E										
14	S										
	E										
<b>Stabilized K<sub>sat</sub> in/hr</b>									<b>0.00</b>	<b>I-01</b>	



**Compact Constant Head Permeameter - ASTM D-5126 {4.1.6}**  
**In-situ Field Saturated Conductivity of Soils in the Vadose Zone via Amoozemeter**

Project Name: HCS - Erwin Elementary Project Number: RD190564  
 Client Name: SFLA Architects/ Harnett County Schools Report Number: 2 of 3  
 Technician: M.Lumpkin Date: 1/10/2020

**Test Constants**

Liquid Used: Municipal Water Depth of Water Table: 33" Water Temp ( °F): 65 °F  
 Test Location: I-03 Depth of Observed Water: NA inches

Constants:	Capacity	Liquid Containers	
		setting	Rate cm <sup>3</sup> /cm
Sight Tube	1L	1 On	20.000
Storage Tube	5L	2 On	105.000

Flow rate used: 105 Hole Diameter: 3 inches  
 Start Saturation: 15:40 Water Head: 27.6 inches  
 Hole Radius: 1.500 Hole Depth: 36 inches

**Test Data**

Trial #	Date	Time	Elapsed Time (hrs) Δ   Total		Flow Readings			Flow Rate in <sup>3</sup> /hr	Conductivity	Remarks: Weather conditions, etc.	
					Reading	Tube Flow	Flow cm <sup>3</sup>		K <sub>sat</sub> in/hr		
1	S	1/10	15 :46	0.08	0.08	25.0	105	105	76.89	0.04	
	E	1/10	15 :51			24.0					
2	S	1/10	15 :51	0.08	0.17	24.0	105	105	76.89	0.04	
	E	1/10	15 :56			23.0					
3	S	1/10	15 :56	0.08	0.25	23.0	105	105	76.89	0.04	
	E	1/10	16 :01			22.0					
4	S	1/10	16 :01	0.08	0.33	22.0	105	105	76.89	0.04	
	E	1/10	16 :06			21.0					
5	S										
	E										
6	S										
	E										
7	S										
	E										
8	S										
	E										
9	S										
	E										
10	S										
	E										
11	S										
	E										
12	S										
	E										
13	S										
	E										
14	S										
	E										
<b>Stabilized K<sub>sat</sub> in/hr</b>									<b>0.04</b>	<b>I-03</b>	



**Compact Constant Head Permeameter - ASTM D-5126 {4.1.6}**  
**In-situ Field Saturated Conductivity of Soils in the Vadose Zone via Amoozemeter**

Project Name: HCS - Erwin Elementary Project Number: RD190564  
 Client Name: SFLA Architects/ Harnett County Schools Report Number: 3 of 3  
 Technician: M.Lumpkin Date: 1/10/2020

**Test Constants**

Liquid Used: Municipal Water Depth of Water Table: 36" Water Temp ( °F): 65 °F  
 Test Location: I-04 Depth of Observed Water: NA inches

Constants:	Capacity	Liquid Containers	
		setting	Rate cm <sup>3</sup> /cm
Sight Tube	1L	1 On	20.000
Storage Tube	5L	2 On	105.000

Flow rate used: 105 Hole Diameter: 3 inches  
 Start Saturation: 15:40 Water Head: 27.6 inches  
 Hole Radius: 1.500 Hole Depth: 36 inches

**Test Data**

Trial #	Date	Time	Elapsed Time (hrs) Δ   Total		Flow Readings			Flow Rate in <sup>3</sup> /hr	Conductivity K <sub>sat</sub> in/hr	Remarks: Weather conditions, etc.	
					Reading	Tube Flow	Flow cm <sup>3</sup>				
1	S	1/10	10 :45	0.08	0.08	27.5	105	105	76.89	0.04	
	E	1/10	10 :50			26.5					
2	S	1/10	10 :50	0.08	0.17	26.5	105	105	76.89	0.04	
	E	1/10	10 :55			25.5					
3	S	1/10	10 :55	0.10	0.27	25.5	105	105	64.07	0.04	
	E	1/10	11 :01			24.5					
4	S	1/10	11 :01	0.10	0.37	24.5	105	105	64.07	0.04	
	E	1/10	11 :07			23.5					
5	S	1/10	11 :07	0.10	0.47	23.5	105	105	64.07	0.04	
	E	1/10	11 :13			22.5					
6	S	1/10	11 :13	0.10	0.57	22.5	105	105	64.07	0.04	
	E	1/10	11 :19			21.5					
7	S										
	E										
8	S										
	E										
9	S										
	E										
10	S										
	E										
11	S										
	E										
12	S										
	E										
13	S										
	E										
14	S										
	E										
<b>Stabilized K<sub>sat</sub> in/hr</b>									<b>0.04</b>	<b>I-04</b>	



## LABORATORY TEST PROCEDURES

A brief description of the laboratory tests performed is provided in the following sections.

### *DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D2488)*

The soil samples were visually examined by our engineer and soil descriptions were provided. Representative samples were then selected and tested in accordance with the aforementioned laboratory-testing program to determine soil classifications and engineering properties. This data was used to correlate our visual descriptions with the Unified Soil Classification System (USCS).

### *NATURAL MOISTURE CONTENT (ASTM D2216)*

Natural moisture contents (M%) were determined on selected samples. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles.

### *ATTERBERG LIMITS (ASTM D4318)*

The Atterberg Limits test was performed to evaluate the soil's plasticity characteristics. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid. The Plastic Limit is the moisture content at which the soil is between "plastic" and the semi-solid stage. The Plasticity Index ( $PI = LL - PL$ ) is a frequently used indicator for a soil's potential for volume change. Typically, a soil's potential for volume change increases with higher plasticity indices.

### *MATERIAL FINER THAN NO. 200 SIEVE BY WASHING (ASTM D1140)*

Grain-size tests were performed to determine the partial soil particle size distribution. The amount of material finer than the openings on the No. 200 sieve (0.075 mm) was determined by washing soil over the No. 200 sieve. The results of wash #200 tests are presented on the boring logs included in this report and in the table of laboratory test results.

### *STANDARD PROCTOR COMPACTION TEST (ASTM D698)*

Standard Proctor compaction tests were performed to determine the maximum dry density and optimum moisture content for the soil, for use as a comparative basis during fill placement. The Standard Proctor test consists of the compaction of soil with known moisture content into a steel mold of fixed height and diameter. The soil is compacted in the mold in three lifts of equal volume using a 5.5 lb. manual hammer with a 12-inch free fall, to produce a consistent compactive effort. The test procedure is repeated on samples at several different moisture contents until a curve showing the relationship between moisture content and dry density of the soil is established. From this curve, the maximum dry density (peak density value) and optimum moisture content (moisture content correlating to the maximum dry density) are obtained.

*LABORATORY CALIFORNIA BEARING RATIO (ASTM D1883)*

The California Bearing Ratio, usually abbreviated CBR, is a punching shear test. The CBR value is a semi-empirical index of the soil's strength and deflection characteristics and has been correlated with pavement performance to establish design curves for pavement thickness. The tests were performed on six-inch diameter, five-inch thick disks of compacted soil, confined in steel cylinders. The specimens were soaked for at least 96 hours prior to testing. A piston, approximately two inches in diameter, was forced into the soaked soil at a standard rate to determine the soil's resistance to penetration. The CBR value is the ratio, expressed as a percentage, of the actual load required to produce a 0.1-inch deflection to that required for the same deflection in a certain standard crushed stone.





610 Spring Branch Rd.  
Dunn, NC 28334  
(910) 292-2085

# MOISTURE-DENSITY RELATIONSHIP

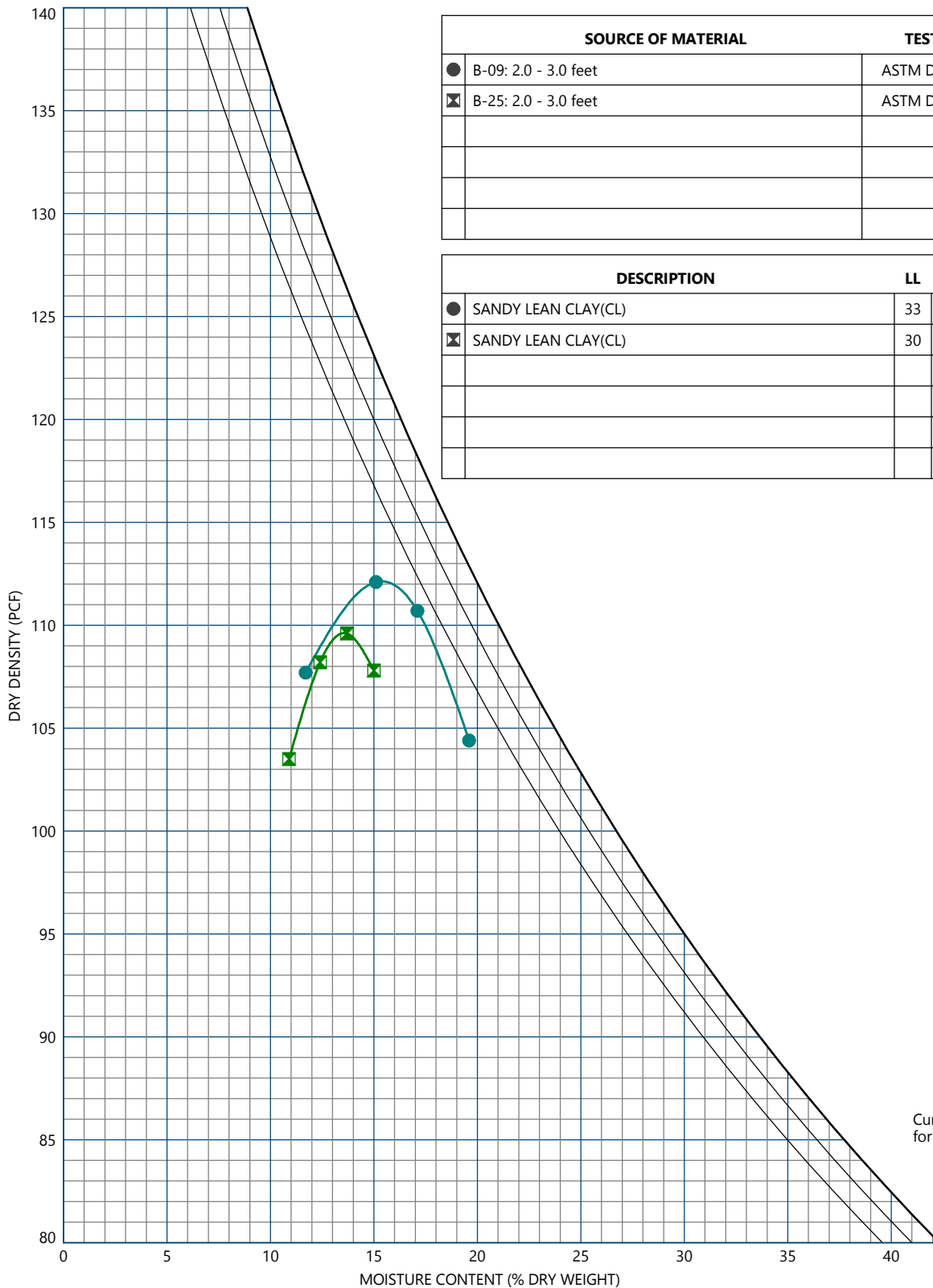
Geotechnical, Environmental, and Materials Engineers

**PROJECT NAME** HCS - Erwin Elementary School

**PROJECT NUMBER** RD190564

**CLIENT** SFLA Architects

**PROJECT LOCATION** Erwin, NC

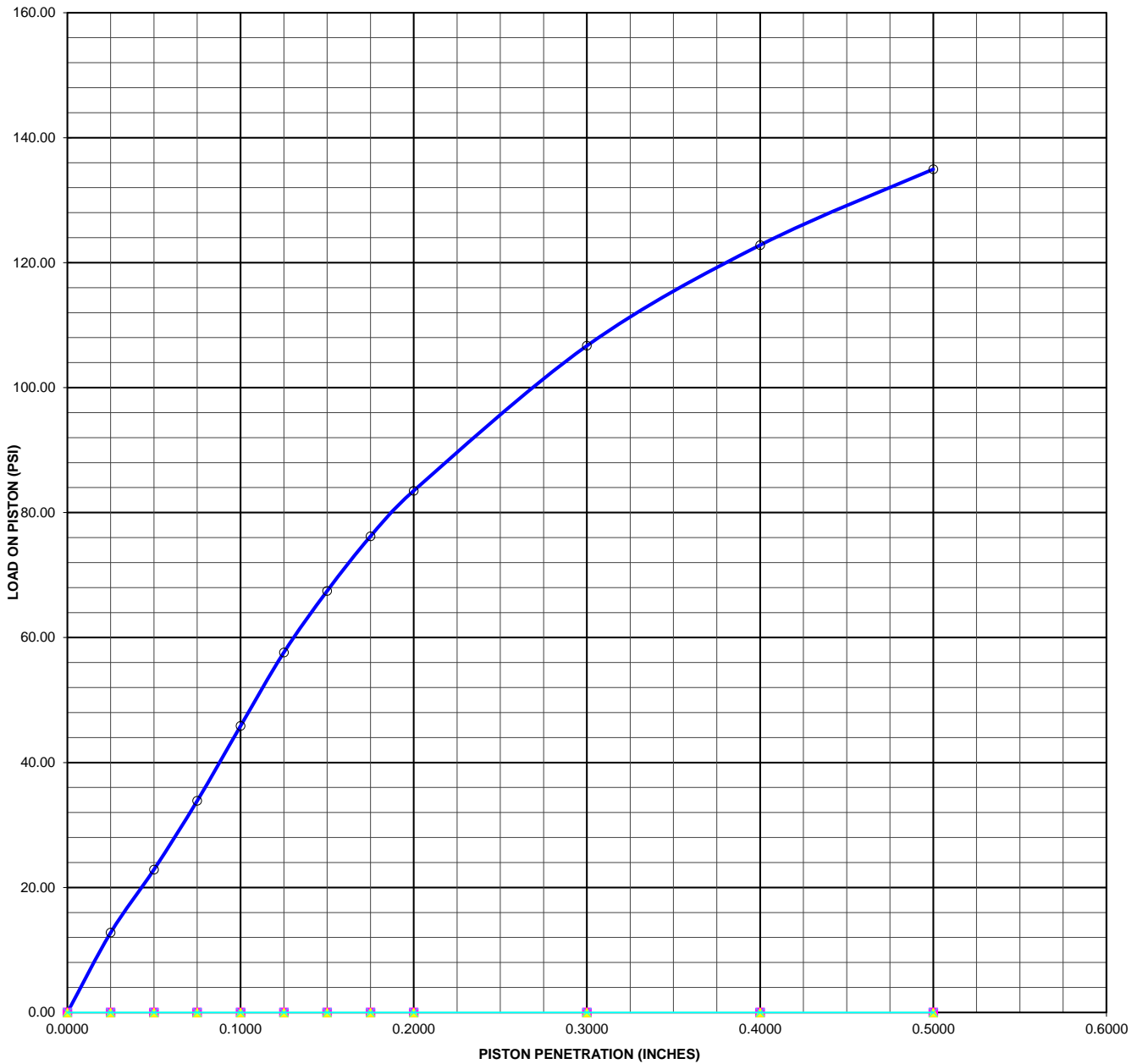


SOURCE OF MATERIAL	TEST METHOD	CLASS
● B-09: 2.0 - 3.0 feet	ASTM D698 Method A	CL
☒ B-25: 2.0 - 3.0 feet	ASTM D698 Method A	CL

DESCRIPTION	LL	PL	PI	MAX DD (PCF)	OPT MC (%)
● SANDY LEAN CLAY(CL)	33	16	17	112.1	15.4
☒ SANDY LEAN CLAY(CL)	30	17	13	109.6	13.6

Curves of 100% Saturation  
for Specific Gravity Equal to:  
2.80  
2.70  
2.60

CALIFORNIA BEARING RATIO TEST RESULTS



Project HCS - Erwin ES  
 Project # RD190564  
 Date 1/11/2020  
 Client SFL&A Architects

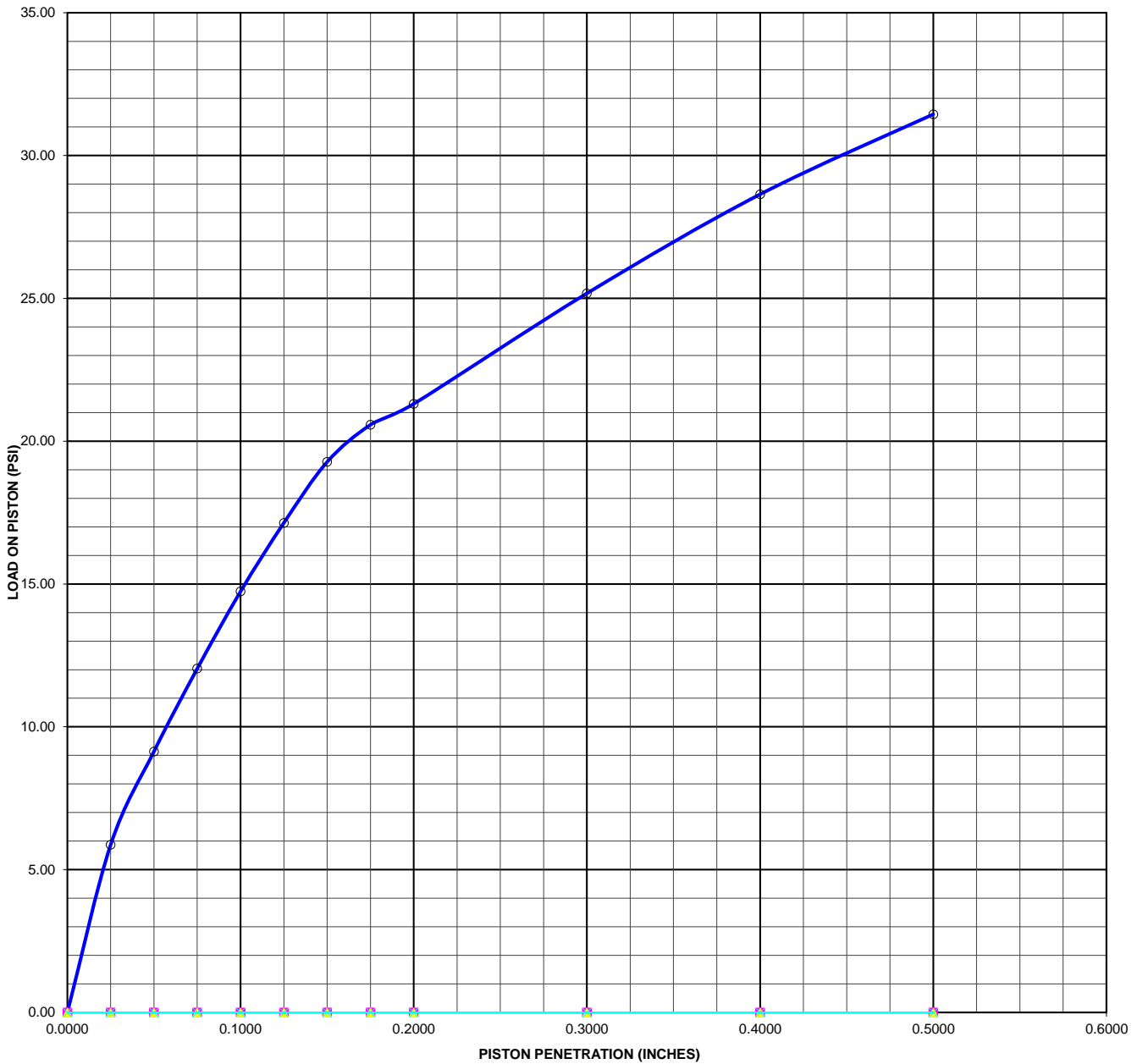
**BUILDING & EARTH SCIENCES, INC.**  
 1209 Baker Rd. Suite 506  
 Virginia Beach, VA 23455  
 Phone (757) 217-9950

Sample No.	Molding Moisture Content (%)	Post-Soak Moisture Content (%)	Pre-Soak Dry Density (PCF)	Post-Soak Dry Density (PCF)	Change In Dry Density (%)	Swell (%)	CBR Value @	
							0.1"	0.2"
1	14.2	16.8	110.6	110.2	0.00	0.39	4.6	5.6
2								
3								
4								

Sample Number: 19-0231-23 Sample Location: B-25

Sample Description: Olive SANDY lean CLAY

CALIFORNIA BEARING RATIO TEST RESULTS



Project HCS - Erwin ES  
 Project # RD190564  
 Date 1/20/2020  
 Client SFL&A Architects

**BUILDING & EARTH SCIENCES, INC.**  
 1209 Baker Rd. Suite 506  
 Virginia Beach, VA 23455  
 Phone (757) 217-9950

Sample No.	Molding Moisture Content (%)	Post-Soak Moisture Content (%)	Pre-Soak Dry Density (PCF)	Post-Soak Dry Density (PCF)	Change In Dry Density (%)	Swell (%)	CBR Value @	
							0.1"	0.2"
1	15.2	18.5	110.2	109.1	-0.01	-0.22	1.5	1.4
2								
3								
4								

Sample Number: 19-0231-24 Sample Location: B-9

Sample Description: Red brown SANDY lean CLAY

# 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.

## Geotechnical 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 civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you 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 the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

## Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- 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. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

## Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

## Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

## A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

## A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

### Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

### Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time to perform additional study.* Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

### Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of 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.

### Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* 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 environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

### Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

### Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of 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. Confer with you GBC-Member geotechnical engineer for more information.



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**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.
  - 5. Permits.
  - 6. Specification Conventions.

**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. Stipulated Sum Contract.
- C. Coordinate Work with utilities of Owner and public and private agencies.
- D. Work under this contract [includes:
  - 1. Work as indicated in the Project Manual, on Drawings and all other Contract Documents.

**1.4 WORK BY OWNER OR OTHERS**

- A. 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.
- B. 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.

**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 in is not permitted on the construction site or any school property.
- C. Electronic Smoking Devices Restriction: Use of electronic smoking devices and e-cigarette/vapor devices are not permitted on the construction site or any school property.
- D. Fire Arms Restriction: Fire Arms are prohibited on the construction site.
- 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.

## **1.7 PERMITS**

- A. Acquire and furnish all necessary permits for the Work.

## **1.8 SPECIFICATION CONVENTIONS**

- A. 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.
- B. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

Erwin Elementary School - 01905.000

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**PART 2 PRODUCTS (Not Used)**

**PART 3 EXECUTION (Not Used)**

**END OF SECTION**



**SECTION 01 20 00**  
**PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.1 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 Contractor's construction schedule.

**1.2 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 Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

**1.3 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with 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 Contractor's construction schedule.
  - 2. Submit the schedule of values in duplicate to Architect within 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. Contractor'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.
  - 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 measured quantity. Use information indicated in the Contract Documents to determine 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 Contractor.
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 Contractor'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.

#### 1.4 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 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 Contractor. Certification to be Notarized. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of 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/Contractor 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 Contractor 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 contractor, 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. Contractor's construction schedule requirements.
  4. Products list requirements.
  5. Schedule of unit prices.
  6. Submittal schedule requirements.
  7. List of Contractor's staff assignments.
  8. List of Contractor'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 claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  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.

**END OF SECTION**



**SECTION 01 21 00**  
**ALLOWANCES (ADD-1&4)**

**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. Types of allowances include the following:
  - 1. Cash Allowances.
  - 2. Contingency Allowance.
- 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 inspecting.
  - 5. Divisions 03 through 33 Sections for items of Work covered by allowances.

**1.3 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 or 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.

**1.4 ACTION SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Submit invoices or delivery slips to show 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 installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

**1.6 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 items in the Schedule of Values. Progress payments shall not be requested by Contractor until Owner and Contractor have certified Allowance Disbursement authorization form.
  3. Assist Architect in selection of products, suppliers and installers.
  4. Obtain proposals from suppliers and installers. Submit proposals to Architect and offer recommendations.
  5. Upon Architect's notification of Owner decisions, execute purchase agreement with designated supplier and installer.
  6. Obtain and process shop drawings, product data, and samples.
  7. Provide for delivery and, upon delivery, promptly inspect products for completeness, damage, and defects. Submit claims for transportation damage to supplier or 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 Allowance Disbursement authorization form, 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.

**1.7 CASH ALLOWANCES**

- A. Contractor is to include and allocate the allowances into bid packages.
- B. Allowable Costs Included in Cash Allowances:
1. Purchase and delivery costs to Contractor or Subcontractor of product delivered to site and required purchase taxes, less applicable trade discounts.
  2. Options only when indicated in the description of individual allowance in the Cash Allowance Schedule (listed further below):
    - a. Installation: Cost of product installation, labor, equipment, incidentals and finishing of Work.
- C. Costs Not Included in Cash Allowances, but to be Included by Contractor in Contract Sum:
1. Handling of product at site, including unloading and uncrating.
  2. Storage and protection of product from the elements and from damage.
  3. Overhead and Profit.
  4. Bonding and Insurance.
  5. Payroll Taxes.
  6. Installation: When not indicated in the description of individual allowance in the Cash Allowance Schedule (listed further below).
- D. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed by Owner.
- E. Funds remaining in Cash Allowances will be credited to the Owner by Change Order at closeout of Contract.

1. Owner may choose to accept credit for remaining funds in all or select Cash Allowances prior to closeout of Contract.
- F. Cash Allowance Change: To change allowance amounts, prepare a Change Order proposal based on the difference between the total Allowable Cost amount and the Cash Allowance.
  1. Multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  2. If requested by Architect or Owner, prepare itemized explanation and documentation to substantiate proposed changes.
  3. Change In Allowance Scope:
    - a. Submit substantiation of a claim of change in scope of work of the allowance described in the Contract Documents.
    - b. Do not include Contractor's or subcontractor's indirect expense in the Change Order proposal cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
    - c. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.
  4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- G. Schedule of Cash Allowances is included in Part 3 of this Section. (ADD-4)
  1. **Include a cash allowance of \$250,000 for cameras, security and technology equipment in the Base Bid for the project.**

## 1.8 CONTINGENCY ALLOWANCES

- A. Contractor is to include and allocate the allowances into bid packages.
- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in a proposal requesting expenditure of funds from Contingency Allowances.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed by Owner.
- D. Funds remaining in Contingency Allowances will be credited to the Owner by Change Order at closeout of Contract.
  1. Owner may choose to accept credit for remaining funds in all or select Contingency Allowances prior to closeout of Contract.
- E. Schedule of Contingency Allowances is included in Part 3 of this Section.

## PART 2 PRODUCTS (Not Used)

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

### 3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

### 3.3 SCHEDULE OF CASH ALLOWANCES

- A. Section 04 20 00 - Unit Masonry:
  - 1. Include the unit cost of \$300.00 per thousand for purchase and delivery only of Face Brick - BRK1. Installation of face brick is part of the Contract Sum.
  - 2. Include the unit cost of \$345.00 per thousand for the purchase and delivery only of Face Brick - BRK2. Installation of face brick is part of the Contract Sum.
  - 3. Include the unit cost of \$350.00 per thousand for purchase and delivery only of Face Brick - BRK3. Installation of face brick is part of the Contract Sum.
- B. Include a cash allowance of \$75,000 to provide for additional sound system and stage lighting components in addition to the Work shown on the Contract Documents for the gymnasium and auditorium facilities.
- C. **Omit irrigation system allowance.**
- D. Playground Equipment:
  - 1. Include a cash allowance of \$50,000 for playground equipment in the Base Bid for the project.
- E. Provide ten (10) **24 x 24**-inch ceiling access doors and frames in the Base Bid in addition to those shown in the drawings; locations to be determined.
- F. **Provide ten (10) site bollards, see detail 8/D101, in the Base Bid with locations to be determined as needed.**

### 3.4 SCHEDULE OF CONTINGENCY ALLOWANCES

- A. Not Used

**END OF SECTION**

**SECTION 01 22 00**  
**UNIT PRICES (ADD-1&4)**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Schedule of unit prices.
  - 2. Measurement and payment criteria applicable to Work performed under a unit price payment method.
  - 3. Defect assessment and non-payment for rejected work.
- 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 indicate by the Items listed in this Section under the Schedule of Unit Prices

**1.2 COSTS INCLUDED**

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

**1.3 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.

**1.4 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.
- B. Take all measurements and compute quantities.
  - 1. Architect will verify measurements and quantities.
- 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.

### 1.5 PAYMENT

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in 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.

### 1.6 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; however, and at the discretion of the Owner, the unit price will be adjusted as follows:
    - a. To a new unit price.
  2. The authority of Owner to assess the defect and identify 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.

### 1.7 SCHEDULE OF UNIT PRICES (ADD-4)

- A. Item 1: Exit Sign (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- B. Item 2: Surface Mounted Strobe (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- C. Item 3: Surface Mounted ~~Speaker Horn~~/Strobe (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- D. Item 4: Smoke Detector (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- E. Item 5: Heat Detector (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- F. Item 6: Fire Alarm Pull Station (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- G. Item 7: Data Outlet (including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).
- H. Item 8: Duplex Power Outlet (not on new circuit, including all circuitry and hardware for complete and concealed installation – no surface mounted conduit or boxes).



- I. Unit Price No 9: Woven Geo-Textile Separation and Stabilization Fabric in-place - The Contractor shall include in the Base Bid an allowance cost for 2,000 square yards of woven geo-textile fabric.
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
  2. Unit of measurement: square yard of surface to be covered.
  3. Include the following in the unit price:
    - a. Materials and transport to site.
    - b. Unloading, handling, and placement.
    - c. Overhead and profit.
  4. Include all other related costs in the contract sum.
  5. Method of measurement: Quantities will be verified by a soils and materials engineer employed by the Owner based on the area of ground covered by the fabric. Excess and/or overlap shall not be included in the measurement.
  6. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."
- J. Item 10: Offsite Borrow Material – The Contractor shall include in the Base Bid an allowance cost for 20,000 cubic yards of offsite borrow material.
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
  2. The unit price bid shall include the cost of a cubic yard (CY) of borrow material and all transportation cost to the jobsite from the contractor's approved offsite borrow source. Delivery tickets must be provided to verify all quantities delivered to the jobsite.
  3. The unit price submitted in the bid proposal shall be used to adjust the contract sum in the event that off-site borrow material is needed to complete the work required by the Contract Documents or the quantity is less than the allowance.
  4. Method of measurement: Quantities will be verified by a soils and materials engineer employed by the Owner.
  5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."
- K. Item #11: Replacement of authorized excavation of unsuitable soils or rock with off-site suitable soils – The Contractor shall include in the Base Bid an allowance cost for 3,000 cubic yards of offsite suitable soils.
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
  2. Unit of measurement: cubic yard, compacted in place.
  3. Include the following in the unit price:
    - a. Suitable soil materials from Contractor's off-site source.
    - b. Excavation, loading, transport, placement, moisture control and compaction of suitable soil materials.
    - c. The unit price bid shall include the cost of a cubic yard (CY) of borrow material and all transportation cost to the jobsite from the contractor's approved offsite borrow source. Delivery tickets must be provided to verify all quantities delivered to the jobsite.
  4. Include all other related costs in the contract sum. Unit price shall not include the excavation of unsuitable soil or rock.
  5. The unit price submitted in the bid proposal shall be used to adjust the contract sum in the event that off-site borrow material is needed to complete the work required by the Contract Documents or the quantity is less than the allowance.
  6. Method of measurement: Quantities will be verified by a soils and materials engineer employed by the Owner.

7. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."
- L. Item 12: Removal of Unsuitable Soil (Bulk) – The contractor shall include in the base bid removal of 2,000 cubic yards of unsuitable soil materials.
1. The unit price will include removal and disposal on-site and also includes backfilling the undercut area with suitable onsite or offsite borrow material.
  2. The unit price submitted in the bid proposal shall be used to adjust the contract sum in the event that less than or more than the specified or indicated quantity is required to complete the work required by the Contract Documents.
  3. Method of measurement: Quantities will be verified by a soils and materials engineer employed by the Owner
  4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."
- M. Item 13: Removal of Unsuitable Soil (Trench) – The contractor shall include in the base bid removal of 500 cubic yards of unsuitable soil in trench.
1. The unit price will include removal and disposal on-site and also includes backfilling the undercut area with suitable on-site borrow material.
  2. The unit price submitted in the bid proposal shall be used to adjust the contract sum in the event that less than or more than the specified or indicated quantity is required to complete the work required by the Contract Documents.
  3. Method of measurement: Quantities will be verified by a soils and materials engineer employed by the Owner.
  4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."
- N. Item 14: Replacement of removed rock or unsuitable soils with Aggregate Base Course in-place – The contractor shall include in the base bid and allowance for 1,500 cubic yards of Aggregate Base Course in-place.
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
  2. Unit of measurement: cubic yard of void to be filled.
  3. Include the following in the unit price:
    - a. Certified ABC materials from contractor's off-site source.
    - b. Excavation, loading, transport, placement and compaction of ABC into void remaining from removed rock or unsuitable soil.
    - c. Overhead and profit.
  4. Include all other related costs in the contract sum.
  5. Include costs related to removal of rock or unsuitable soil in other Unit Prices.
  6. Method of measurement: Quantities will be verified by a soils and materials engineer employed by the Owner based on volume of void to be filled.
  7. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."
- O. ~~Item #15: Site Irrigation – Areas adjacent to the building shown as Sod on the Landscape Plans.~~
- ~~1. Purpose: To adjust the contract sum in case the Owner elects to include irrigation of Turf/Sod areas.~~
  - ~~2. Unit of measurement: number of Irrigation Zones: estimated 8 Turf/Sod zones.~~
  - ~~3. Include the following in the unit price:
 
    - ~~a. Materials and transport to site.~~
    - ~~b. Unloading, handling, and placement.~~
    - ~~c. All piping materials, joints and fittings.~~
    - ~~d. Pipe supports.~~~~

- e. Valves, sprinkler heads, and accessories.
  - f. ~~Miscellaneous special fittings.~~
  - g. ~~Sprinkler automatic control system and all associated control wiring and sleeves and mainline piping.~~
  - h. Sprinkler System Design by licensed or qualified professional
  - i. ~~Overhead and profit.~~
- 4. ~~Include all other related costs in the contract sum.~~
  - 5. ~~Method of measurement: Quantities will be verified architect or his consultant employed by the Owner based on the area and irrigation zones provided.~~
  - 6. ~~Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."~~ **OMIT ITEM #15 ENTIRELY. (ADDM-1)**

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



**SECTION 01 23 00**  
**ALTERNATES (ADD-1, 2&4)**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Alternates.

**1.2 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, 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.

**1.3 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:
1. A Schedule of Alternates is included in this Section.

**1.4 ALTERNATES**

- A. Schedule of Alternates:

**REJECTED**

1. Alternate No. 1: Deduct Four (4) Classrooms
  - a. Provide the cost to deduct four (4) classrooms as indicated on Sheet A-409

**ACCEPTED**

2. Alternate No. 2: Terrazzo floors in Corridors, Lobbies, and Cafeteria in lieu of VCT
  - a. Provide the cost to add terrazzo floors as per the Room Finish Schedule on Sheet A-701 for the Corridors, Lobbies, and Cafeteria areas.

**REJECTED**

3. **Alternate No. 3: Add Terrazzo floors in Corridors and Cafeteria in lieu of VCT**
  - a. **Provide the cost to add terrazzo floors as per the Room Finish Schedule on Sheet A-701 for the Classroom areas including Toilet and Storage rooms in**

**classrooms (i.e. – the remainder of the flooring not included in Alternate No. 2, except for the mechanical, electrical, toilet rooms, janitorial, and storage rooms.**

- ACCEPTED** 4. Alternate No. 4: Add Fifty-six (56) Parking Spaces  
a. Provide the cost to add an additional fifty six (56) parking spaces as indicated on Sheet C-201
- REJECTED** 5. Alternate No. 5: Add Decorative fencings and Brick Piers at front of school  
a. Provide the cost to add Decorative fencing and brick piers as indicated on Sheet A-504.
- REJECTED** 6. Alternate No. 6: Machine Room-less Elevator – Section 14 24 50 Machine Room-Less Elevators  
a. State the amount to be added to the Base Bid to provide a machine room-less elevator in lieu of the hydraulic elevator shown
- ACCEPTED** 7. Alternate No. 7 (Owner Preferred): Section 08 71 00 - Door Hardware.  
a. Provide locks and latches with interchangeable cores: Best, no substitutions.  
b. Provide exit devices: Precision, no substitution.  
c. Provide closers: **LCN 4111**, no substitutions.  
d. Provide continuous hinges: Select, no substitutions.  
e. Provide Grand Master Key System: Best, no substitutions
- ACCEPTED** 8. Alternate No. 8 (Owner Preferred): Plumbing Schedules on Drawings.  
a. Provide plumbing fixture faucets: Zurn, no substitutions.  
b. Provide plumbing fixture flush valves: Sloan, no substitutions.  
c. Provide plumbing fixture water coolers: Elkay, no substitutions.
- ACCEPTED** 9. Alternate No. 9 (Owner Preferred): Section 28 31 11 - Digital, Addressable Fire Alarm System. **(ADD-2&4)**  
a. **Provide EST3 system by Edwards Inc., no substitutions**
- REJECTED** 10. Alternate No. 10 (Owner Preferred): Division 23 - HVAC Equipment.  
a. Provide HVAC Equipment: Trane, no substitutions
- ACCEPTED** 11. Alternate No. 11 (Owner Preferred): Section 22 05 23 - General-Duty Valves For Plumbing Piping.  
a. Provide Plumbing Valves: Apollo, no substitutions.
- REJECTED** 12. Alternate No. 12: (Owner Preferred): Division 23 09 00 – Direct Digital Control System  
a. Provide Reliable Controls Corporation, Mach-system by Building Automation Services, no substitutions
- REJECTED** 13. Alternate No. 13 (Owner Preferred): Section 26 24 13 - Switchboards.  
a. Provide Switchgear: Square D, no substitutions.
- ACCEPTED** 14. Alternate No. 14: (Owner Preferred) Section 26 51 16 - Lighting  
a. Provide Lithonia 2x4 lay-in fixtures CPX 2X4 4000LM M2, no substitutions

- ACCEPTED** 15. **Alternate No. 15: (Owner Preferred) Section 08 17 43 – Integrated Composite Door Opening Assemblies**  
a. **Provide Integrated Composite Door Opening Assemblies: Special-Lite, no substitutions.**

**PART 2 PRODUCTS (Not Used)**

**PART 3 EXECUTION (Not Used)**

**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. Work Change 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 Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the 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 Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- 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 Contractor 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. Contractor is responsible for informing others in Contractor's employ and Subcontractors of approved changes to the Work.
- C. Stipulated Sum Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approval 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 Contractor 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 Contractor 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 change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, 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 Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of directed change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract. Approved changes to the Contract will be authorized by Change Order.

**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. Electronic Documents Services.
    - a. Submittal Procedures and Other Project Documentation.
    - b. Project Manual (Specifications) and Project Drawings.
  2. Coordination and Project Conditions.
  3. Coordination Drawings.
  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 entity 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 Contractor'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. Keep list current at all times.

**1.4 GENERAL COORDINATION PROCEDURES**

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

progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Project meetings.
  6. Startup and adjustment of systems.
  7. Project closeout activities.
- C. 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 ELECTRONIC DOCUMENTS SERVICES**

- A. Submittal Procedures and Other Project Documentation:
1. Refer to Section 01 33 00 - Submittal Procedures.
- B. Project Management Software Application(s):
1. Provide internet-based project management system(s) for digital access to all project management information associated with the project, including, but not limited to, the following:
    - a. Submittals and Shop Drawings
    - b. Requests for Information
    - c. Supplemental Instructions
    - d. Requests for Proposals
    - e. Change Proposals
      - 1) Change Order Proposals
      - 2) Contingency Allowance Disbursements
    - f. Meeting Reports
    - g. All Agency Reports
    - h. Closeout Documents
    - i. Other documentation as may be required by Architect or Owner.
  2. Application must be capable of recording and attaching field photos, commentary, and providing punchlist activities.
  3. Application(s) must be capable of storing and accessing:
    - a. Construction Documents
    - b. Specifications
    - c. Project Drawings
    - d. Progress Schedules
    - e. Project Models (Assemble)
    - f. Other pertinent information associated with the Contract Documents.
- C. Documents transmitted/posted are to be in electronic (PDF) format and transmitted/posted to application(s) 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 internet-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 Contractor's responsibility to submit documents in PDF format.
3. Contractor, 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](http://www.adobe.com), or Bluebeam PDF Revu, [www.bluebeam.com](http://www.bluebeam.com)), unless such software capability is provided by the submittal service provider.
5. Paper documents 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 internet-based service. In such case of Architect's written approval, the submitted documents and review results are still to be documented by Contractor in proper sequence within the internet-based service as a matter of record.
6. In the case of submissions of samples or color selection charts, the items shall be physically shipped to the required recipient and a detailed description of the items and review actions shall be logged into the internet-based submittal service on the same day as the shipment for the purpose of documentation.
7. Cost: The cost of the internet-based service is to be paid by Contractor.
  - a. Contractor to pay all licensing and access fees and distribute the aforementioned software for individual access to:
    - 1) Architect (3 persons)
    - 2) Owner's Representatives (2 persons).
    - 3) Architect's Civil/Site Consultant (2 persons).
    - 4) Architect's MEP/FP Consultant (4 persons).
    - 5) Architect's Structural Consultant (2 persons).
    - 6) Technology Consultant (2 persons).
    - 7) Architect's Kitchen Equipment Consultant (1 person).
    - 8) Others that may be required by Architect or Owner (3 persons).
  - b. Contractor to acquire email addresses from proposed users for the purpose of establishing user access and usability.
8. Provide submittal service "Oracle - Submittal Exchange" (tel: 1-800-714-0024), [www.submittalexchange.com](http://www.submittalexchange.com) or similar format acceptable to the Architect and Owner.
9. Training: Contractor to provide, schedule and participate in one, one-hour, web-based training session for all users; further training is the responsibility of the user of the service.

### 3.2 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, Contractor 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.

### **3.3 COORDINATION DRAWINGS AND BUILDING INFORMATION MODELS**

- 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 be in 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, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
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 Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
9. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements and with descriptive titles with logical sequencing numbers. Submit three (3) paper copies to Architect as indicated submittals in Division 01 Section "Submittal Procedures."
  - a. Internet Based Submittal Service: If preferred by Contractor and only if approved by Owner and Architect, coordinate with Owner and Architect requesting approval to use an Internet Based Submittal Service for submitting Coordination Drawings.
    - 1) If approved by Owner and Architect, Contractor is responsible for establishing and payment for the service and is to provide access to all parties requiring input and review access to the service.
10. Coordination – Building Information Model
  - a. Produce a Building Information Model for the entire project. Contractor's model may be based on the Architect's model and updated to use within the Contractor's electronic documents management program.
  - b. Building Information Model is to be completed within the first month from Notice to Proceed.
  - c. Building Information Model 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. Building Information Model shall be made available to all sub-contractors for use on a daily basis in the field during construction tasks.

- e. Include Procore's ASSEMBLE program for incorporation of the project Building Information Model into the project management application.

### 3.4 REQUESTS FOR INFORMATION (RFIs)

- A. Definition: A 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.
- B. Whenever timely and possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the submittal of a RFI.
- C. Acceptable Uses for RFIs: Contractor good faith effort to determine resolution from Contract Documents.
  1. Prior to submitting a RFI, carefully study all Contract Documents to confirm that sufficient information for interpretation is definitely not included in Contract Documents.
- D. 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 Contractor means and methods (Contractor'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 Contractor. Do not forward requests which solely require internal coordination between Contractor 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 Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit a 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 so as to avoid delays in the Work. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
- F. 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 Contractor.

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. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  11. Contractor's certification signature attesting to Contractor'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.
- G. 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 Contractor 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 contractor, in which case Architect's time for response will date from time of receipt of additional information.
- H. RFI Log: Maintain current status of RFI's via the Contractor provided Electronic Documents Service.
- I. 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. Contractor is to schedule and conduct meetings and conferences at Project site unless otherwise indicated or agreed upon by Contractor, 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 everyone concerned, including Owner and Architect, within three 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. Contractor 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. Contractor Project Manager and On-Site Superintendent.
  5. Major Subcontractors.
  6. Major Suppliers.
  7. Relevant Utility Providers.
  8. 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 Contractor's Safety Officer.
  3. Lines of communications.
  4. Status of Owner-Contractor Agreement, Bond 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. Procedures for processing Applications for Payment.
  17. Submittal schedule and procedures.
  18. Critical work sequencing and long-lead items.
  19. Responsibility for temporary facilities and controls.
  20. Procedures for moisture and mold control.
  21. Construction waste management and recycling.
  22. Office, work, parking, staging and storage areas.
  23. Equipment deliveries and priorities.
  24. On-Site and Site Access Traffic Control.
  25. Protocol for emergency events and first aid.
  26. Security.
  27. Progress cleaning.
  28. Procedures for maintaining Contractor as-built drawings and specifications documentation.
  29. Project closeout and submission of closeout items and record documents.

- D. Minutes: Entity responsible for conducting meeting is to record minutes and distribute copies within two (2) working days after meeting. Distribute to those indicated in the list of Attendees.

### 3.7 SITE MOBILIZATION MEETING

- A. Contractor is to schedule and conduct a Site Mobilization Meeting before Contractor occupancy of site. If Owner and Contractor 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. Contractor Project Manager and On-Site Superintendent.
  4. Major Subcontractors.
  5. Relevant Utility Providers, if services required during mobilization.
- C. Agenda: Discuss items of significance and including the following:
  1. Mobilization schedule.
  2. Use of premises by Owner and Contractor.
  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 Contractor 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.
- D. Minutes: Entity responsible for conducting meeting is to record minutes and distribute copies within two (2) working days after meeting. Distribute to those indicated in the list of Attendees and others affected by decisions made.

### 3.8 PROGRESS MEETINGS

- A. Contractor is to schedule and conduct Progress Meetings throughout progress of the Work at regularly scheduled interval of 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. Contractor 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 construction schedule and completion.
    - b. Review corrective action planned to recover activities that are behind schedule.
    - c. Review planned progress during succeeding work period.
    - d. 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. Minutes: Entity responsible for conducting meeting is to record minutes and distribute copies within two (2) working days after meeting. Distribute to those indicated in the list of Attendees and others affected by decisions made.
- E. Contractor shall employ a project overview video at each progress meeting from a choreographed drone flight video within produced within two days of the progress meeting. Subject video shall be used at each meeting in conjunction with specific area photographs to provide an overview of the project status and progress.

### 3.9 PRE-INSTALLATION MEETINGS

- A. Contractor 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.
- E. Minutes: Entity responsible for conducting meeting is to record minutes and distribute copies within two (2) days after meeting to participants, Owner, Architect, and others affected by decisions made.

### 3.10 CLOSEOUT MEETING

- A. Contractor 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. Contractor 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. Contractor'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 and transfer of insurance responsibilities.
  10. Final cleaning.
  11. Closeout Submittals.
    - 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.
  12. Contractor preparation and distribution of Contractor's comprehensive punch list.
  13. Procedure to request Architect inspection to determine date of Substantial Completion.
  14. Completion time for correcting deficiencies.
  15. Partial release of retainage.
  16. Preparation for final inspection.
  17. Final Application for Payment package components including affidavits and other require documents.
  18. Contractor's demobilization from Site.
  19. Archiving and submittal of data from Contractor-provided Electronic Documents Service.
  20. Maintenance.
- D. Minutes: Entity responsible for conducting meeting is to record minutes and distribute copies within two (2) working days after meeting. Distribute to those indicated in the list of Attendees and others affected by decisions made.

**END OF SECTION**





**SECTION 01 32 00****CONSTRUCTION PROGRESS DOCUMENTATION****PART 1 GENERAL****1.1 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. Contractor's Construction Schedule.
    - c. Schedule Updating.
    - d. Daily Construction Reports.
    - e. Site Condition Reports.

**1.2 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 Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file.
  - 2. PDF electronic file.
- B. 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.

- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- D. Construction Schedule Updating Reports: Submit with each Applications for Payment.
- E. Daily Construction Reports: Maintain on site; to be submitted upon request from Owner or Architect.
- F. Site Condition Reports: Submit at time of discovery of differing site conditions.

#### **1.4 QUALITY ASSURANCE**

- A. Scheduler: Contractor's personnel specializing in CPM scheduling with two 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 within 48 hours of request.
- B. Contractor's Administrative Personnel: Two years minimum experience in using and monitoring CPM schedules on comparable projects.

#### **1.5 COORDINATION**

- A. Coordinate Contractor'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.

### **PART 2 PRODUCTS**

#### **2.1 SCHEDULING REQUIREMENTS**

- A. Time Frame:
  - 1. Extend schedule from Contract Start Date to Date of Substantial Completion.
    - a. 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 AON (activity-on-node) 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 estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
      - 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 Contractor's activities.
    - i. Testing and commissioning.
    - j. Preparation and submittal of closeout and record documents.
  - 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. Immediate 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 making revisions to schedule, prepare tabulated reports showing the following:
  - 1. Identification of activities that have changed.
  - 2. Changes in early and late start dates.
  - 3. Changes in early and late finish dates.
  - 4. Changes in activity durations in days.
  - 5. Changes in the critical path.
  - 6. Changes in total float or slack time.
  - 7. Changes in the Contract Time.

## 2.2 REPORTS

- A. 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. Change Orders received and implemented.
  13. Construction Change Directives received and implemented.
  14. Utility services connected and disconnected.
  15. Equipment or system tests and startups.
  16. Partial completions and occupancies.
  17. Substantial Completion certification.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

### **PART 3 EXECUTION**

#### **3.1 STARTUP CONSTRUCTION SCHEDULE**

- A. Within 10 days of the Contract Start Date, 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 construction schedule with each Application for Payment.
  2. Submit number of opaque reproductions Contractor requires, plus two copies Architect will retain.

#### **3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Prepare and submit Contractor's Construction Schedule, including a time-scaled CPM network analysis diagram for the Work.
- B. Within 30 days of the Contract Start Date, prepare and submit a draft of proposed Contractor's Construction Schedule for review. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.
1. Submit updated construction schedule with each Application for Payment.
  2. Submit number of opaque reproductions Contractor requires, plus two copies Architect will retain.
- C. Within 50 days of the Contract Start Date, prepare and submit the final Contractor'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 updated construction schedule with each Application for Payment.
  2. Submit number of opaque reproductions Contractor requires, plus two copies Architect will retain.
- D. Failure to include any work item required for performance of the Contract shall not excuse Contractor 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 Contractor's Construction Schedule.

- G. Contractor's Construction Schedule Updating: 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.
  3. Include specific updates at the monthly meeting to indicate current progress and critical path tasks.
    - a. If the project is behind schedule, indicate the impact on critical path items and recovery efforts to maintain the schedule related to those tasks.
    - b. If progress schedule indicates more than a four (4) week impact on critical path items, the Contractor is required to convene a meeting with the Owner and Architect to review strategies for recovery.
- H. Distribution: Distribute copies of approved schedule to Architect, Owner and testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

### **3.3 REPORTS**

- A. Maintain and submit as indicated in this Section.
- B. All Progress Schedule reports are required to be uploaded to the Electronic Documents Service on a monthly basis.

**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. Refer to specification 01 30 00 – Administrative Requirements

**1.2 SUMMARY**

- A. Section includes administrative, procedural and other requirements that include:
  - 1. Submittal Schedule.
  - 2. Submittal Administrative Requirements.
  - 3. Internet-Based Submittal Service.
  - 4. Submittal Procedures.
  - 5. Types of Submittals.
  - 6. Delegated Design Services.
  - 7. Closeout Submission of Internet-Based Submittal Service Archive.

**1.3 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is for the Contractor to demonstrate the way by which the Contractor 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. The Contractor 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 Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor 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 are able to 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 Contractor's Construction Schedule.
    - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  - 4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Name of subcontractor 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. As part of the Electronic Documents Service described in 01 30 00 – Administrative Requirements Section 3.1, specific requirements for submission of submittals, shop drawing and other pertinent information are as follows:
  - 1. Transmit/post each submittal with Architect accepted form.
  - 2. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 3. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 4. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 5. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 6. 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.



7. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - a. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - b. Submittals Requiring Color Selection: All submittals requiring color selection for the exterior and interior need to be coordinated together and will not be reviewed individually and will be reviewed once all submittals requiring color selection are received with appropriate manufacturers printed or hard copy materials required for color selection. Submittals provided electronically that require color selection must have color selection chart and or samples provided on manufacturers original printed material.
  - c. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - d. Resubmittal Review: Allow 15 days for review of each resubmittal.
  - e. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal. Provide consultant review action columns in submittal log for Architect's consultant reviews. Position the consultant review action columns in the log prior to the Architect's review action columns, reflecting the sequence of reviews.
8. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
  - a. 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.
  - b. Name file with submittal number or other unique identifier, including revision identifier.
  - c. 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).
  - d. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work, Contract Documents and the Submittal requirements.
  - e. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  - f. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect, containing the following information:
    - 1) Project name.
    - 2) Date.
    - 3) Name and address of Architect.
    - 4) Name of Contractor.
    - 5) Names of subcontractor, manufacturer, and supplier.
    - 6) Category and type of submittal.
    - 7) Submittal purpose and description.
    - 8) Specification Section number and title.
    - 9) Specification paragraph number or drawing designation and generic name for each of multiple items.

- 10) Drawing number and detail references, as appropriate.
  - 11) Location(s) where product is to be installed, as appropriate.
  - 12) Related physical samples submitted directly.
  - 13) Transmittal number, numbered consecutively.
  - 14) Submittal and transmittal distribution record.
  - 15) Other necessary identification.
  - 16) Remarks.
9. Options: Identify options requiring selection by Architect.
  10. 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 Contractor's letterhead, record each deviation itemization number and provide an explanation for each deviation and its impact on the Work and the Contract Documents.
  11. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
    - a. Note date and content of previous submittal.
    - b. Note date and content of revision in label or title block and clearly indicate extent of revision.
    - c. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
  12. 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.
  13. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Contractor's action stamp.

## **PART 2 PRODUCTS**

### **2.1 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  1. Upload/post electronic submittals as PDF electronic files directly to the 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: Collect information into a single submittal for each element of construction and type of product or equipment.
  1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.

- b. Manufacturer's product specifications.
  - c. 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 Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide (upload) corresponding electronic submittal of Sample transmittal, digital image file of the submitted Samples, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  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 Contractor.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
- F. Coordination Drawing Submittals: Comply with requirements indicated in the Contract Documents.
- G. Contractor's Construction Schedule: Comply with requirements indicated in the Contract Documents.
- H. Application for Payment and Schedule of Values: Comply with requirements indicated in the Contract Documents.
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements indicated in the Contract Documents.
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements indicated in the Contract Documents.
- K. Maintenance Data: Comply with requirements indicated in the Contract Documents.
- L. 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.
- M. 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.

- N. 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.
- O. 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.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. 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.
- S. 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.
- T. 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.
- U. 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.
- V. 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.
- W. 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.
- X. 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.
- Y. 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 CONTRACTOR'S REVIEW**

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. For submittals that are compliant with the contract requirements, mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 - General Requirements regarding project closeout and maintenance material submittals.
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval indicating and certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### **3.2 ARCHITECT'S ACTION**

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action. The Architect will review and approve, or take other appropriate action upon, the Contractor's 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 Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor 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.

- B. Informational Submittals: Architect will review each submittal and will not return it; or, will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. 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 Contractor are incomplete submittals.
- D. Submittals not required by the Contract Documents may be returned by the Architect without action.
- E. The 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. Contractor 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 Contractor.

### 3.3 CLOSEOUT SUBMISSION OF INTERNET-BASED SUBMITTAL SERVICE ARCHIVE

- A. After Substantial Completion has been certified and prior to Final Payment, submit a digital archive of the submittal history and other documentation maintain on the Internet-Based Submittal Service(s) to Owner and Architect for their separate records.
  - 1. Prior to digital archive processing of the internet-based submittal service history data:
    - 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 internet-based submittal service or the Owner's and Architect's internet user portal until verification that both have received the fully operational digital archive.
  - 2. Coordinate with internet-based submittal service technical support to acquire comprehensive download of digital archive files, logs and navigational portal (dashboard).
  - 3. Submission Format: DVD disc or other larger capacity digital archive storage device acceptable to Owner.
    - a. Label disc to include Owner name; project name; Owner's project number; Contractor's name and contact information; Architect company name; name of internet-based submittal service; archive date and list of logs included on disc.
    - b. Digital archive shall include a HTML file that provides a navigation portal (dashboard) that operates and appears the same as did the internet-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 internet-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 internet-based submittal service. Acquire approval from Owner for termination of the internet-based submittal service.

**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 Contractor 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 Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Document requirements.
  3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, 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 does 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.
- 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 Contractor 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. Contractor's Quality Control Plan: For quality-assurance and quality control activities and responsibilities.
- B. Qualification Data: For Contractor'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 CONTRACTOR'S QUALITY CONTROL PLAN

- A. Quality Control Plan, General: Submit quality control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality control responsibilities. Coordinate with Contractor'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. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-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, Contractor 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 Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements on Contract Documents.
- G. 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 Contractor by deducting testing charges, and other costs directly related to re-testing or re-inspection, from Contractor's Contract Sum/Price.
- H. 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 Owner, Architect and Contractor 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.
- I. Agency Reports: After each test or inspection, promptly submit reports by way of electronic or hard-copy transmission to Owner, Contractor 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.
  - J. 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 Contractor.
    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 Contractor 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 Contractor.

- B. Contractor Responsibilities: Where not explicitly indicated as Owner's responsibility, Contractor will engage a qualified testing agency to perform quality control services including, but not limited to, tests and inspections. Also, Contractor 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 Contractor 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 Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. 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 Contractor'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 Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Owner, Architect, Commissioning Authority, and Contractor 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 Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- 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 are as indicated on Shop Drawings or as instructed by manufacturer.
  6. 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 a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Architect.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's 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. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

### **3.3 SCHEDULE OF MOCKUPS**

- A. Exterior Wall Mockup: Provide mockup wall as indicated on Drawings and Section 04 20 00 - Unit Masonry. Mockup construction is to be separate from project final construction and is to be removed from project site after Contractor acquires approval for removal from Architect.
- B. Interior Room Mockup:
1. Provide mockup classroom; location to be selected by the Architect. The mockup classroom shall have all interior finishes completely installed and approved by the Owner and Architect. Work completed in the mockup classroom shall be incorporated into the final work upon approval.
  2. Final schedule and progressive installation of finishes for approval to be coordinated between the Architect, Owner, and Contractor. It is not expected that the entire mockup be completed prior to review and approval. The intent is to allow for an assessment of the intended level of workmanship and compliance prior to the mass installation of the products and finishes as deemed necessary by the Architect.
  3. Related specifications sections of the Work are included as appropriate to the project:
    - a. 06 20 00 Finish Carpentry
    - b. 08 14 16 Flush Wood Doors
    - c. 08 71 00 Door hardware
    - d. 09 21 16 Gypsum Board Assemblies
    - e. 09 51 13 Acoustical Panel Ceilings
    - f. 09 66 23 Resinous Matrix Terrazzo Flooring
    - g. 09 90 00 Painting and Coating
    - h. 10 14 00 Signage
    - i. 10 56 13 Prefabricated Wood Storage Shelving

**END OF SECTION**

**SECTION 01 45 00****INSPECTION REQUIREMENTS (ADD-4)****PART 1 GENERAL**

Architect of Record: Thomas Hughes, AIA REFP, LEED AP – SfL+a Architects, PA  
 Structural Engineer of Record: Robert E. Lasater, Jr., P.E. – LHC Structural Engineers, P.C.  
 Building Official: Hertford 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 in 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 – 2004 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 User's 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 User's 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](http://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 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).

## 1.7.2 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 & Table 1705.3; 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 Sections 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)

## 1.2 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, Structural Engineer, and authority having jurisdiction. When requested by Architect, provide interpretation of test results. All reports must be uploaded to the electronics management program for the project: Procore.
 

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.

### **1.3 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: *Erwin Elementary School*  
Location: *Erwin, NC*  
Owner: *Harnett County Schools*

Design Professional in Responsible Charge: *Thomas Hughes, AIA, LEED AP*  
Structural Engineer of Record: Robert E. Lasater, Jr., P.E. – LHC Structural Engineers, P.C.

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.

SpA *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.

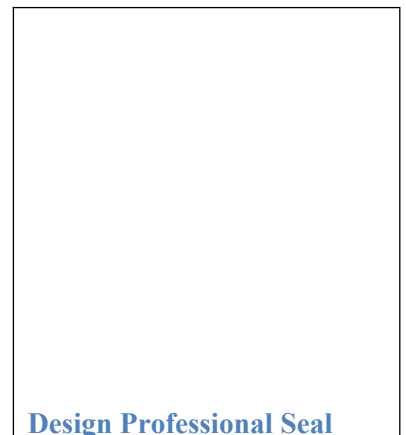
Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *WEEKLY* or  per attached schedule.

Prepared by:

\_\_\_\_\_  
(type or print name)

\_\_\_\_\_  
Signature Date



Owner's Authorization:

Building Official's Acceptance:

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Signature Date



**SCHEDULE OF INSPECTION AND TESTING AGENCIES**

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Soils and Foundations  | <input type="checkbox"/> Spray Fire Resistant Material              |
| <input checked="" type="checkbox"/> Cast-in-Place Concrete | <input type="checkbox"/> Wood Construction                          |
| <input type="checkbox"/> Precast Concrete                  | <input type="checkbox"/> Exterior Insulation and Finish System      |
| <input checked="" type="checkbox"/> Masonry                | <input checked="" type="checkbox"/> Mechanical & Electrical Systems |
| <input checked="" type="checkbox"/> Structural Steel       | <input checked="" type="checkbox"/> Architectural Systems           |
| <input type="checkbox"/> Cold-Formed Steel Framing         | <input checked="" type="checkbox"/> Seismic Requirements            |
| <input type="checkbox"/> Deep Foundations                  | <input type="checkbox"/> Other                                      |

<b>Special Inspection Agencies</b>	<b>Firm</b>	<b>Address, Telephone, e-mail</b>
1. Special Inspections	<i>SI</i>	<i>OWNER TO PROVIDE</i>
2. Structural Engineer of Record	<i>SER</i>	<i>LHC Structural Engineers</i>
3. Testing Laboratory	<i>ITL</i>	<i>OWNER TO PROVIDE</i>
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	<i>C</i>
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**Quality Assurance for Wind Requirements**

Basic Wind Speed (3 second gust)	<i>128</i>
Wind Exposure Category	<i>C</i>

**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      **IT-#** - Inspection Type  
**SER** - Structural Engineer of Record      **C** - Continuous Special Inspections  
**SI** - 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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Construction materials and systems that are alternatives to materials and systems prescribed by the 2012 NCBC.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.1.1, #1	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unusual design applications of materials described in the 2012 NCBC.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.1.1, #2	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Special Events (as decided / required by Code Enforcement).	<input type="checkbox"/>	<input type="checkbox"/>	Local Authority Having Jurisdiction	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Retaining Walls.	<input type="checkbox"/>	<input type="checkbox"/>		

#### 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
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Structural Steel.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	AISC 360	NCBC 1705.2.1 & Exception
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Cold-formed Steel Deck.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	SDI QA/QC	NCBC 1705.2.2
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Open-web Steel Joists and Joist Girders.	<input type="checkbox"/>	<input checked="" type="checkbox"/>		NCBC 1705.2.3 & Table
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1. Installation of open-web steel joists and joist girders. a. End connections - welding or bolted.		<input checked="" type="checkbox"/>	SJI specifications listed in Section 2207.1	
			b. Bridging - horizontal or diagonal.				
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	i. Standard bridging.		<input checked="" type="checkbox"/>	SJI specifications listed in Section 2207.1	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ii. Bridging that differs from the SJI specifications listed in Section 2207.1		<input checked="" type="checkbox"/>		Uplift Bridging
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cold-formed steel trusses spanning 60 feet or greater		<input type="checkbox"/>		NCBC 1705.2.4

#### IT-3 CONCRETE CONSTRUCTION (Refer to NCBC Section & Table 1705.3; Ch. 19)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1. Inspect reinforcement, including pre-stressing tendons and verify placement.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ACI 318 Ch 20, 25.2, 25.3, 26.6.1 – 26.76.3; & NCBC 1908.4	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	AWS D1.4; ACI 318:26.6.4	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3. Inspect anchors cast in concrete.		<input checked="" type="checkbox"/>	ACI 318: 17.8.2	

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ACI 318: 17.8.2.4  ACI 318: 17.8.2	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5. Verify use of required design mix.		<input checked="" type="checkbox"/>	ACI 318: Ch. 19, 26.4.3, 26.4.4, NCBC 1904.1, 1904.2. 1908.2, 1908.3	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	<input checked="" type="checkbox"/>		ASTM C 172; ASTM C 31; ACI 318: 26.4, 26.12	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. Inspect concrete and shotcrete placement for proper application techniques.	<input type="checkbox"/>		ACI 318: 26.5, NCBC 1908.6, 1908.7. 1908.8	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	8. Verify maintenance of specified curing temperature and techniques		<input checked="" type="checkbox"/>	ACI 318: 26.5.3-26.5.5 NCBC 1908.9	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. Inspect of pre-stressed concrete for: a. Application of pre-stressing forces; and b. Grouting of bonded pre-stressing tendons.	<input type="checkbox"/>	<input type="checkbox"/>	ACI 318: 26.10	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. Inspect erection of precast concrete members		<input type="checkbox"/>	ACI 318: Ch. 26.8	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.		<input type="checkbox"/>	ACI 318: 26.11.2	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12. Inspect formwork for shape, location and dimensions of the concrete members being formed.		<input checked="" type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Masonry Construction.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TMS 402/ ACI 530/ ASCE 5 and TMS 602/ACI 530.1/ASCE 6,	See NCBC 1705.4 Exceptions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Empirically designed masonry (per 2109), glass unit masonry (per 2110) or masonry veneer (per Ch 14) in Risk Category IV.	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prefabricated wood structural elements and assemblies to be in accordance with the requirements set forth in NCBC Section 1704.2.5.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1704.2.5	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High Load Diaphragms.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.5.1 & 1704.2	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temp & permanent bracing on metal-plate-connected trusses spanning ≥ 60 ft.	<input type="checkbox"/>	<input type="checkbox"/>	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
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1. Verify materials below shallow foundation are adequate to achieve the design bearing capacity.		<input checked="" type="checkbox"/>	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	See NCBC 1705.6 exception

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2. Verify excavations are extended to proper depth and have reached proper material.	<input checked="" type="checkbox"/>	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3. Perform classification and testing of compacted fill materials.	<input checked="" type="checkbox"/>	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	<input checked="" type="checkbox"/>	NCBC 1705.6; geotechnical report & construction documents from RDPIRC	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5. Prior to placement of compacted fill, inspect sub-grade and verify that site has been prepared properly.	<input checked="" type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Verify element materials sizes and lengths comply with the requirements.	<input type="checkbox"/>		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. Determine capacities of test elements and conduct additional load tests as required.	<input type="checkbox"/>		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. Inspect driving operations and maintain complete and accurate records for each element.	<input type="checkbox"/>		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>		NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. For steel elements, perform additional inspections in accordance with Section 1705.2.			NCBC 1705.7; geotechnical report & construction documents from RDPIRC	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Inspect drilling operations and maintain complete and accurate records for each element.	<input type="checkbox"/>		NCBC 1705.8; geotechnical report & construction documents from RDPIRC	

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>		NCBC 1705.8; geotechnical report & construction documents from RDPIRC	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. For concrete elements, perform tests and additional special inspections in accordance with section 1705.3.	<input type="checkbox"/>		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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inspect during installation. Record: <ol style="list-style-type: none"> <li>1. Installation equipment used.</li> <li>2. Pile dimensions.</li> <li>3. Tip elevations.</li> <li>4. Final depth.</li> <li>5. Final installation torque.</li> <li>6. Other pertinent installation data as req'd by RDPIRC.</li> </ol>	<input type="checkbox"/>		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
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inspect during fabrication. <ol style="list-style-type: none"> <li>1. Structural,</li> <li>2. Load-bearing or</li> <li>3. Lateral load-resisting members or assemblies.</li> </ol>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
			Only required in the following instances: <ol style="list-style-type: none"> <li>1. In wind Exposure Category B, where <math>V_{asd}</math> is <math>\geq</math> 120 MPH (per 1609.3.1), or</li> <li>2. In wind Exposure Category Cor D, where <math>V_{asd}</math> is <math>\geq</math> 110 MPH (per 1609.3.1).</li> </ol>				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Structural Wood. <ol style="list-style-type: none"> <li>1. Gluing elements of the main wind force-resisting system.</li> <li>2. Nailing, bolting, anchoring, etc. of elements of the main wind force-resisting system.</li> </ol>	<input type="checkbox"/>	<input type="checkbox"/>	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.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Cold-formed steel light frame construction.</p> <ol style="list-style-type: none"> <li>1. Welding operations of elements of the MWRS</li> <li>2. Screw attachment, bolting, anchoring and other fastening of elements of the MWRS including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs</li> </ol>	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.11.2	<p>Not required for shear walls and diaphragms, where either of the following applies:  <b>#1.</b> Sheathing is gypsum bd or fiberboard;  <b>#2.</b> 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 &gt; 4"o.c.</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Wind-resisting components</p> <ol style="list-style-type: none"> <li>1. Roof covering, roof deck and roof framing connections</li> <li>2. Exterior wall covering and wall connections to roof and floor diaphragms and framing</li> </ol>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NCBC 1705.11.3	

**IT-12 SEISMIC RESISTANCE** (Refer to NCBC Sections 1705.12)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
			<p>SI in sections 1705.12.1 – 1705.12.9 are not required for structures designed and constructed in accordance with one of the following:</p> <ol style="list-style-type: none"> <li>1. Structure is light-frame construction, <math>S_{DS}</math> is not greater than 0.5; and building height is not greater than 35'.</li> <li>2. SFRS of the structure is reinforced masonry or reinforced concrete, <math>S_{DS}</math> is not greater than 0.5; and building height is not greater than 25'.</li> </ol>				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Structural steel in the seismic force-resisting systems of buildings and structures assigned to SDC B, C, D, E or F.</p>	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.12.1.1; AISC 341	<p>Not required in the SFRS of buildings or structures in SDC B or C not specifically detailed for seismic resistance, with response modification coefficient, <math>R, \leq 3</math></p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>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.</p>	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.12.1.2; AISC 341	<p>Not required in the SFRS of buildings and structures in SDC B or C with response modification coefficient, <math>R, \leq 3</math></p>

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Structural Wood in the seismic force-resisting systems of structures assigned to SDC C, D, E or F.	<input type="checkbox"/>	<input type="checkbox"/>	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.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Field gluing operations of elements of seismic force-resisting system	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. Nailing, bolting, anchoring and other fastening of elements of the seismic force-resisting system	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cold-formed steel light frame construction in the SFRS of structures in SDC C, D, E, or F.	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Welding operations of elements of the SFRS	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. Screw attachment, bolting, anchoring, and other fastening of elements of the SFRS including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	ASCE 7, Section 13.2.2	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	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.



<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Access floors - anchorage in structures assigned to Seismic Design Category D, E or F.	<input type="checkbox"/>	NCBC 1705.12.5.1	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Plumbing, Mechanical and electrical components: Seismic Design Categories C, D, E or F: 1. Anchorage of electrical equipment for emergency and standby power.	<input checked="" type="checkbox"/>	NCBC 1705.12.6, #1	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2. Installation and anchorage of piping systems for Hazardous materials and associated mechanical units.	<input checked="" type="checkbox"/>	NCBC 1705.12.6, #3	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. Installation and anchorage of ductwork for Hazardous materials.	<input type="checkbox"/>	NCBC 1705.12.6, #4	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	4. Installation and anchorage of vibration isolation systems where the required clearance is $\leq 1/4"$ between the equipment support frame and restraint.	<input checked="" type="checkbox"/>	NCBC 1705.12.6, #5	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Seismic Design Categories E or F: 1. Anchorage of other electrical equipment.	<input type="checkbox"/>	NCBC 1705.12.6, #2	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storage racks $\geq 8'$ in height in Seismic Design Categories D, E or F.	<input type="checkbox"/>	NCBC 1705.12.7	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Seismic isolation systems in seismically isolated structures assigned to SDC B, C, D, E, or F.	<input type="checkbox"/>	NCBC 1705.12.8	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Installation of cold-formed steel special bolted moment frames in the SFRS of structures assigned to SDC D, E, or F.	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Structural Steel. 1. Nondestructive testing for seismic resistance for SFRS for buildings assigned to SDC B, C, D, E or F.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.13.1 NCBC 1705.13.1.1 or AISC 341	Exception: SDC B or C buildings with a response modification coefficient $\leq 3$ .
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.13.1.2 AISC 341	Exception: SDC B or C buildings with a response modification coefficient $\leq 3$ .
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.13.2	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.13.3	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sprayed fire-resistant materials.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.2 & ASTM E605	4/1000sf
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Floor, roof and wall assemblies	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.3	4 @12"x12"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. Cellular Decks	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.4	4 @12"x12"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. Fluted Decks	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.5	25%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. Structural members	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.6	9@12"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. Beams and Girders	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.7	7@12"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. Joists and Trusses	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.8	12@12"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. Wide-flanged columns	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.14.4.9	4@12"
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. Hollow structural section and pipe columns	<input type="checkbox"/>	<input type="checkbox"/>		

**IT 15 MASTIC AND INTUMESCENT FIRE-RESISTANT COATING 1705.15**

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mastic and Intumescent fire-resistant coating applied to structural elements and decks.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.15; AWCI 12-B	

**IT-16 EXTERIOR INSULATION & FINISH SYSTEM (EIFS)**

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EIFS application.	<input type="checkbox"/>	<input type="checkbox"/>		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.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water-resistive barrier coating when installed over a sheathing substrate.	<input type="checkbox"/>	<input type="checkbox"/>	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.				

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inspection of tested and listed penetration firestop systems: 1. Through penetrations: a. Verify materials before installation. b. Verify against design (Cutsheet or EJ). c. For each type of firestop: i. Witness 10% of installations, or ii. Destructive testing on 2% of installations. d. Verify all firestops are installed. 2. Membrane penetrations: a. Verify materials before installation. b. Verify against design (Cutsheet or EJ). c. For each type of firestop: i. Witness 10% of installations or ii. Destructive testing on 2% of installations. d. Verify all firestops are installed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NCBC 1705.17.1; ASTM E2174-10ae1	10% of installations per floor or per area. Area = 1 sf – 10,000 sf.  2% of installations per floor or per area. Area = 1sf – 10,000 sf  10% of installations per floor or per area. Area = 1sf – 10,000 sf  2% of installations per floor or per area. Area = 1sf – 10,000 sf
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
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<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NCBC 1705.17.2; ASTM E2393-10a	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					

**IT-18 SMOKE CONTROL** (Refer to NCBC Section 1705.18)

ITL	SER	SI	Inspection Task	C	P	Standard	Notes / Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inspection of smoke control system.	<input type="checkbox"/>	<input type="checkbox"/>	NCBC 1705.18	

**FINAL REPORT OF SPECIAL INSPECTIONS**  
**AGENTS FINAL REPORT**

Project: *Erwin Elementary School*

Location: *Erwin, NC – Harnett County, NC*

Owner: *Harnett County Schools*

Design Professional in Responsible Charge: *Thomas Hughes, AIA, LEED AP*

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

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Signature

Date

**END OF SECTION**

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Temporary Utilities.
  2. Construction Facilities.
  3. Temporary Controls.
  4. Moisture and Mold Control.
  5. Operation, Termination and Removal.

**1.2 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. 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.

### 1.3 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 Enclosures 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 Enclosures 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 to field office at time of Project mobilization. Provide desktop computer with Microsoft operating system and appropriate office function software, modem, copier and printer. Provide access and functionality for Architect, Architect's Consultants and Owner.
- 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.

#### 1.4 CONSTRUCTION FACILITIES

- A. Field Offices And Sheds
1. Provide a field office – double wide trailer.
  2. Office: Weather tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
  3. Provide space for Project meetings, with table and chairs to accommodate 16 persons.
  4. Provide separate offices for meeting area and Contractor staff.
  5. Provide designated space for As-Built drawings to be maintained for the duration of the construction.
  6. Provide minimum 55" LED television/monitor on wall of meeting room area with HDMI connection and wireless connection for use during progress meeting.
  7. Provide wireless internet access and internet services.
  8. Provide toilet room facilities.
  9. Locate offices and sheds minimum distance of 30 feet from existing and new structures.
  10. When permanent facilities are enclosed with operable utilities, relocate offices and storage into building, with written agreement of Owner, and remove temporary buildings.

11. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.
    - a. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove when no longer needed.
    - b. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
    - c. Exterior Materials: Weather resistant, finished.
    - d. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
    - e. Lighting for Offices: 50 foot candles at desk top height, exterior lighting at entrance doors.
    - f. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.
  12. Environmental Control:
    - a. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions.
    - b. Storage Spaces: Heating and ventilation as needed to maintain products in accordance with Contract Documents; lighting for maintenance and inspection of products.
  13. Storage Areas and Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00 - Product Requirements.
  14. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.
  15. Installation:
    - a. Install office spaces ready for occupancy 15 days after Notice to Proceed.
    - b. Parking: Gravel surfaced parking spaces for use by Owner, Architect and others connected to office by gravel walk.
    - c. Employee Residential Occupancy: Not allowed on Owner's property.
  16. Maintenance and Cleaning:
    - a. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.
    - b. Maintain approach walks free of mud, water, and snow.
  17. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.
- B. Vehicular Access
1. 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.
  2. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
  3. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.
  4. Location as indicated on Drawings.
  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
- C. 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.
- D. 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.
- E. 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 office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.
    - c. Provide state traffic agency directional traffic signs to and within site.
    - 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.
- F. 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 and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
  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, 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 [automatic] traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor'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.

## 1.5 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 during the course 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.
  - 3.
- 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 work day.
- 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 is 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 NFPA requirement 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 every construction trailer and storage shed and as otherwise required in construction areas.
- K. Barriers
1. Provide barriers to prevent unauthorized entry to construction areas to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
  2. Provide protection for plants designated to remain. Replace damaged plants.
  3. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.
- L. Enclosures And Fencing
1. Construction: Commercial grade chain link fence.
  2. Provide fence not less than 6 feet high where indicated on the Drawings between the area of Work and existing structures maintaining safe width for circulation.
- 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.
- O. Noise Control
1. Provide methods, means, and facilities to minimize noise produced by construction operations during school (or other facility type) operating hours.

**1.6 MOISTURE AND MOLD CONTROL**

- A. Contractor'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 airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
  - 4. Remove standing water from decks.
  - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction 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.

**1.7 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 need for its service has ended, when it has been replaced by authorized use of a permanent facility, or 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 sur-faces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. 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 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 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. 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.

**1.2 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. Furnish, Provide and Supply:
1. Furnish: To supply, deliver, unload, and inspect for damage.
  2. Provide: To furnish and install.
  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.

### **1.3 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.

### **1.4 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.

### **1.5 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.

### **1.6 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.



- B. Products Specified indicating a Basis of Design product: Use of Basis of Design product is preferred if other manufacturers are indicated; but, required if no other manufacturer indicated.
- C. Products Specified by Naming One or More Manufacturers: Use product of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- D. Products Specified by Naming One or More Manufacturers with stated Provision for Substitutions: Submit Substitution Request for any manufacturer not named.

## 1.7 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 Bidder only, and only up to fourteen (14) days before receipt of Bids.
- C. Substitution Requests during the Construction Period: Substitutions may be considered from Contractor only, and only when a product becomes unavailable through no fault of Contractor.
  - 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 Contractor of accepted substitutions by issuance of Addendum.
  - 3. During the Construction Period, Architect will notify Contractor of accepted substitutions in written form. After which, Contractor 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, Contractor 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.

Erwin Elementary School - 01905.000

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**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: \_\_\_\_\_  
 Contractor Company: \_\_\_\_\_ 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 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.
- 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" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 4. Division 01 Section "Project Record Documents" for submitting HVAC and Controls Testing and Balancing Records as part of the project Record Certifications.
  - 5. Division 07 Section "Firestopping" for patching penetrations in fire-rated construction.

**1.2 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 Contractor, 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. Dissimilar Materials: Apply appropriate coating or material as permanent separator of dissimilar materials to prevent galvanic, chemical and other corrosive processes that produce discoloration or damaging effects on construction materials. Application to be in a manner as to not be visible when construction is completed.
- 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 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: Engage a Professional Land Surveyor, registered in the State in which the project is located, to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
  - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
  - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

### 3.5 INSTALLATION

- A. 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, or 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. Provide access to Project site for Owner's construction personnel.
- B. Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
- C. Coordinate activities of Owner's technology contractor(s) and incorporate these services into the overall project 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.

**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. Project Warranties.
  5. Stairs and Ramps Compliance survey and certification.
  6. Spare Parts and Maintenance Products delivery and certification.
  7. Final Cleaning.
  8. 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 Commissioning Requirements for verification and compilation of data into operation and maintenance manuals.
  7. Sections indicating specific operation and maintenance manual requirements for the Work in those Sections.
  8. Sections indicating specific closeout and special cleaning requirements for the Work in those Sections.

**1.3 PROCEDURES PRIOR TO SUBSTANTIAL COMPLETION**

- A. Closeout Meeting: Comply with the requirements for Closeout Meeting indicated in Section 01 30 00 - Administrative Requirements.
- B. Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Complete Stairs and Ramps Compliance survey and certification. Refer to this Section, article Stairs and Ramps Compliance Certification.
  3. Complete Spare Parts and Maintenance Products delivery and certification. Refer to this Section, article Spare Parts and Maintenance Product.
  4. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

5. Complete startup and testing of systems and equipment.
6. Perform preventive maintenance on equipment used prior to Substantial Completion.
7. Complete instruction to Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
8. Advise Owner of changeover in heat and other utilities.
9. Schedule and conduct inspection and walkthrough with Owner and local emergency responders.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Complete final cleaning requirements, including touchup painting.
12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

#### **1.4 SUBSTANTIAL COMPLETION PROCEDURES**

- A. Submittals Prior to Substantial Completion: Submit the following a minimum of ten (10) days prior to issuing written request to Architect for inspection for certification of date of Substantial Completion. Include other required items not specifically indicated for later submission. Identify items that are incomplete at time of submittal.
  1. Submit Initial Warranties Manual Submittal as indicated in this Section.
    - a. At this time, for review purposes, submit only digital media disk as indicated for the initial manual submittal in this Section.
    - b. Submit two copies of disk, labeled with identification.
  2. Submit Initial Operation and Maintenance Manuals Submittal as indicated in Section 01 78 23 - Operation and Maintenance Data.
    - a. At this time, for review purposes, submit only digital media disks for the initial submittal of the various manual types as indicated in Section 01 78 23 - Operation and Maintenance Data.
    - b. Submit two copies of each disk, labeled with identification information.
  3. Submit Initial Records Submittal as indicated in Section 01 78 39 - Project Record Documents.
    - a. At this time, for review purposes, submit only digital media disks for the initial submittal of the various record types as indicated in Section 01 78 39 - Project Record Documents.
    - b. Submit two copies of each disk, labeled with identification information.
  4. Submit Preliminary Test and Balance Report and complete start-up testing of all systems, controls, and instruction of the Owner's personnel.
- B. 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 Contractor's List of Incomplete Items (Contractor's Punch List) as further detailed in this Section under heading CONTRACTOR'S LIST OF INCOMPLETE ITEMS.
  1. On receipt and review of request, Architect will either proceed with scheduling inspection or notify Contractor of unfulfilled requirements that preclude certification of Substantial Completion.
    - a. In such case that the Architect provides notification to Contractor of unfulfilled requirements, Contractor will complete the noted and other such incomplete requirements that preclude certification of Substantial Completion. Whereafter, Contractor will issue another written request to Architect of inspection.
  2. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor'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 provided notification report to Contractor 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 Contractor's certification and date and Contractor 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. Contractor 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 Contractor's Superintendent as being inspected and complete.
    - b. Certification by Contractor'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 Records Submittal as indicated in Section 01 78 39 - Project Record Documents.
  8. Review time for submittal of Final Warranties Manual Submittal as indicated in this Section under heading SUBMITTAL - WARRANTIES MANUAL.
- 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 Contractor of unfulfilled requirements that preclude certification of final Certificate For Payment.
    - a. In such case that the Architect provides notification to Contractor of unfulfilled requirements, Contractor will complete the noted and other such incomplete requirements that preclude certification of final Certificate For Payment. Whereafter, Contractor will issue another written request to Architect of inspection.
  2. Architect will prepare a final Certificate For Payment after inspection or will notify Contractor 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 Contractor 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 Contractor's certification and date and Contractor initials of completion by each deficient item completed in preparation for reinspections.
  - 1) Contractor's written request for reinspections to include an updated final Certificate For Payment and updated Contractor Certified List of Incomplete Items.

## 1.6 CONTRACTOR'S LIST OF INCOMPLETE ITEMS

- A. Time of Submittal: 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 (Contractor'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 Contractor 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 Contractor.
    - e. Contractor'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.

## 1.7 SUBMITTAL - WARRANTIES MANUAL

- A. Content: All required Warranties, Bonds, Maintenance Service Agreements, Final Certifications and similar documents.
- B. Initial Warranties Manual Submittal: Submit as indicated below for Electronic Copy of Project Warranties Manual.
  1. Documents to be unexecuted with all information filled in except commencement/expiration dates and certification signatures and dates.
  2. Submit ten (10) days prior to issuing written request to Architect for inspection for certification of date of Substantial Completion.
- C. Final Warranties Manual Submittal: Submit as indicated below for both Paper Copy and Electronic Copy of Warranties Manual. Make corrections as may have been indicated by



- Architect or Owner from Initial Warranties Manual Submittal. Submit promptly after Final Acceptance of Project and as to not limit Owner's rights under warranties or bonds.
1. Paper Copy version: Documents to be finalized original documents with all information filled in including commencement and expiration dates and certification signatures and dates.
    - a. All commencement dates are to be the certified Date of Substantial Completion, unless previously agreed upon otherwise in writing by Owner and Contractor. Such written agreement must be included with documentation.
    - b. Contractor is responsible for acquiring all information and signatures to affect full execution of documents, including from Owner when required, prior to final submittal.
    - c. Submit duplicate copy of Paper Copy version.
  2. Electronic Copy version: Insert digital media disk in the front cover pocket of each Paper Copy manual submitted.
- D. Paper Copy of 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. WARRANTIES MANUAL
    - b. Project name and ID number(s)
    - c. Contractor name, address and telephone number.
- E. Electronic Copy of Project Warranties Manual:
1. PDF single file format on digital media disk; 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 2 PRODUCTS****2.1 MATERIALS**

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

**PART 3 EXECUTION****3.1 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 Section 01 78 39 - Project Record Documents, article Record Certifications Submittals.

**3.2 SPARE PARTS AND MAINTENANCE PRODUCTS**

- A. Coordinate with Owner to deliver and store Spare Parts and Maintenance Products. Such items are specified in individual Divisions 02 through 49 Sections and include, but may not be limited to, tools, special tools, spare parts, extra stock materials, and similar items.
- B. Label, Package and Deliver Items: Coordinate delivery times and locations with Owner for attendance.
  - 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 Contractor 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 Contractor and receipt by Owner.
- 3. Submit receipts as support documentation with the List Of Spare Parts and Maintenance Products.
- C. Closeout Submittal: Submit a 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 indicated in the Specification Sections. 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.

### 3.3 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, 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.
- C. Construction Waste Disposal:
- 1. Dispose of all waste in accordance with regulatory codes, laws and ordinances related to construction waste management and disposal.
  - 2. Comply with waste disposal requirements to include, but not limited to Section 01 73 00 - Execution as related to Progress Cleaning.

### **3.4 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.
  6. Demonstration and Training Manual.
- B. Related Requirements:
1. Where requirements in the Contractor and Owner Agreement expressly differ with the requirements stated in this Section, the Contractor and Owner Agreement shall take precedence.
  2. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
  3. Sections indicating Submittal Procedures for submitting copies of submittals for operation and maintenance manuals.
  4. Sections indicating Commissioning Requirements for verification and compilation of data into operation and maintenance manuals.
  5. Sections indicating specific operation and maintenance manual requirements for the Work in those Sections.
  6. Sections indicating Demonstration and Training requirements.

**1.3 DEFINITIONS**

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

**1.4 CLOSEOUT SUBMITTALS**

- A. 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 acceptable to Architect.

- 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 disk indicating content name of manual, project identification name and numbers, Owner, Contractor name and phone number and certified date of Substantial Completion.
  - b. Enable inserted reviewer comments on draft submittals.
  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 draft copy of Electronic Copies of Manuals as described in this Section.
  3. Submit draft copy of Paper Copies of Manuals as described in this Section.
  4. Architect may provide review comment regarding acceptability of general scope and content.
- 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 applicable).
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Authority (if applicable).
  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 electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: 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 Disk. Two copies of disk 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-by-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 Contractor name, address and telephone number. 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 by 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 in-stalled.
- 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 tele-phone 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.

## 2.6 DEMONSTRATION AND TRAINING MANUAL

- A. Comply with the heading REQUIREMENTS FOR MANUALS indicated in this Section.
- B. Include a section (tab) titled INSTRUCTION PROGRAM. Within this section insert the Instruction Program documentation indicated in Section 01 79 00 - Demonstration and Training.
- C. In subsequent sections (tabs), ordered in sequence by Project Manual Section Numbers, insert the training documentation for each Train Module (session).
1. Records documenting the training session.
  2. Training information disseminated during training session.
  3. List of training session attendees and presenters.
  4. If video record of the training session was made, indicate so in the Paper Copy of this manual and include the digital file in the Electronic Copy of this manual.
  5. If training video(s) was viewed during the training session, indicate so by video title(s) in the Paper Copy of this manual and include the digital file in the Electronic Copy of this manual.
- D. Comply with the submittal procedures indicated in Section 01 77 00 - Closeout Procedures for Records Submittal.

## 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.
  4. Record Product Data and Samples.
  5. Record Certifications.
- B. Related Requirements:
1. Division 01 Section "Execution" for requirements including, but not limited to, Final Property Survey, and Testing and Balancing HVAC and Controls.
  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. Record Prints: Contractor maintained documents on which the Contractor records new information and revisions to the original information thereon. The recording process and result is regularly referred to as "mark-up" and "marked-up". In the construction industry, Record Prints are also known as "As-Built Documents".

**1.4 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 Contractor'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 Contractor's Record Prints and other documents.
  2. Prior to making submissions, ensure legible reproduction quality.
  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:
    - a. Submit prior to Substantial Completion Inspection.
    - b. Architect will indicate observed deficiencies in changes recorded, additional information recorded, and quality of mark-ups.
  5. Final record submittals:
    - a. Submit prior to Final Inspection.

- b. Prior to submission, correct deficiencies indicated from Architect review of Initial Submittal.
- B. Record Contract Drawings Submittal.
  - 1. Initial Submittal:
    - a. Paper Copy Format: Submit one photocopy of Record Prints.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
  - 2. Final Submittal:
    - a. Paper Copy Format: Submit final Record Prints and one photocopied sets.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
- C. Record Shop Drawings Submittal.
  - 1. Initial Submittal:
    - a. Paper Copy Format: Submit one photocopy of Record Prints.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
  - 2. Final Submittal:
    - a. Paper Copy Format: Submit final Record Prints and one photocopied sets.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
- D. Record Specifications Submittal.
  - 1. Initial Submittal:
    - a. Paper Copy Format: Submit one photocopy of Record Prints.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
  - 2. Final Submittal:
    - a. Paper Copy Format: Submit final Record Prints and one photocopied sets.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
- E. Record Product Data Submittal.
  - 1. Initial Submittal:
    - a. Paper Copy Format: Submit one photocopy of Record Prints.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
  - 2. Final Submittal:
    - a. Paper Copy Format: Submit final Record Prints and one photocopied sets.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
  - 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 one photocopy of Certifications.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.
  - 2. Final Submittal:
    - a. Paper Copy Format: Submit final Certifications and one photocopied sets.
    - b. Electronic Scanned Files Format: Submit on read-only digital media disk.

## **PART 2 PRODUCTS**

### **2.1 RECORD PRINTS - CONTRACT DRAWINGS AND SHOP DRAWINGS**

- A. Maintain one set of marked-up paper copies of the original Contract Drawings and approved Shop Drawings, incorporating new and revised drawings and notes as modifications are issued. Contractor's personnel to be proficient at recording graphic information in production of marked-up Record Prints.

- B. Maintain one set of annotated PDF documents of the original Contract Drawings and approved Shop Drawings, incorporating new and revised drawings and notes as modifications are issued. Contractor's personnel to be proficient at recording graphic information in production of PDF documents. Employ an application equal to Bluebeam REVU. Information recorded in digital format shall incorporate all requirements of the marked-up paper copies as required in this section.
- C. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to provide information for Contractor to apply to corresponding marked-up Record Prints.
  - 1. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
  - 2. Accurately record information in an acceptable drawing technique.
  - 3. Record data daily after obtaining it.
  - 4. Record and check the markup before enclosing concealed installations.
  - 5. Cross-reference Record Prints to corresponding archive photographic documentation.
- D. 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.
- E. Mark the Record Prints completely and accurately.
- F. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- G. Mark important additional information that was either shown schematically or omitted from original Drawings.
- H. Incorporate new drawings received, including but not limited to, drawings received as part of Addenda, Construction Change Directives, Change Orders or Field Orders.
- I. 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 (i.e. "This Sheet Replaced by \_\_\_\_\_; Change Order # \_\_\_\_; Dated \_\_\_\_).
  - 1. Insert the new drawing sheet behind the deleted drawing and similarly identifying it (i.e. "This Sheet Added To Replace \_\_\_\_\_; Change Order # \_\_\_\_; Dated \_\_\_\_).
- J. Note Construction Change Directive numbers, Alternate numbers, Change Order numbers, Field Order numbers and similar identification, where applicable.

## 2.2 RECORD CONTRACT DRAWINGS SUBMITTALS

- 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 Contractor.
    - 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 (i.e. "043\_A-603 Door and Frame Elevations.pdf").
  4. For added drawings, provide sequencing of file name 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 with same information as indicated for Paper Copy Format.

### 2.3 RECORD SHOP DRAWINGS SUBMITTALS

- 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 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 Contractor.
      - 4) Signature and Date
    - e. First page in each binder is to be the overall record shop drawings directory.
      - 1) Provide overall directory titled "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. (i.e. “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 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. Contractor’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 Contractor 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 modification.
  - 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) SUBMITTALS

- 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 Contractor.
  - 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 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. Contractor'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 Contractor until disposition is confirmed by Contractor 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 Contractor 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 SUBMITTALS

- 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 of 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 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 Contractor.
    - d. Signature and Date.
  5. First page in each binder to be overall directory titled "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. (i.e. "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 with same information as indicated for 3-Ring Binder Format.

## 2.8 RECORD CERTIFICATIONS SUBMITTALS

- 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. Certificate of Insurance: For continuing coverage.
  3. Changeover information related to Owner's occupancy, use, operation, maintenance, HVAC and other utilities.
  4. Permanent Locks, Keys and Security: Certification signed/dated by both Contractor and Owner indicating completion of final changeover of permanent locks and delivery of keys to Owner.
  5. Health Department Inspection and Acceptance: For areas of construction receiving or required to receive such inspection.
  6. Fire Marshal Inspection and Acceptance: For areas of construction receiving or required to receive such inspection.
  7. Stairs and Ramps Compliance Certification. Refer to Section 01 77 00 - Closeout Procedures, article Stairs and Ramps Compliance Certification.
  8. Spare Parts and Maintenance Products delivery certification. Refer to Section 01 77 00 - Closeout Procedures, article Spare Parts and Maintenance Product.

9. Damage or Settlement Surveys.
  10. Final Property Survey.
  11. Testing and Balancing HVAC and Controls.
  12. 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. Organize documents in sequence by Specification Section Number.
  3. 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.
  4. Insert identification information in cover sleeve and spine sleeve.
    - a. Designation "PROJECT RECORD CERTIFICATIONS".
    - b. Project Name and Number.
    - c. Name of Contractor.
    - d. Signature and Date.
  5. First page in each binder to be overall directory titled "Directory for Project Record Certifications". List each document type sequenced by Specification Section Number - Title\_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. (i.e. "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 with same information as indicated for 3-Ring Binder Format.

## **PART 3 EXECUTION**

### **3.1 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.

**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 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.
- B. Related Requirements:
1. Divisions 03 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

**1.3 INFORMATIONAL SUBMITTALS**

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

**1.4 CLOSEOUT SUBMITTALS**

- A. Submit documentation of demonstration and training records. Submit two copies within seven days of end of each training module.
1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name of Architect.
    - c. Name of Contractor.
    - d. Name of Subcontractor.
  2. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

**1.5 QUALITY ASSURANCE**

- A. Pre-Instruction Meeting: 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, and facilities needed to avoid delays.
  3. Review required content of instruction.

4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
5. Review training documentation requirements.

## 1.6 COORDINATION

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

## PART 2 PRODUCTS

### 2.1 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 module, include instruction for the following as applicable to the system, equipment, or component:
  1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. 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.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

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

### **3.2 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.

**END OF SECTION**

**SECTION 03 10 00**  
**CONCRETE FORMING AND ACCESSORIES**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Formwork for cast-in place concrete.
  - 2. Shoring, bracing, and anchorage.
  - 3. Form accessories.
  - 4. Form stripping.
- B. Related Sections:
  - 1. Section 03 20 00 - Concrete Reinforcing.
  - 2. Section 03 30 00 - Cast-In-Place Concrete.
  - 3. Section 04 20 00 - Unit Masonry: Product requirements for masonry accessories for placement by this Section.
  - 4. Section 05 50 00 - Metal Fabrications: Product requirements for metal fabrications for placement by this Section.

**1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
  - 2. ACI 301 - Specifications for Structural Concrete.
  - 3. ACI 318 - Building Code Requirements for Structural Concrete.
  - 4. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
  - 1. AF&PA - National Design Specifications for Wood Construction.
- C. The Engineered Wood Association:
  - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- D. ASTM International:
  - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
  - 1. Submit formwork, shoring, and reshoring shop drawings.
  - 2. Indicate the following:
    - a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
    - b. Sequence and timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.

- c. Procedure and schedule for removal of shores and installation and removal of reshores.
- C. Product Data: Submit data on void form materials [and installation requirements].

#### **1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 347, ACI 301 and ACI 318.
- B. For wood products furnished for work of this Section, comply with AF&PA.

#### **1.5 QUALIFICATIONS**

- A. Design formwork under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of North Carolina.

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

- A. Section 01 60 00 - Product Requirements: Products storage and handling requirements.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

#### **1.7 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

### **PART 2 PRODUCTS**

#### **2.1 WOOD FORM MATERIALS**

- A. Form Materials: At discretion of Contractor.
- B. Lumber Forms:
  1. Application: Use for edge forms and unexposed finish concrete.
  2. Boards: 6 inches or 8 inches in width, shiplapped or tongue and groove, "Standard" Grade Douglas Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber. Surface boards on four sides.
- C. Plywood Forms:
  1. Application: Use for exposed finish concrete.
  2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA.
  3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8 inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade.
  4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4 inch thick.

#### **2.2 PREFABRICATED FORMS**

- A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

#### **2.3 FORMWORK ACCESSORIES**

- A. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- B. Bituminous Joint Filler: ASTM D1751.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

### **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. Earth Forms:
  1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing widths indicated on Drawings.
  2. Trim sides and bottom of earth forms.
  3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
  4. Form sides of footings where earth sloughs.
  5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.
- B. Formwork - General:
  1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
  2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
  3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
  4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
  5. Complete wedging and bracing before placing concrete.
- C. Forms for Smooth Finish Concrete:
  1. Use steel, plywood or lined board forms.
  2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
  3. Install form lining with close-fitting square joints between separate sheets without springing into place.

4. Use full size sheets of form lines and plywood wherever possible.
  5. Tape joints to prevent protrusions in concrete.
  6. Use care in forming and stripping wood forms to protect corners and edges.
  7. Level and continue horizontal joints.
  8. Keep wood forms wet until stripped.
- D. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and ACI 318.
  - E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

### 3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive [special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

### 3.5 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- F. Construction Joints:
  1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
  2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
  3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
  4. Arrange joints in continuous line straight, true and sharp.
- G. Embedded Items:
  1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
  2. Do not embed wood or uncoated aluminum in concrete.
  3. Obtain installation and setting information for embedded items furnished under other Specification sections.
  4. Securely anchor embedded items in correct location and alignment prior to placing concrete.

5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- H. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
  2. Coordinate work to avoid cutting and patching of concrete after placement.
  3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- I. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
  2. Slope slabs to drain where required or as shown on Drawings.
  3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- J. Screenshot Supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
  2. Staking through membrane is not be permitted.

### 3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

### 3.7 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

### 3.8 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Construct formwork to maintain tolerances required by ACI 301 and ACI 318.

### 3.9 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

- C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

**END OF SECTION**



**SECTION 03 20 00**  
**CONCRETE REINFORCING**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Reinforcing bars.
  - 2. Welded wire fabric.
  - 3. Reinforcement accessories.
- B. Related Sections:
  - 1. Section 03 10 00 - Concrete Forming and Accessories.
  - 2. Section 03 30 00 - Cast-In-Place Concrete.
  - 3. Division 26 – Electrical as related to bonding and grounding requirements.

**1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete, 2016.
  - 2. ACI 318 - Building Code Requirements for Structural Concrete, 2014.
  - 3. ACI SP-66 - ACI Detailing Manual, 2004.
- B. ASTM International:
  - 1. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement, 2016.
  - 2. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, 2017.
- C. American Welding Society:
  - 1. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel.
  - 2. AWS D1.1/D1.1M - Structural Welding Code - Steel
- D. Concrete Reinforcing Steel Institute:
  - 1. CRSI (DA4) - Manual of Standard Practice.
  - 2.
- E. The Masonry Society:
  - 1. TMS 402/602 - Building Code Requirements and Specification For Masonry Structures.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Indicate bar sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, and supporting and spacing devices.
- C. Certificates:
  - 1. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
  - 2. AWS qualification certificate for welders employed on the Work.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with CRSI (DA4), ACI 301 and ACI 318.

1. Maintain one copy of each document on project site.

## **1.5 QUALIFICATIONS**

- A. Welders: Certified as AWS qualified within previous 12 months.

## **1.6 COORDINATION**

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

## **PART 2 PRODUCTS**

### **2.1 REINFORCEMENT**

- A. Deformed Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.
- B. Welded Plain Wire Fabric: ASTM A1064/A1064M; in flat sheets or coils; unfinished.

### **2.2 ACCESSORY MATERIALS**

- A. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
- B. 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.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic tipped steel type; size and shape to meet Project conditions.

### **2.3 FABRICATION**

- A. Fabricate concrete reinforcement in accordance with CRSI (DA4).
- B. Form standard hooks for 90 degree bend as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Welding of reinforcement is not permitted, unless indicated on Drawings or approved by Architect.
  1. If welding of reinforcement is indicated on Drawings or otherwise approved by Architect, perform welding in accordance with AWS D1.4/D1.4M.
  2. Galvanized or Epoxy Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).
- F. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting 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 PLACEMENT**

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
  - 1. Do not weld crossing reinforcement bars for assembly.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318, but not less than 1 inch.
  - 1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.
- E. Maintain concrete cover around reinforcement in accordance with ACI 318.
- F. Splice reinforcing where indicated on Drawings in accordance with splicing device manufacturer's instructions.
- G. Bond and ground all reinforcement to requirements of Division 26 – Electrical as related to bonding and grounding requirements.

**3.4 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements.
- B. Install reinforcement within the tolerances specified in TMS 402/602 for foundation walls.

**3.5 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Reinforcement Inspection:
  - 1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
  - 2. Welding: Inspect welds in accordance with AWS D1.1/D1.1M.
  - 3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

**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 (grains/[hour \* ft<sup>2</sup> \* in. Hg])

### 1.4 SUBMITTALS

- A. Section 013300 - 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 01770 - Execution and Closeout Requirements: 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.

## 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<sup>2</sup> · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7.1.
    - b. Other performance criteria:
      - 1) Strength: ASTM E 1745 Class A.
      - 2) Thickness: 15 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.
- 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. 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  $\frac{3}{4}$  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.
- C. 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  $\frac{3}{4}$  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  $\frac{3}{4}$ -inch nominal maximum aggregate size.
  5. Water-Cementitious ratio: 0.40.
- D. Elevated slabs on metal deck: Proportion light-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
  2. Minimum Cementitious Materials Content: 520 lb/cu. yd. for 1 inch maximum aggregate size; 540 lb/cu. yd. for  $\frac{3}{4}$  inch maximum aggregate size.
  3. Slump Limit: 4 inches, plus or minus 1 inch.
  4. Water-Cementitious ratio: 0.40.

## 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 013100 - 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 of maximum 1/4 inch in 10 ft.
- 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.
- V. For pumped concrete, grout used to prime the pump shall be not be used on the project.

### 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. 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.
  - 2. 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<sub>F</sub>50 (floor flatness), F<sub>L</sub>35 (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.
  - 5. Finish of all slabs to receive terrazzo shall be coordinated with terrazzo installer.
- 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 033000**



**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. American Concrete Institute:
  - 1. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.
- B. ASTM International:
  - 1. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
  - 2. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
  - 3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
  - 4. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
  - 5. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
  - 6. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
  - 7. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2015.
  - 8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
  - 9. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
  - 10. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2015a.
  - 11. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
  - 12. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.
  - 13. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.
  - 14. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2014.
  - 15. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2010.
  - 16. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

**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:
  - 1. Colored Masonry Mortar: Submit two sample sets illustrating full range of mortar colors.
- D. 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.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

#### **1.4 QUALITY ASSURANCE**

- A. Comply with provisions of ACI 530/530.1/ERTA, except where 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 ACI 530/530.1/ERTA 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. Grout: Grout to be ready-mixed.
- C. Mortar Colors:
  - 1. Standard Masonry Mortar: Sand based Buff.
    - a. Location: All masonry not indicated to be other color.
- D. Mortar Mix Designs: ASTM C270, Property Specification.
  - 1. Structural Masonry: Type S.
  - 2. Non-Structural Masonry: Type S.
  - 3. Repointing Masonry: Type N; with maximum 2 percent ammonium stearate or calcium stearate per cement weight with silica sand aggregate.
- E. Grout Mix Designs:

1. Structural Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide ready-mixed type in accordance with ASTM C 94/C 94M.
  - a. Fine grout.
1. Non-Structural Masonry: 2,000 psi strength at 28 days; 8-10 inches slump; provide ready-mixed type in accordance with ASTM C 94/C 94M.
  - 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: Refer to MORTAR AND GROUT APPLICATIONS above.
  2. Color: As required to produce approved mortar color sample(s).
- B. Packaged Dry Material for Mortar for Repointing Masonry Units: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type N mortar in accordance with ASTM C270 with the addition of water only.
  1. Color: Match mortar being repointed.
- C. 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.
- D. Portland Cement: ASTM C150/C150M.
  1. Type: Type I - Normal; ASTM C150/C150M.
  2. Color: As required to produce approved mortar color sample(s).
- E. Hydrated Lime: ASTM C207, Type S.
- F. Mortar Aggregate: ASTM C144, standard masonry type.
  1. Color: As required to produce approved mortar color sample(s).
- G. Grout Aggregate: ASTM C404, fine.
- H. 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).
- I. Water: Clean and potable.
- J. 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. Install mortar and grout to requirements of Section 04 20 00 - Unit Masonry and other section(s) in which masonry is specified.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.
- D. 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 (ADD 2)**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Brick Masonry Units.
  2. Concrete Masonry Units.
  3. Reinforcement and Anchorage.
  4. Accessories.
- B. Related Requirements:
1. Section 03 20 00 - Concrete Reinforcing.
  2. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.
  3. Section 04 72 00 - Cast Stone Masonry.
  4. Section 05 12 00 - Structural Steel: Product requirements for steel anchors for placement by this section.
  5. Section 05 21 00 - Steel Joists: Product requirements for steel bearing pads for joists for placement by this section.
  6. Section 05 50 00 - Metal Fabrications: Product requirements for loose steel lintels and fabricated steel items for placement by this section.
  7. Section 05 40 00 - Cold Formed Metal Framing: Product requirements for steel bearing pads for trusses placed by this section.
  8. Section 07 11 00 - Dampproofing: Dampproofing masonry surfaces.
  9. Section 07 21 19 - Foamed-In-Place Insulation: For veneer wall cavity spaces.
  10. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for reglets for flashings for placement by this section.
  11. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.
  12. Section 07 90 00 - Joint Protection: Rod and sealant at control and expansion joints.
  13. Section 07 95 00 - Expansion Control.
  14. Division 08 - Openings: Multiple types of opening frames to be installed in or anchored to masonry work.

**1.2 REFERENCES**

- A. American Concrete Institute:
1. ACI 530 – Building Code Requirements for Masonry Structures.
  2. ACI 530.1 – Specifications for Masonry Structures.
- B. ASTM International:
1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement, 2002.
  2. ASTM A153/A153M – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  3. ASTM A615/A615M – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  4. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar, 2015.
  5. ASTM A951/A951M – Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016.
  6. 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, 2016.

7. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, 2017.
  8. ASTM C55 – Standard Specification for Concrete Brick, 2011.
  9. ASTM C62 – Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale), 2013.
  10. ASTM C67 – Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, 2017.
  11. ASTM C90 – Standard Specification for Loadbearing Concrete Masonry Units.
  12. ASTM C129 – Standard Specification for Nonloadbearing Concrete Masonry Units.
  13. ASTM C140/C140M – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units, 2017.
  14. ASTM C216 – Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
  15. ASTM C780 – Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry, 2016.
  16. ASTM D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  17. ASTM D395 – Standard Test Methods for Rubber Property - Compression Set, 2016.
  18. ASTM D746 – Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact, 2014.
  19. ASTM D2000 – Standard Classification System for Rubber Products in Automotive Applications, 2012.
  20. ASTM D2287 – Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds, 2012.
  21. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.
  22. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
- C. Canadian Standards Association (CSA Group) (CSA)
1. CSA A82 - Fired Masonry Brick Made from Clay or Shale, 2014.
- D. National Fire Protection Association:
1. NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. Underwriters Laboratories Inc.:
1. UL 723 – Tests for Surface Burning Characteristics of Building Materials.

### 1.3 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 Verification: Submit three (3) samples of each type of the following units to illustrate the manufacturer’s full range of material, color, texture and extremes of color range.
  1. Face Brick.
- D. 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.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
- B. Fire Rated Wall Construction: Rating as indicated on Drawings.
  - 1. Tested Rating: Determined in accordance with ASTM E119.
- C. Surface Burning Characteristics:
  - 1. Foam Insulation: Maximum 75/450 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 foam plastic insulation insert.

**1.5 QUALIFICATIONS**

- A. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience.

**1.6 MOCKUP**

- A. Section 01 40 00 – Quality Requirements: Mockup requirements.
- B. Cavity Masonry Wall Mockup Panel: Construct 6 feet long by 8 feet high, including all types of masonry units indicated on Drawings, mortar and accessories, structural backup, cavity drainage materials, wall ties, window sill and frame, wall openings, flashings, wall insulation, and air barrier materials.
  - 1. Refer to Mockup detail in Drawings.
  - 2. Include all materials adjacent to unit masonry, including but not limited to:
    - a. Downspout and anchor straps.
    - b. Downspout boot.
  - 3. Locate panel where directed by Architect.
  - 4. Remove panel after requesting and receiving approval for removal from Architect.

**1.7 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.

**1.8 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 ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 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.

**1.10 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.

**PART 2 PRODUCTS****2.1 PERFORMANCE REQUIREMENTS**

- A. Clay Masonry Compressive Strength:
  - 1. Clay Masonry Units: 3,000 psi, ASTM C216, determined by average of five (5) brick method.
- B. Concrete Masonry Compressive Strength:
  - 1. Concrete Masonry Units: **2,000 psi**, unless indicated otherwise on Structural Drawings.
  - 2. Concrete Masonry Wall (f'm): 2,000 psi, unless indicated otherwise on Structural Drawings.

**2.2 COMPONENTS**

- A. Face Brick Modular Size: 2-1/4 x 3-5/8 x 7-5/8 inches. Provide special units for 90 degree and 135 degree corners and lintels. Provide solid units where Drawings indicate brick setting position or special shape would, otherwise, allow brick holes to be exposed.
  - 1. ASTM C216, Type FBS, Grade SW.
  - 2. Efflorescence Rating: Rating to be “not effloresced” in accordance with ASTM C67 or rating to be “slightly effloresced” in accordance with CSA A82.
  - 3. Bond: 1/2 Bond.
  - 4. Coursing: Three units and three mortar joints to equal 8 inches.
  - 5. Mortar Joint Tooling: Refer to INSTALLATION in this Section.
  - 6. Colors: As indicated on Drawings.
  - 7. Field Brick:
    - a. BRK-1 Palmetto: Flashed Wire Cut.
    - b. BRK-2 Palmetto: Chocolate Wire Cut.
    - c. BRK-3 Palmetto: .25 Greystone Wire Cut.
- B. Building Brick:
  - 1. ASTM C62, Grade SW; solid units.
  - 2. Efflorescence Rating: Rating to be “not effloresced” in accordance with ASTM C67 or rating to be “slightly effloresced” in accordance with CSA A82.
- C. Fire-Rated Hollow Load Bearing and Non-Load Bearing Concrete Masonry Units (CMU):
  - 1. ASTM C90; light weight; UL Listed.
  - 2. Single scored vertically where indicated on Drawings.
- D. Hollow Load Bearing Concrete Masonry Units (CMU):
  - 1. ASTM C90; lightweight in accordance with ASTM C331 with the following modifications:
    - a. Organic Impurities (Color): C40 <1

- b. Clay Lumps (%): C142 <2
    - c. Stain Test (Index): C641 No Stain
  - 2. Single scored vertically where indicated on Drawings.
- E. Solid Load-Bearing Concrete Masonry Units (CMU):
  - 1. ASTM C90; lightweight in accordance with ASTM C331 with the following modifications:
    - a. Organic Impurities (Color): C40 <1
    - b. Clay Lumps (%): C142 <2
    - c. Stain Test (Index): C641 No Stain
  - 2. Single scored vertically where indicated on Drawings.
- F. Hollow Non-Load Bearing Concrete Masonry Units (CMU):
  - 1. ASTM C129; light weight.
  - 2. Single scored vertically where indicated on Drawings.
- G. Concrete Masonry Unit Size and Shape: Modular face size of 7-5/8 x 15-5/8 inches and depths as indicated on Drawings. Furnish special units for 90 degree and 135 degree corners, bond beams and lintels.
  - 1. Bond: 1/2 Bond, unless indicate otherwise on Drawings.
  - 2. Coursing: One unit and one mortar joint to equal 8 inches.
  - 3. Mortar Joints Tooling: Refer to INSTALLATION in this Section.
  - 4. Provide units with bull-nosed corners:
    - a. At all outside corners exposed to view.
    - b. Exceptions: Refer to Drawings Details 1/A-511 and 2/A-511.
      - 1) Where bottom course is to receive wall base application, use angle formed CMU at that course level only. Chamfer top corner of block to coordinate with bullnose block above.
      - 2) Where upper course interfaces with ceiling wall angle support, use angle formed CMU at that course level only.
  - 5. Provide units with bull-nosed corners at window sills where CMU is indicated as the finished sill material. Protect all window sill CMU from damage and accumulation of mortar. CMU sill is the finished product. Clean all debris prior to painting.
- H. Concrete Brick Units: 2,500 psi minimum compressive strength, ASTM C55 (average of three (3) units); for use in non-facing, utilitarian applications.
- I. Cast Stone Masonry: Refer to Section 04 72 00 - Cast Stone Masonry.

### 2.3 ACCESSORIES

- A. Manufacturers: Reinforcement and anchorage materials.
  - 1. Hohmann & Barnard, Inc.
  - 2. Wire-Bond.
  - 3. Blok-Lok Limited.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength, deformed billet bars, uncoated finish.
- C. Reinforcing Steel Rebar Positioners (Z-shaped wire bridges cell of block while bent ends rest on block shell):
  - 1. Hohmann & Barnard, Inc - HB RB Rebar Positioner. (Basis of Design)
  - 2. Wire (Carbon Steel): Cold-drawn steel wire conforming to ASTM A82/A82M
  - 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).

- D. 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. Hohmann & Barnard, Inc - HB 220 Ladder-Mesh. (Basis of Design)
- E. 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. Hohmann & Barnard, Inc - HB 220 Ladder-Mesh. (Basis of Design)
- F. 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. Hohmann & Barnard, Inc - HB 344 Rigid Partition Anchor. (Basis of Design)
- G. 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. Hohmann & Barnard, Inc. - HB 265 S.I.S Ladder -2X Hook Anchor and Seismic Interlock System. (Basis of Design)
  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. Hohmann & Barnard, Inc. - HB BL-5407. (Basis of Design)
- H. Wall Ties: ASTM A82; steel wire 0.1875 inch diameter, eye and pintle type. ASTM A153/A153M, Class B hot dip galvanized after fabrication.
- I. 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.
- J. 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 o.c.; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.
- K. 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.
- L. Mortar and Grout: As specified in Section 04 05 03.
- M. Through-Wall 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 - 0.030 inch (30 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. **Hohmann & Barnard, Inc. - Mighty-Flash, SA Flashing (Basis of Design).**
- N. Termination Bar at Top of Self-Adhering Flashing: Aluminum 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 o.c., 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.
- O. Metal Flashing Drip Edge Plate: Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge (0.0179 inch) thick x 3 inches wide (see drawings for additional width requirements) x 8 feet long, factory formed hemmed drip edge configuration; finish 2D (dull).
1. Hohmann & Barnard, Inc. - HB Drip Edge Plate. (Basis of Design)
  2. Provide factory preformed Inside Corners, Outside Corners and End Dams.
- P. Preformed 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: Open polyethylene mesh, 10 inches high, thickness as required to fill cavity space, and dove-tail shaped at top providing moisture drainage to cavity weeps.
- S. Weeps: Preformed corrugated polypropylene cell vents. Conforming to Standards: ASTM D2240, ASTM D790B, ASTM D638 and ASTM D1238B.
1. Hohmann & Barnard, Inc. - HB Quadro Vent. (Basis of Design)
  2. Size: 2-1/2 x 3-1/2 inch size, 3/8 inch thick.
  3. Color: Clear.
- T. Cavity Vents: Same material as weeps.
- U. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
1. Sure-Klean Vanatrol. (Basis of Design)
- V. Steel Lintels: Refer to Section 05 50 00 – Metal Fabrications. Size and configuration as indicated on Drawings. All exterior lintels to be hot dip galvanized per Section 05 50 00.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 40 00 - Quality Requirements: 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 40 00 - Quality Requirements: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.
- B. Direct and coordinate placement of metal anchors supplied to other sections.
- C. Provide protection coverings to protect adjacent and surrounding work from damage and mortar and grouting splatters/droppings.
- D. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

### 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 Tooling: Concave. Exceptions as follows:
  - 1. Exceptions:
    - a. Use larger (2 inch diameter) concave tooling (such as 2 inch PVC pipe) for mortar joints in food preparation areas. Such areas include Kitchens, Food Service Areas, Food Storage Areas, Dishwashing Areas, Kitchen Offices and Kitchen Area Toilets/Locker Rooms. The intent is to comply with common local Health Department requirements by minimizing the tooling depression made during the tooling process.
- 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. Build inner wythe ahead of outer wythe to receive cavity insulation and air/vapor retarder adhesive.



1. Install cavity drain material continuously at bottom of each cavity above through-wall flashing.
  2. At below grade locations, where cavity is shown in drawings to be grouted solid between back of veneer and foundation insulation system, don't allow debris or soil to collect in the cavity prior to grouting. Ensure that the insulation, where required, is installed tight to face of CMU and without voids. Install the specified grout in the resulting cavity promptly after the installed veneer units have set and cured. The intent is to ensure that the cavity does not remain open for debris or soil to collect in the cavity prior to grout installation. Also, insure that the cavity is free of any debris or soil prior to grouting.
- 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 Anchorages - Multiple Wythe Unit Masonry:
1. Install horizontal joint reinforcement 16 inches o.c.
  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) Non-Self-Adhering Flashing:
        - 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 contain moisture along its 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.
- 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 indicted 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 ACI 530.1 Specification for Masonry Structures.
- P. Control and Expansion Joints:
1. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:

- a. Exterior Walls: As indicated on Drawings.
  - b. Interior Walls: 30 feet on center.
  - c. At changes in wall height.
2. Do not continue horizontal joint reinforcement through control and expansion joints.
  3. Install preformed 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.

### 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 ACI 530.1 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. Remove excess mortar and mortar smears as work progresses.

- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.
- 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. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.
- B. Protect base of walls from mud and mortar splatter.
- C. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar and grouting activities.
- 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 masonry walls.
  - 3. Caps for masonry columns.
  - 4. Caps for monumental sign wall.
  - 5. Other 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 and Commentary; 2011.
  - 2. ACI 530 - Building Code Requirements for Masonry Structures.
  - 3. ACI 530.1 - Specifications for Masonry Structures.
  
- B. ASTM International (ASTM):
  - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
  - 2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
  - 3. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
  - 4. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).
  - 5. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.
  - 6. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
  - 7. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
  - 8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 9. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
  - 10. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
  - 11. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.
  - 12. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2013.

13. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
14. ASTM C1195 - Standard Test Method for Absorption of Architectural Cast Stone.
15. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2016.

### 1.3 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.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
- B. Perform Work in accordance with Cast Stone Institute Technical Manual.

### 1.5 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.

### 1.6 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.

**1.7 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 can be avoided.
- 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.

**1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 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.

**1.9 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.

**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 bugholes, air voids, or other surface blemishes visible from distance of 10 feet.
  5. Color: Selected by Architect from manufacturer's full range.
  6. Remove cement film from exposed surfaces before packaging for shipment.
- 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. Acid etch 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. Provide for erection procedures and induced loads during erection. Furnish temporary bracing during installation. Maintain temporary bracing in place until final support is provided.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.
- C. Mechanically anchor cast stone units indicated; set remainder in mortar.
- D. Erect units without damage to shape or finish. Replace or repair damaged panels.
- E. Erect units level and plumb within allowable tolerances.
- F. Align and maintain uniform horizontal and vertical joints as erection progresses.
- G. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.
- H. 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.
- I. 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.
- J. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
  2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
  3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
  4. 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.
- K. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
1. Remove and replace units that cannot be repaired to the approval of Architect.
  2. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
  3. Repair methods and results subject to Architect 's approval.

### 3.4 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.

### 3.5 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.
  - 9. Metal bar grating.
  
- B. Related Sections:
  - 1. Section 052100 - Steel Joists.
  - 2. Section 053100 - Steel Decking.

## 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. National Association of Architectural Metal Manufacturers:
    - 1. NAAMM MBG 531, "Metal Bar Grating Manual"
  - F. Research Council on Structural Connections:
    - 1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
  - G. 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 01330 - 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 South 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 01400 - Quality Requirements.
- B. Coordinate work with the following:
  1. Section 05210, 05310.
  2. Section 05500 for miscellaneous steel supports other than structural steel.
  3. Section 07811 for finishes on structural steel receiving fireproofing.

## 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.
- H. Wire Rod for Grating Crossbars: ASTM A 510

### 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.
  - G. Lock Washers: Helical, spring type, ASME B18.21.1
- 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. Exposed Structural Steel: Refer to Division 9.
- 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.
- E. Grating: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## 2.7 METAL BAR GRATINGS

- A. Welded Steel Grating:
  - 1. Bearing Bar Spacing: As indicated on Drawings.
  - 2. Bearing Bar Depth: As indicated on Drawings.
  - 3. Bearing Bar Thickness: As indicated on Drawings.
  - 4. Crossbar Spacing: 4-inches o.c.
  - 5. Traffic Surface: Plain.
  - 6. Steel Finish: Shop primed
- B. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
  - 1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars
- C. Do not notch bearing bars at supports to maintain elevation.

## 2.8 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 form smooth surface, splayed 45 degrees.

### 3.5 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

### 3.6 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.

### 3.7 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 033000 – Cast-in-Place Concrete
- B. Section 051200 - Structural Steel
- C. Section 052100 - Steel Joists

##### 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: 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: As indicated in drawings.
  4. Profile Depth: As indicated in drawings.
  5. Design Uncoated-Steel Thickness: As indicated in drawings.
  6. Span Condition: Triple span or more unless noted in drawings.
  7. Side Laps: Overlapped.

## 2.2 ACOUSTICAL ROOF DECK

- A. Form deck units in lengths to span two or more supports, unless indicated otherwise on the drawings with nested 2" laps at ends and sides, unless greater laps are required by drawing notations.
- B. Provide wide rib deck configuration complying with Steel Deck Institute "basic design specifications", of 20 gauge and 3" deep.
- C. All roof deck shall be galvanized G-60.
- D. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs.
- E. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.

## 2.3 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: 2"
  3. Design Uncoated-Steel Thickness: 20 gauge.
  4. Span Condition: Minimum of double at any clear spans longer than 12'.

## 2.4 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 standard rust-inhibitive primer of same color as primer.
- 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 oc 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: 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.

### 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 053100**





**SECTION 05 40 00**  
**COLD-FORMED METAL FRAMING**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes formed steel stud exterior wall framing.
- B. Related Requirements:
  - 1. Section 07 21 00 - Thermal Insulation: Thermal insulation within framing members.
  - 2. Section 07 43 13 - Metal Soffit Panels.
  - 3. Section 09 21 16 - Gypsum Board Assemblies:
    - a. Light weight, non-load bearing metal stud framing.
    - b. Acoustic attenuation insulation for interior construction that does not require a thermal barrier between two conditioned spaces.

**1.2 REFERENCES**

- A. American Iron and Steel Institute:
  - 1. AISI General - Standard for Cold-Formed Steel Framing - General Provisions.
  - 2. AISI Header - Standard for Cold-Formed Steel Framing - Header Design.
  - 3. AISI NAS - North American Specification for Design of Cold-Formed Steel Structural Members.
- B. American Society of Civil Engineers:
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
  - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
  - 2. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
  - 3. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- D. American Welding Society:
  - 1. AWS D1.1 - Structural Welding Code - Steel.
  - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- E. California Department of Health Services:
  - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. National Association of Architectural Metal Manufacturers:
  - 1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.
- G. SSPC: The Society for Protective Coatings:
  - 1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- H. Steel Stud Manufacturers Association:
  - 1. SSMA - Product Technical Information.

**1.3 SYSTEM DESCRIPTION**

- A. Size components to withstand design loads in accordance with ASCE 7.

- B. Maximum Allowable Deflection: 1: 360 of span.
- C. Wall System:
  - 1. Design to AISI NAS, AISI General, and AISI Header.
  - 2. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
  - 3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
  - 4. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable code.

#### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings:
  - 1. Indicate component details, framed openings, bearing, anchorage, loading, type and location of fasteners, and accessories or items required of related Work.
  - 2. Describe method for securing studs to tracks and for bolted framing connections.
  - 3. Delegated Design Drawings of the metal framing components and systems, designed and sealed by a Professional Engineer experienced in design of this Work and licensed in the State in which the Work is constructed.
- C. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, and limitations.
- D. Manufacturer's Installation Instructions: Submit special procedures and perimeter conditions requiring special attention.

#### 1.5 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI NAS.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.
- C. Perform Work in accordance with the following:
  - 1. Framing: AISI General and AISI NAS.
  - 2. Headers: AISI Header.
  - 3. Wall Studs: AISI WSD.
  - 4. Lateral Design: AISI Lateral.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
  - 1. Current member of Steel Stud Manufacturers Association.
- B. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.
- C. Delegated Design Requirement: Metal framing components and systems to be designed and sealed by a Professional Engineer experienced in design of the requirements of this Section and licensed in State in which the Work is constructed.
- D. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

**1.7 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of components within stud framing system specified in other Sections.

**PART 2 PRODUCTS****2.1 COLD-FORMED METAL FRAMING**

- A. Manufacturers:
  - 1. Clark Dietrich Building Systems.
  - 2. Craco Manufacturing, Inc.
  - 3. Marino\Ware.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Cold-Formed Metal Framing: ASTM C955.

**2.2 FRAMING COMPONENTS**

- A. Steel Sheet: ASTM A1003/A1003M; Structural Grade, Type H, metallic coated:
  - 1. Grade: ST50H, minimum.
  - 2. Galvanized in accordance with ASTM A653/A653M, G60/Z180 hot dipped galvanized coating.
- B. Studs: Steel sheet, formed to channel shape, punched web,; size and thickness as shown on Drawings or as required for design loads.
- C. Track: Steel sheet, formed to channel shape; same width as studs, tight fit; thickness to match studs, solid web.

**2.3 ACCESSORIES**

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
  - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

**2.4 FASTENERS**

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized.
- B. Anchorage Devices: Power actuated.

**PART 3 EXECUTION****3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate surfaces building framing components are ready to receive Work.

- C. Verify rough-in utilities are in proper location.

### **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 ERECTION OF STUDS**

- A. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches o.c.
- B. Place studs at 16 inches o.c.; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs.
- D. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- E. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- F. Fully seat axial loaded studs in receiving tracks (maximum 1/16 inch gap between stud and track web).
- G. Coordinate placement of insulation in multiple stud spaces after erection.
- H. Install intermediate studs above and below openings to align with wall stud spacing.
- I. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- J. Attach cross studs to studs for attachment of fixtures anchored to walls.
- K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- L. Complete framing ready to receive wall sheathing.

### **3.4 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Indicated Position: 1/4 inch.
- C. Maximum Variation of Members from Plane: 1/4 inch.

**END OF SECTION**

**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. Elevator sill angles and hoist and divider beams.
  4. Bollards.
  5. Ladders.
  6. Structural supports for miscellaneous attachments.
  7. 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:
1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
  2. AAMA 611 AA-M12C22A41: Clear anodic coating.
- B. American National Standards Institute:
1. ANSI A14.3 - Ladders - Fixed - Safety Requirements
- 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 A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  6. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  7. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
  8. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  9. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
  10. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.

11. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings.
  12. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  13. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
  14. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
  15. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes, 2014.
  16. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
  17. ASTM F436 - Standard Specification for Hardened Steel Washers.
  18. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield 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.
  3. AWS D1.2 - Structural Welding Code - Aluminum.
- E. California Department of Health Services:
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes.
- G. Green Seal:
1. GC-03 - Anti-Corrosive Paints.
- H. 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).

### 1.3 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. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

### 1.4 QUALITY ASSURANCE

- A. Where anchors or support brackets to structure penetrate finish and moisture protection materials, coordinate fabrication of those finish and moisture protection materials to allow for weather sealed finish condition (i.e. ladders, etc.)
- B. Finish joints in accordance with NOMMA Guideline 1.
- C. Perform Work in accordance with applicable codes and standards in the State in which the project is located.

- D. Maintain one copy of each document on site.

## 1.5 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.

## 1.6 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.

## 1.7 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on shop drawings.

## PART 2 PRODUCTS

### 2.1 MATERIALS - STEEL

- A. Structural W-Shapes: ASTM A992/A992M.
- B. Structural Shapes: ASTM A36/A36M.
- C. Channels and Angles: ASTM A36/A36M.
- D. Steel Plate: ASTM A36/A36M.
- E. Hollow Structural Sections: ASTM A500/A500M, Grade B.
- F. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40.
- G. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality, galvanized with coating class.
- H. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436 washers.
- I. Structural Bolts, Nuts and Washers: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M, Class B.
- J. Welding Materials: AWS D1.1; type required for materials being welded.
- K. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- L. Touch-Up Primer: Match shop primer.
  - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- M. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
  - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

### 2.2 MATERIALS – ALUMINUM

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.
- E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
- F. Aluminum -Alloy Die Castings: ASTM B85/B85M.
- G. Bolts, Nuts, and Washers:
  - 1. Stainless steel.
- H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

**2.3 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.

**2.4 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.

**2.5 ELEVATOR SILL ANGLES AND HOIST AND DIVIDER BEAMS**

- A. Sill Angles: Steel sections as indicated on Drawings for support of elevator sills; hot-dip galvanized.
- B. Hoist and Divider Beams: Steel wide flange sections, shape and size required to support applied loads with maximum deflection of 1/240 of the span; prime paint, two coats.

**2.6 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).

**2.7 LADDERS**

- 1. 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: 60 degrees, unless indicated otherwise on Drawings.
- d. Finish:
  - 1) Manufacturer's standard clear anodized coating, comply with AAMA 611, Class 1.

## 2.8 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.

## 2.9 ANCHOR BOLTS

- A. Anchor Rods: ASTM A307; Grade A.
  - 1. Shape: Hooked and straight.
  - 2. Furnish with nut and washer; unfinished.

## 2.10 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Railing Assemblies, wall rails, and attachments to resist force of 75 lbs at any point without damage or permanent set.

## 2.11 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.

## 2.12 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.

### 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. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Field weld components indicated on shop drawings.
- D. Perform steel field welding in accordance with AWS D1.1 – Structural Welding Code.
- E. Perform aluminum field welding in accordance with AWS D1.2 – Structural Welding Code.
- F. Obtain approval of Architect prior to site cutting or making adjustments not scheduled.
- G. 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 52 00.11****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. Steel tube handrails, balustrades and guardrails: Floor and wall mounted; at stairs, ramps and vertical edges; and as indicated on Drawings.
- 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.
  - 4. Section 09 90 00 - Painting and Coating: Paint finish.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - 2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - 3. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
  - 4. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
  - 5. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
  - 6. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
  - 7. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
- B. American Welding Society:
  - 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
  - 2. AWS D1.1 - Structural Welding Code - Steel.
- C. California Department of Health Services:
  - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. National Ornamental & Miscellaneous Metals Association:
  - 1. NOMMA Guideline 1 - Joint Finishes.
- E. SSPC: The Society for Protective Coatings:
  - 1. SSPC - Steel Structures Painting Manual.
  - 2. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

**1.3 DESIGN REQUIREMENTS**

- A. Integral railing assemblies, balustrades, wall mounted railings, and attachments to resist lateral force of 200 lbs at any point, in any direction without damage or permanent set. Also, railings to resist a 50 lb./lin. ft. load applied in any direction without damage or permanent set. Test in accordance with ASTM E935. Railing shapes and profiles in compliance with applicable codes and as indicated on Drawings.

#### 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.
- C. Shop Drawings: Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings.
- B. Finish joints in accordance with NOMMA Guideline 1.

### PART 2 PRODUCTS

#### 2.1 COMPONENTS

- A. Structural Pipe: ASTM A53/A53M, Grade B.
- B. Tubing: ASTM A501.
- C. Bolts: ASTM A307; Grade A.; Type 1.
  - 1. Finish: Hot dipped galvanized.
- D. Nuts: ASTM A563 heavy hex type.
  - 1. Finish: Hot dipped galvanized.
- E. Washers:
  - 1. For ASTM A307 Bolts: ASTM F844.
    - a. Finish. Hot dipped galvanized.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- H. Touch-Up Primer: Match shop primer.
  - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

#### 2.2 FABRICATION

- A. Fit and shop assemble components in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Continuously seal joined pieces by intermittent welds and plastic filler.

- 1. On monumental stairs, continuously seal joined pieces by continuous welds.
- D. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 1.
  - 1. No evidence of weld.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.

### **2.3 SHOP FINISHING**

- A. Prepare surfaces to be primed in accordance with SSPC SP 2.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat.
- D. Stainless Steel: No. 4 satin brushed finish.

### **2.4 FINISH PAINT**

- A. Field applied as indicated in Section 09 90 00.
- B. Color as selected by Architect.

## **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. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- B. Install components with true alignment, plumb and level, accurately fitted, free from distortion or defects.
- C. Install anchors, angles, struts and blocking as required for connecting stairs to structure.

- D. Core-drill concrete floor to receive vertical support of railings. Insert vertical supports to depths and grout securely as indicated on Drawings as to comply with the Design Requirements indicated.
- E. Secure wall-mounted railings as indicated on Drawings.
- F. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.
- G. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS D1.1.
- H. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- I. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- J. Obtain approval of Architect prior to site cutting or creating adjustments not scheduled.
- K. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

**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 Alignment: 1/4 inch.

**3.5 FIELD QUALITY CONTROL**

- A. Welding: Inspect welds in accordance with AWS D1.1.

**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.

**3.7 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.

**END OF SECTION**



**SECTION 05 71 00**  
**DECORATIVE METAL STAIRS AND RAILINGS**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Include:
  - 1. Decorative stairs.
  - 2. Stainless Steel railing and guardrail assemblies.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast In Place Concrete. (Stair Turn-Landings)

**1.2 REFERENCE STANDARDS**

- A. American Society of Civil Engineers (ASCE)
  - 1. ASCE 7-98 Minimum Design Loads for Buildings and Other Structures
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- G. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2015.
- I. AWS D1.6/D1.6M - Stainless Steel Welding Code; American Welding Society; 2007.
- J. NOMMA - National Ornamental & Miscellaneous Metal Association.
  - 1. NOMMA Guideline 1 - Metal Joint Finishes.
- K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; Society for Protective Coatings; 1999 (Ed. 2004).

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this section. Attendees shall include, but not be limited to:
  - 1. General Contractor.
  - 2. Other subcontractors of adjacent and related work.
  - 3. Manufacturer's representative.
  - 4. Architect.

**1.4 SUBMITTALS**

- A. See Section 01 33 00 - Submittal Procedures: for submittal procedures.

- B. Product Data: Submit manufacturer's product data including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
- C. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
- D. Samples: Submit one (1) of each item below for each type and condition shown.
  - 1. Railing: 12 inch long section of handrail illustrating color, finish and connection detail.
- E. Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.
- F. Manufacturer's Installation Instructions.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in installing decorative stairs and railing systems and acceptable to manufacturer.
- B. Templates: Supply installation templates, reinforcing and required anchorage devices.

### **1.6 MOCK-UP**

- A. Provide mock-up of railing system, wall-mounted handrail and guardrail, of length from one post to next post with infill between, illustrating each type of material, cladding and finish.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

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

- A. Deliver materials in factory provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover, in a dry location.

### **1.8 FIELD CONDITIONS**

- A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.
- B. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

### **1.9 WARRANTY**

- A. Section 01 77 00 – Closeout Procedures: Product warranties.

- B. Warranty: Manufacturer's standard one (1) year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 METAL STAIRS

- A. Decorative Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
  2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
  3. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
  4. Dimensions and Configuration: As indicated on drawings.
  5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
  6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
  7. Separate dissimilar metals using concealed paint or concealed permanent tape.
  8. Joints: Tightly fitted and secured, machined smooth with hairline seams.
  9. Field Sleeve Connections: Where indicated on the Drawings, provide sleeves to accommodate site assembly and installation.
  10. Welded Joints: Make exposed joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
    - a. Ease exposed edges to small uniform radius.
    - b. Welded Joints:
      - 1) Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
      - 2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
- B. Metal Jointing and Finish Quality Levels:
1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
    - a. Welded Joints: Continuously welded and ground smooth and flush; NOMMA Guideline 1 - Finish Level #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. Stair Treads: As indicated on Drawings
- D. Stair Turn-Landings: As indicated on Drawings
- E. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- F. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

## 2.2 RAILING SYSTEMS

- A. Railing Systems - General: Factory or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
  2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
  3. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
  4. Dimensions and Configuration: As indicated on drawings.
  5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
  6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
  7. Separate dissimilar metals using concealed paint or concealed permanent tape.
  8. Joints: Tightly fitted and secured, machined smooth with hairline seams.
  9. Welded Joints: Make exposed joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
    - a. Ease exposed edges to small uniform radius.
    - b. Welded Joints:
      - 1) Carbon Steel: Perform welding in accordance with AWS D1.1/D 1.1M.
      - 2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
- B. Metal Jointing and Finish Quality Levels:
1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
    - a. Welded Joints: Continuously welded and ground smooth and flush; NOMMA Guideline 1 - Finish Level #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 or compatible with 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, except where specifically indicated otherwise; provide all anchors and fasteners required.

## 2.3 MATERIALS

- A. Steel Components:
1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
  2. Tubing: ASTM A501/A501M structural tubing, round and shapes as indicated.
  3. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- B. Stainless Steel Components:
1. ASTM A666, Type 304.
  2. Stainless Steel Finish: Brushed finish.

## 2.4 ACCESSORIES

- A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.

- B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners, unless Drawings indicate otherwise.
  - 1. For anchorage to concrete, provide inserts to be cast into concrete for bolting anchors.
  - 2. For anchorage to masonry, provide brackets to be embedded in masonry for bolting anchors.
  - 3. For anchorage to stud walls, provide backing plates for bolting anchors.
  - 4. Exposed Fasteners: No exposed bolts or screws.
- C. Carbon Steel Bolts and Nuts: ASTM A307.
- D. Hydraulic Expansion Cement: ASTM C1107/C1107M.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.
- C. Do not proceed with work until detrimental conditions have been corrected.
- D. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment of anchors.

#### **3.2 PREPARATION**

- A. Protect existing work.
- B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions and directions for installation of anchorages and fasteners.
- C. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

#### **3.3 INSTALLATION**

- A. Comply with Drawings and manufacturer's drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings, unless Drawings indicate otherwise.
- E. Isolate dissimilar materials with concealed coating, bushings, grommets or washers to prevent electrolytic corrosion.

#### **3.4 TOLERANCES**

- A. Maximum Variation From Plumb: 1/8 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/16 inch.

- C. Maximum Out-of-Position: 1/4 inch in 10 feet, noncumulative.

### **3.5 CLEANING**

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.

### **3.6 PROTECTION**

- A. Protect installed components and finishes from damage after installation.
- B. 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.

### **3.7 SCHEDULE**

- A. Decorative Metal Stairs: See Drawings.

**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. Specification sections related to roofing curbs, roofing and roof decking construction.

**1.2 REFERENCES**

- A. American Wood-Preservers' Association:
  - 1. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- B. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. Southern Pine Inspection Bureau:
  - 1. SPIB - Standard Grading Rules for Southern Pine Lumber: 2014.
- D. U.S. Department of Commerce - National Institute of Standards and Technology:
  - 1. DOC PS 1 - Structural Plywood; 2009.
  - 2. DOC PS 2 - Performance Standard for Wood-based Structural-Use Panels; 2010.
  - 3. DOC PS 20 - American Softwood Lumber Standard; 2015.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood 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](http://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 DOC PS 20 and requirements of specified grading agencies.
  - 2. Wood Construction Panels:
    - a. Plywood: Comply with DOC PS 1 and requirements of specified grading agencies.
    - b. Oriented Strand Board (OSB): Comply with DOC 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 MATERIALS**

- A. Lumber Grading Rules: SPIB.
- B. Miscellaneous Framing: Southern Yellow Pine species, No. 2 grade, 19 percent maximum moisture content.
- C. Plywood: APA/EWA Rated Sheathing, Grade C-D; Exposure Durability 1; sanded.

### **2.2 ACCESSORIES**

- A. Fasteners and Anchors:
  1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  2. Nails: ASTM F1667.
  3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

### **2.3 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  1. 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 AWWA standards.
- B. Fire Retardant Treatment:
  1. Exterior Type: AWWA U1, 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. Treat rough carpentry items as indicated on Drawings.
  2. Interior Type: AWWA 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. Treatment required for materials as indicated on Drawings.



- C. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWP A 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: AWP A 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: AWP A 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. Set members level and plumb, in correct position.
- B. Place horizontal members, crown side up.
- C. 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.
- D. Coordinate curb installation with installation of decking and support of deck openings, and parapet construction.

- E. Communications and Electrical Room Mounting Boards: Coordinate and size mounting boards 12 inches beyond size of panels, devices and wiring to be mounted.

**3.4 SCHEDULES**

- A. Roof Blocking: Unless specified otherwise in specification sections for roofing; Southern Yellow Pine species, 19 percent maximum moisture content, pressure preservative treatment.
- B. Communications and Electrical Room Mounting Boards: DOC PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; Fire Retardant Treated as specified in this Section.

**END OF SECTION**

**SECTION 06 20 00**  
**FINISH CARPENTRY (ADD-1&2)**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes:
  1. Finish carpentry items.
  2. Wood trim.
  3. Hardware and attachment accessories for finish carpentry items not specified in other Sections of the Work.
- B. Related Requirements:
  1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  2. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.
  3. Section 08 14 16 - Flush Wood Doors.
  4. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.

**1.2 REFERENCES**

- A. ~~APA-The Engineered Wood Association:~~
  - 1. ~~APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood. (ADD-1)~~
- B. Architectural Woodwork Institute:
  1. Architectural Woodwork Standards, Edition Two (2014)
- C. ASTM International:
  1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. American Wood Protection Association:
  1. AWPA U1 - Use Category System: User Specification for Treated Wood, 2017.
- E. American Woodwork Institute:
  1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
  2. AWI (QCP) - Quality Certification Program, current edition at [www.awigcp.org](http://www.awigcp.org).
- F. California Department of Health Services:
  1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- G. Forest Stewardship Council:
  1. FSC Guidelines - Forest Stewardship Council Guidelines.
- H. U.S. Department of Commerce - National Institute of Standards and Technology:
  1. DOC PS 1 - Structural Plywood; 2009.
  2. DOC PS 2 - Performance Standard for Wood-based Structural-Use Panels; 2010.
  3. DOC PS 20 - American Softwood Lumber Standard; 2015.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit the following data:

1. Veneer Hardwood Plywood and Solid Lumber materials.
  2. Fire retardant treatment materials and application instructions.
  3. Finish materials.
  4. 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.
- 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 Quality Certification Program license and Project specific letters to the Architect.
  2. Submit labels and certificates required by quality assurance and quality control programs.

#### **1.4 QUALITY ASSURANCE**

- A. Provide products and work of quality specified in accordance with AWI/AWMAC/WI (AWS).
1. Maintain one copy of each document on site.
- B. 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 work complies 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 this work is in compliance with specified requirements.

#### **1.5 QUALIFICATIONS**

- A. Fabricator: Company specializing in fabricating Products indicated with minimum five (5) years documented experience and certified by AWI Quality Certification Program.

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

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect work from moisture damage.

#### **1.7 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**1.8 SEQUENCING**

- A. Section 01 30 00 - Administrative Requirements and Section 00 10 00 - Summary: Scheduling and sequencing.
- B. Sequence work to ensure utility connections are achieved in orderly and expeditious manner.

**1.9 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

**PART 2 PRODUCTS****2.1 FINISH CARPENTRY ITEMS**

- A. Quality Standard: Custom Grade in accordance with AWI/AWMAC/WI (AWS), unless otherwise indicated.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

**2.2 COMPONENTS**

- A. Hardwood Lumber: AWI Grade I; maximum moisture content 6 - 8 percent; with vertical grain, of quality suitable for transparent finish; and the following:
  - 1. Species of Wood:
    - a. Red Oak.
  - 2. Cut or slicing of Wood:
    - a. Plain.
- B. ~~Hardwood Plywood: AWI Grade A veneer; with veneer core; type of glue recommended for application; and the following: (ADD-1)~~
  - 1. ~~Species of Veneer:~~
    - a. ~~Red Oak.~~
  - 2. ~~Cut or Slicing of Veneer:~~
    - a. ~~Plain~~
  - 3. ~~Matching of Individual Leaves to Each Other: Book matching.~~
  - 4. ~~Matching Across Panel Face: Balanced matching.~~
- C. Hardwood Tongue and Groove Flooring **(ADD-1)**: ¾" x 2-1/4", Random Length.
  - 1. Species of Wood:
    - a. Red Oak.
  - 2. Cut or slicing of Wood:
    - a. Plain.
  - 3. Grade:
    - a. Select and Better

**2.3 ACCESSORIES**

- A. Fasteners and Adhesives:
  - 1. Fasteners: Of size and type to suit application; hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.

- a. Nails: ASTM F1667.
  - b. Concealed Joint Fasteners: Threaded steel.
- 2. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Lumber for Shimming and Blocking: Softwood lumber.
- C. Veneer Edge Band: Standard wood veneer edge band matching face veneer.
- D. Wood Filler: Oil base, tinted to match surface finish color.
- E. Primer: Low VOC alkyd primer sealer type.
  - 1. Interior Primers: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. Wood Treatment:
  - 1. Factory-Treated Lumber: Comply with requirements of AWWA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
  - 2. 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.
  - 3. Wood Preservative by Pressure Treatment (PT Type): AWWA U1 Treatment using water borne preservative with 0.25 percent retainage.
  - 4. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
  - 5. Provide identification on fire retardant treated material.
  - 6. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

## 2.4 FABRICATION

- A. Fabricate to AWI Custom standards.
- B. Shop assemble work for delivery to site, permitting passage through building openings.
- C. Shop prepare and identify components for book match grain matching during site erection.
- D. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

## 2.5 FINISHING

- A. Provide shop finishing for items that are shop fabricated for installation at site.
- B. Sand work smooth and set exposed nails and screws.
- C. Apply wood filler in exposed nail and screw indentations.
- D. On items to receive transparent finishes, tint wood filler to matching surrounding surfaces and of types recommended for applied finishes.
- E. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
  - 1. Transparent:
    - a. System - 5, Varnish, Conversion.
    - b. Stain: Match wood door stain. As selected by Architect.
    - c. Sheen:
      - 1) Semigloss.
- F. Seal internal surfaces and semi-concealed surfaces.

- G. Prime paint surfaces in contact with cementitious materials.

### **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. Install work in accordance with AWI Custom quality standard.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install trim with finish nails at 12 inches on center.
  - 1. Set, fill and finish over fastener locations to match surrounding finish.
- E. Install hardware.
- F. 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 SCHEDULE**

- A. Interior: **(ADD-1)**

1. ~~Media and Corridors Walls and Benches: Red Oak Hardwood plywood and trim; prepare for stained transparent finish.~~
  2. Moldings, Bases, Casings, and Miscellaneous Trim: Hardwood, prepare for stained transparent finish.
- B. ~~Stage~~ **Platform** Apron and Miscellaneous Trim: **(ADD-1)**
1. Refer to Section 09 65 95 – ~~Resilient Stage~~ **Polymer Panel** Flooring Systems.
  2. Refer to Section **06 42 16** – Wood Veneer Paneling **(ADD-2)**
  3. Red Oak Hardwood ~~plywood~~ and trim; prepare for stained transparent finish.
  4. T&G Red Oak flooring on Platform Apron; prepare for stained transparent finish.

**END OF SECTION**



**SECTION 06 42 16**  
**WOOD-VENEER PANELING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Wood veneer paneling.
  - 2. Wood trim and moldings.
- B. Related Requirements:
  - 1. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.

**1.2 REFERENCE STANDARDS**

- A. ASTM International:
  - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. American National Standard Institute:
  - 1. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications, 2009.
- C. Architectural Woodwork Institute:
  - 1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2014.
- D. U.S. Department of Commerce National Institute of Standards and Technology:
  - 1. DOC PS 20 - American Softwood Lumber Standard.

**1.3 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate locations and requirements for blocking and backing for support and attachment of work of this section.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Submit data on fire retardant treatment materials and application instructions.
- C. Shop Drawings:
  - 1. Indicate materials, surface graining elevations of sheet paneling, fastening methods, joining methods, and interruptions to other work, to minimum scale of 1-1/2 inch equals 1 foot.
  - 2. Include plan of panel number sequencing.
- D. Samples for Initial Selection: For products with factory-applied finishes, submit two manufacturer's color charts illustrating the full range of finishes, colors and sheens available. For products receiving field-applied finishes, submit color charts illustrating a full range of finishes, colors and sheens. Submit to Architect for initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare two samples for each selected finish and color; on same product material type indicated for final Work; each

8x10 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

### **1.5 QUALITY ASSURANCE**

- A. Paneling: In accordance with AWI AWS Section 8; Custom Grade.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

### **1.6 QUALIFICATIONS**

- A. Fabricator: Company specializing in fabricating products specified in this section with minimum three (3) years documented experience.

### **1.7 MOCKUP**

- A. Section 01 40 00 - Quality Requirements: Mockup requirements.
- B. Construct mockup, 12 feet long by 12 feet wide, illustrating full panel sheet, edge trim, and joint trim.
- C. Locate where directed by Architect.
- D. Incorporate accepted mockup as part of Work.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect work from moisture damage.
- C. Maintain storage space relative humidity within ranges indicated in AWI/AWMAC/WI (AWS) Section 2.

### **1.9 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
  - 1. Maintain relative humidity within ranges indicated in AWI/AWMAC/WI (AWS) Section 2.

## **PART 2 PRODUCTS**

### **2.1 WOOD VENEER PANELING**

- A. Manufacturers:
  - 1. Marlite.
  - 2. Rulon.
  - 3. Western Panel Manufacturing, Inc.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Transparent Finished Wood Veneer Paneling: Flush; veneered wood panels with solid lumber trim.
  - 1. Grain Direction: Vertical.
  - 2. Edge Banding: Veneer.

**2.2 MATERIALS**

- A. Hardwood Lumber:
  - 1. As indicated on Drawings.
  - 2. Cut: Plain sawn.
- B. Lumber Moisture Content Range: 4-9 percent.
- C. Hardwood Plywood: HPVA HP-1; medium density fiberboard core.
  - 1. Veneer Face:
    - a. As indicated on Drawings.
  - 2. Veneer Slicing: Riff cut.
  - 3. Matching of Individual Leaves to Each Other: Book matching.
  - 4. Matching Across Panel Face: Balanced matching.
  - 5. Matching or Relationship of Panels to Each Other: Premanufactured sets matching.
- D. Medium Density Fiberboard: ANSI A208.2, composed of wood fibers, medium density.
  - 1. Fire Retardant Fiberboard: ASTM E84; 25 maximum flame spread index and 450 maximum smoke developed index.

**2.3 WOOD TREATMENT**

- A. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Interior Type.
- B. Provide identification on fire retardant treated material.
- C. Product installation must conform to requirements for installation in auditorium occupancy (A - assembly) as set forth by NC 2012 Building Code. Indicate compliance in shop drawing submittal.
- D. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.
- E. Moisture Content after Treatment: Kiln dried (KDAT).
  - 1. Lumber: As indicated for interior lumber.
  - 2. Plywood: Maximum 15 percent.

**2.4 FABRICATION**

- A. Fabricate to AWI/AWMAC/WI (AWS) Section 10; Custom Grade.
- B. Shop prepare and identify sheets for grain matching during site erection.
- C. Prepare panels 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. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.
- F. Finish exposed edges of panels as specified by grade requirements.

**2.5 FINISHES**

- A. Sand work smooth and set exposed fasteners.
- B. Apply wood filler in exposed nail indentations. Tint wood filler color as to result in a match to the surrounding surfaces after finishing is complete. Wood filler type to be compatible with applied finishes. Installed work shall have no visible indication of fasteners or filler.

- C. Finish work in accordance with AWI/AWMAC/WI (AWS) Section 5; Custom Grade; Stained Transparent Type:
  - 1. System 5, Conversion varnish.
  - 2. Stain Color: Custom color and as to produce finish color as selected by Architect from submitted samples.
- D. Seal internal surfaces and semi-concealed surfaces.

## 2.6 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
- B. Concealed Joint Fasteners: Threaded steel.
- C. Lumber for Shimming and Blocking: Softwood or hardwood lumber as required for application and conditions.
- D. Wood Panel Reveal: Extruded aluminum alloy 6063 T5, .050" nominal wall thickness, clear anodized finish, 3/8" face flange.
  - 1. Flannery – WPR 75-375-50.
  - 2. Fry Reglet.
  - 3. Gordon.
  - 4. Pittcon.
  - 5. Substitutions: Section 01 60 00 – Product Requirements.
- E. Other accessories as indicated on Drawings.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field measurements prior to fabrication. Indicate field measurements on shop drawings.
- C. Verify adequacy of backing and support framing.
- D. 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. Install work in accordance with AWI/AWMAC/WI (AWS) Section 8; Custom Grade.
- B. Set and secure materials and components in place, plumb and level.
- C. Scribe work abutting other components with maximum and consistent gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Coordinate installation of blocking behind paneling.
- E. Coordinate installation of firestopping behind paneling.

- F. Install ceiling paneling with clips with blind fasteners at 24 inches on center.
- G. Set exposed fasteners, fill with wood filler, and finish to match panel finish.
- H. Install wall paneling with Z clips at 24 inches oc.
- I. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.
- J. Finish to be as selected by Architect from samples selected.

**3.4 TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Conform to AWI/AWMAC/WI (AWS) Section 8 requirements for the following:
  - 1. Smoothness.
  - 2. Gaps.
  - 3. Flushness.
  - 4. Flatness.
  - 5. Alignment.
- C. Maximum Variation from True Position: 1/16 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 SCHEDULE (ADD-1)**

- A. AUDITORIUM 126
  - 1. Stained wood veneer wall panels with reveals as shown in drawings.

**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 D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).
- B. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.
- C. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.

**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 QUALITY ASSURANCE**

- 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. Karnak Corporation: [www.karnakcorp.com](http://www.karnakcorp.com).
- B. Mar-Flex Systems, Inc: [www.mar-flex.com/sle](http://www.mar-flex.com/sle).
- C. W.R. Meadows, Inc: [www.wrmeadows.com/sle](http://www.wrmeadows.com/sle).
- D. 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 Type III or ASTM D1187/D1187M Type I.
  - 2. Composition - Horizontal and Low-Slope Application: ASTM D1227 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 APPLICATION**

- A. Apply to surfaces and locations as indicated on Drawings
- B. Perform work in accordance with NRCA ML104.
- C. Prime surfaces in accordance with manufacturer's instructions.
- D. Apply dampproofing with tools or equipment as recommended by manufacturer.
- E. 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.
- F. Apply dampproofing in one coat, continuous and uniform, at a rate of 25 sq ft/gal per coat.
- G. Seal items projecting through dampproofing surface with mastic. Seal watertight.
- H. Protect work from 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 - Roofing.
  - 5. Section 07 90 00 - Joint Protection.

**1.3 REFERENCES**

- A. ASTM International (ASTM):
  - 1. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course; 2018
  - 2. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
  - 3. ASTM D816 - Standard Test Methods for Rubber Cements; 2016.
  - 4. ASTM D1644 - Standard Test Methods for Nonvolatile Content of Varnishes; 2001.
  - 5. ASTM D2370 - Standard Test Method for Tensile Properties of Organic Coatings; 2016.
  - 6. ASTM D2697 - Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings; 2003.
  - 7. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016

**1.4 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.

**1.5 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).

## **1.6 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.

## **1.7 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 MANUFACTURER**

- A. W. R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338; (800) 342-5976; (847) 683-4500; Fax (847) 683-4544; Web Site [www.wrmeadows.com](http://www.wrmeadows.com)

**2.2 MATERIALS**

- A. Waterproofing Membrane: Single-component, cold-applied, solvent-free, non-shrink, liquid waterproofing membrane.
  - 1. Performance Based Spec: Waterproofing membrane shall have the following properties as determined by laboratory testing:
    - a. Solids content:
      - 1) By weight, ASTM D1644: 98%.
      - 2) By volume, ASTM D2697: 98%.
    - b. Tensile Strength, ASTM D2370: 70 psi.
    - c. Elongation, ASTM D2370: 440%.
    - d. Water Vapor Transmission, ASTM E96 (Method B): 0.07 perms.
    - e. Shore 00 Hardness, ASTM C661: 55.
    - f. Low Temperature Flexibility, ASTM D816: -20 deg F (-28.9 deg C) pass 1/4 (6.4mm) mandrel.
  - 2. Proprietary Based Spec:
    - a. HYDRALASTIC 836 Waterproofing Membrane by W. R. Meadows, Inc.

**2.3 ACCESSORIES**

- A. Joint Tape: 6 inches (150 mm) wide reinforcing fabric for corners, crack, and joint treatment.
  - 1. REINFORCING FABRIC HCR by W. R. Meadows, Inc.
- B. Reinforced Joint Tape for outside corners subject to backfill.
  - 1. PRECON TAPE by W.R. Meadows, Inc.
- C. Detailing Membrane: BEM by W. R. Meadows, Inc.
- D. Concrete Repair Materials: MEADOW-PATCH 5 and MEADOW-PATCH 20 Concrete Repair Mortars by W. R. Meadows, Inc.
- E. Waterproofing Protection Course: PERMINATOR or PROTECTION COURSE by W. R. Meadows, Inc.
- F. Rolled Matrix Drainage System: MEL-DRAIN by W. R. Meadows, Inc.

**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. 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.
- J. 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 m<sup>2</sup>/3.78 L), providing a thickness of 60 wet mils.
- 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 wet mils.
- 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, 2016.
  2. ASTM C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation; 2010.
  3. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
  4. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation, 2017.
  5. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing, 2012.
  6. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
  7. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.
  8. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.
  9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2016.
  10. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source, 2014.
- B. 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; 2012.
- C. South Coast Air Quality Management District (SCAQMD):
1. Rule 1168 - Adhesive and Sealant Applications.

- D. Green Seal:
  - 1. GS-36 - Adhesives for Commercial Use

### 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:
    - a. Foundation perimeter, except where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.
    - b. Protective board for sheet waterproofing system.
  - 2. Type (ASTM C578), Minimum Compressive Strength (ASTM D1621) , Minimum R-value (ASTM C518, at 75 degrees F mean temperature), Maximum Water Asorption (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; 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 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. 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.
- B. Board Insulation as Protective Board for Sheet Waterproofing System: Install in accordance with Drawings and recommendations of manufacturers' of sheet waterproofing system and board insulation.
- 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 vapor 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:
  - 1. In masonry cavity walls.
  - 2. At junctions of dissimilar wall and roof materials to achieve thermal, dampproofing and air seal.
- B. Related Requirements:
  - 1. Section 04 20 00 - Unit Masonry: Insulated cavity at masonry veneer.
  - 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 - Water Resistance: Hydrostatic Pressure Test, 2014.
- C. ASTM International:
  - 1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission properties by Means of the Heat Flow Meter Apparatus; 2017.
  - 2. ASTM C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation; 2015.
  - 3. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
  - 4. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.
  - 5. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2014.
  - 6. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2017.
  - 7. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics; 2015.
  - 8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
  - 9. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials, 2016.
  - 10. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen, 2004.
  - 11. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials, 2013.
- D. FM Global:
  - 1. FM 4880 - Approval Standard for Class 1 Insulated Steel Deck Roofs.
- E. National Fire Protection Association:

1. NFPA 286 - Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems.
- F. Underwriters Laboratories Inc.:
1. UL 1040 - Fire Test of Insulated Wall Construction.
  2. UL 1715 - Fire Test of Interior Finish Material.

### **1.3 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), FM 4880, UL 1040 or UL 1715.
    - a. Such testing shall be related to the actual end-use configuration and be performed in the finished manufactured foam plastic assembly in the maximum thickness intended for use.

### **1.4 QUALITY ASSURANCE**

- A. Apply label from agency approved by authority having jurisdiction to identify each foam plastic component.

### **1.5 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.

### **1.6 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.

### **1.7 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.

### **1.8 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 air barrier materials to sunlight longer than as recommended by the material manufacturer.

## **PART 2 PRODUCTS**

### **2.1 FOAMED-IN-PLACE INSULATION**

- A. Manufacturers:
  1. NCFI Polyurethanes - InsulBloc.
  2. Demilec LLC - Heatlok Soy 200 Plus.
  3. BASF - Walltite US.
  4. Henry Company - Permax 2.0X.
  5. Johns Manville - Corbond III.
  6. Substitutions: Section 01 60 00 - Product Requirements.

### **2.2 COMPONENTS**

- A. 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. Regulatory Requirements: Conform to applicable code for flame and smoke limitations.
  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/D1622M.
  4. Compressive Strength: 25 psi, minimum, in accordance with ASTM D1621.
  5. Tensile Strength: 15 psi, minimum, in accordance with ASTM D1623.
  6. Water Vapor Permeance: Vapor retarder; 1.0 perm, maximum, at 1.5 inches thick when tested in accordance with ASTM E96/E96M, desiccant method.
  7. Air Permeance: 0.004 cfm per sq ft, maximum, @ 1.57 psf pressure differential, in accordance with ASTM E2178 .
  8. Closed Cell Content: 90 percent, minimum, in accordance with ASTM D6226.
  9. Surface Burning Characteristics:  $\leq 25$  Flame Spread and  $\leq 450$  Smoke Developed, in accordance with ASTM E84.
  10. Fungal Growth: None in accordance with ASTM C1338.

### **2.3 ACCESSORIES**

- A. Primer: As recommended by insulation manufacturer.
- B. Joint Filler Foam: As recommended by insulation manufacturer.
- C. Joint Sealer: Single component polyurethane type and as recommended by foamed-in-place insulation manufacturer.
- D. Moisture Detection Paper Strips: MDP Strips.
- E. Mineral Wool: Mineral Wool Board, 4 lb per cf density.

**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 over spray 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.

**3.3 INSTALLATION**

- A. Apply work in this section in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to uniform monolithic density without voids.
- C. Apply to a cured thickness of not less than that indicated on Drawings and not greater than that indicated thickness plus 1/2 inch.
- D. Provide overlap onto air barrier materials as indicated on Drawings.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Patch damaged areas with same foam insulation product.
- G. Trim excess away for applied trim or remove as required for continuous sealant bead.

**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 27 00****AIR BARRIERS****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes air leakage criteria for primary air seal building enclosure materials and assemblies; materials and installation methods supplementing other air seal materials and assemblies; and air seal materials to connect and seal openings, joints, and junctions between other air seal materials and assemblies.

**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, 2017.
  - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2017.
  - 3. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials, 2014.
  - 4. ASTM E2178 - Standard Test Method for Air Permeance of Building materials, 2013.
- B. ICC Evaluation Service, LLC (ICC-ES);
  - 1. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers, 2013.

**1.3 DEFINITIONS**

- A. Air Barrier: 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.

**1.4 PERFORMANCE REQUIREMENTS**

- A. 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 lb/sq ft when tested in accordance with ASTM E2178.
- B. Provide continuity of air seal materials and assemblies in conjunction with materials described in Section 07 90 00.

**1.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures
- B. Product Data: Submit data on material characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Submit preparation, installation requirements and techniques, product storage and handling criteria.

**1.6 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.

### 1.7 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EMP): Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacturing. Use secondary materials approved in writing by primary material manufacturer.
- B. Applicator: Company specializing in performing Work of this section with minimum three (3) years documented experience.

### 1.8 SEQUENCING

- A. Section 01 30 00 - Administrative Requirements: Scheduling and sequencing.
- B. Sequence Work to permit installation of materials in conjunction with related materials and seals.

### 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work of this section with sections referencing this section.

## PART 2 PRODUCTS

### 2.1 AIR BARRIER FLASHING MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

- A. Air Barrier Flashing Sheet Seal:
  1. Type: Rubberized asphalt bonded to thermoplastic sheet, self-adhesive.
  2. Thickness: 40 mil (0.040 inch).
  3. Sheet Width: 18 inches, 24 inches, and 36 inches.
  4. Air Leakage: 0.004 cfm/sq ft, maximum when subjected to pressure differential of 1.57 lb/sq ft when tested in accordance with ASTM E2178.
  5. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96/E96M.
  6. Water Absorption: 0.25 percent by weight, maximum, when tested in accordance with ASTM D1970/D1970M.
  7. Seam and Perimeter Tape: As recommended by sheet manufacturer.
  8. Products:
    - a. Henry Company; Blueskin SA. (Basis of Design)
    - b. Carlisle Coatings and Waterproofing, Inc; CCW-705 Air and Vapor Barrier Sheet.
    - c. W.R. Meadows, Inc; Air-Shield.

### 2.2 ACCESSORIES

- A. Substrate Cleaner: Non-corrosive; type recommended by barrier product manufacturer; compatible with adjacent materials.
- B. Primer: As recommended by barrier product manufacturer for substrate material.



**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. Install the Work in accordance with manufacturer's recommendations and as indicated on Drawings.
- B. Air Barriers (Sheet Seal): Install continuous air tight barrier over solid surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives if and where recommended by barrier manufacturer; apply within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Self-Adhesive Sheet Seal:
  - 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 air tight.
  - 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 fishmouths.
  - 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.
- E. Openings, Junctions and Penetrations in Sheet Seal:
  - 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. Structural standing seam metal roofing system.
  - 2. Roof Insulation.
  - 3. Underlayment.
  - 4. Eave protection.
  - 5. Metal flashings and trim.
  - 6. Snow guards.
  
- B. Related Sections:
  - 1. Section 07 42 13 - Metal Wall Panels.
  - 2. Section 07 62 00 - Sheet Metal Flashing and Trim.
  - 3. Section 07 71 23 - Manufactured Gutters and Downspouts.
  - 4. Section 07 90 00 - Joint Protection.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coatings Appendix); 17a.
  
- B. American Society of Civil Engineers:
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
  
- C. ASTM International:
  - 1. ASTM A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products; 2016.
  - 2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010.
  - 3. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
  - 4. ASTM C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation; 2017.
  - 5. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2015.
  - 6. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
  - 7. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2017.
  - 8. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emitters; 2015.
  - 9. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2016.
  - 10. ASTM D226/D226M - Standard specification for asphalt-saturated organic felt used in roofing and waterproofing; 2017.

11. ASTM D1970/D1970M - Standard specification for self-adhering polymer modified bituminous sheet materials used as steep roofing underlayment for ice dam protection; 2017, Revision 17A.
  12. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2016.
  13. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films; 2007, Reapproved 2015.
  14. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
  15. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
  16. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2017.
  17. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004, Reapproved 2012.
  18. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference; 2000, Reapproved 2016.
  19. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques; 2013.
  20. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres; 2012.
  21. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field; 2016.
  22. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.
- D. National Roofing Contractors Association:
1. NRCA - The NRCA Roofing and Waterproofing Manual.
- E. Sheet Metal and Air Conditioning Contractors:
1. SMACNA - Architectural Sheet Metal Manual.
- F. Underwriters Laboratories Inc.:
1. UL 580 - Standard for Safety Tests for Uplift Resistance of Roof Assemblies; 2013.
  2. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings; 2014.

### 1.3 DESIGN REQUIREMENTS

- A. 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.
- B. Wind Uplift Resistance: UL 580; Class 90.
- C. 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 E283.
- D. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure of 6.24 psf.
- E. Roof Covering Fire Test Classification: UL 790 (ASTM E108), Class A, minimum.
- F. 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.

#### 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 and soffit panel profiles, jointing patterns, jointing details, fastening methods, flashings, terminations, snow guards 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. Design Data:
  1. Submit structural design calculations for metal roofing signed and sealed by professional engineer.
- G. Manufacturer's Installation Instructions: Submit instructions including special procedures for roofing penetrations, flashings, and perimeter conditions requiring special attention.
- H. 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.
- 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.
  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 years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum five years documented experience and approved by manufacturer.
- C. 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 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.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials causing discoloration or staining.

**1.9 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**1.10 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Requirements for warranties.
- B. Provide 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 no dollar limit form 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 Period: 20 years from date of Substantial Completion.
    - b. The addition of solar panels mounted with mounting clamps to roof panel standing seams shall not void the warranty.
    - c. 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.
    - d. 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: 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: 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 in excess of 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 MANUFACTURED SHEET METAL ROOFING**

- A. Manufacturers:
1. Petersen Aluminum Corporation (PAC-CLAD).
  2. Innovative Metals Company, Inc. (IMETCO).
  3. Architectural Metal Systems (AMS).
  4. ATAS International, Inc.
  5. Berridge Manufacturing Company.
  6. Construction Metal Products (CMP).
  7. Centria Architectural Systems.
  8. Dimensional Metals, Inc. (DMI).
  9. Fabral Metal Wall and Roof Systems.
  10. MCBI Metal Wall and Roof Systems.
  11. Metal Roofing Systems, Inc.
  12. Metal Sales Manufacturing, LLC.
  13. McElroy Metal, Inc.
- B. Structural Standing Seam Metal Roofing: Factory formed metal roofing panel system with concealed fasteners.
1. Panel Materials: Pre-finished galvalume steel sheet, 24 gauge base metal thickness.
  2. Panel Width: Nominal 16 inches, unless indicated otherwise on Drawings.
  3. Panel Profile:
    - a. Striated.
  4. Seam Type: Sanding seam, 180 degrees double locked, field machine formed.
  5. Seam Height: 2 inches.
  6. Color:
    - a. As selected by Architect from submitted samples.
- C. Roof Surface: Minimum solar reflectance index (SRI) of 29 for 75 percent of roof area, calculated in accordance with ASTM E1980.
1. Reflectance: Measured in accordance with ASTM E903, ASTM E1918, or ASTM C1549.
  2. Emittance: Measured in accordance with ASTM E408 or ASTM C1371.

**2.2 SHEET METAL MATERIALS**

- A. Pre-Finished Galvalume Steel Sheet: ASTM A755/A755M coil coated.
1. Base Metal: ASTM A792/A792M; Structural Quality, Grade 50; AZ50 aluminum-zinc alloy coating.
  2. Exposed Finish: AAMA 2604, minimum two coat fluoropolymer coating with minimum 70 percent polyvinylidene fluoride resin. Coating system shall provide nominal 1.2 mil dry film thickness, consisting of primer and color coat.
  3. Unexposed Finish: Manufacturer's standard coating, minimum 0.5 mil dry film thickness.

**2.3 INSULATION MATERIALS**

- A. Polyisocyanurate board insulation; closed-cell rigid cellular foam, complying with ASTM C1289:
1. Type II:
    - a. Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam. (Basis of Design: Johns Manville - ValuTherm)
    - b. Compressive Strength: Classes 1-2-3, Grade 2 - 20 psi (138 kPa), minimum.

- c. Thermal Resistance, R-value (RSI-value): At 1-1/2 inch (38.1 mm) thick; Class 1, Grades 1-2-3 - 8.6 (1.51) at 75 degrees F (24 degrees C).
2. Flame Spread Index (FSI): Class B - 26 to 75; tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less; tested in accordance with ASTM E84.
4. Tensile Strength: 500 psf, minimum per ASTM C209.
5. Water Absorption: 1 percent, maximum by volume per ASTM C209.
6. Water Vapor Permeance: 0.05 perms/1.5 perms, maximum per ASTM E96.
7. Board Size: Largest size applicable, but not less than 48 x 96 inch.
8. Board Thickness: As indicated on Drawings.
9. Number of Layers: As indicated on Drawings.
10. Board Edges: Square.

## 2.4 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Underlayment: Self-Adhering with reinforcing scrim, High-Temperature Sheet, 50 mils thick minimum, 36 inches wide rolls, consisting of slip-resisting top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.
  1. Thermal Stability: Stable after testing at 250 deg F; ASTM D1970/D1970M.
  2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970/D1970M.
  3. Seams shall be lapped in accordance with manufacturer's recommendations.
  4. Underlayment shall be approved for 90 days (minimum) of exposure to UV and weather penetrations.
- C. Insulation Board Joint Tape: High-Temperature type as recommended in writing by insulation board manufacturer.
- D. Slip Sheet: Rosin sized building paper.
- E. Dissimilar Materials Separation: Separate dissimilar materials to prevent galvanic or other corrosive action by applying a permanent separator 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 roof panel manufacturer. Separator material to be type that will remain in the concealed area of application without running, staining or migrating onto visible finish surfaces.
- F. Sealant: Silicone type.
- G. 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. 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.
  3. Length of roofing panels to be continuous from eaves to ridges.
- B. 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.
- C. Fabricate cleats of same material as sheet, to interlock with sheet.
- D. Fabricate starter strips of same material as sheet, continuous, to interlock with sheet.
- E. Form pieces in longest practical lengths, but not less than specified lengths where indicated.
- F. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- G. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- I. 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. Dissimilar Materials Separation: Separate dissimilar materials to prevent galvanic or other corrosive action with permanent applied material as recommended by roof panel manufacturer. Where using applied coating, coat to minimum dry film thickness of 15 mil.

#### **3.3 INSTALLATION - INSULATION**

- A. Mechanically fasten insulation to deck.
- B. For insulation boards indicated to be faced with foil, lay insulation with foil facing on top side.

- C. For EACH layer of insulation, fully tape all joints with joint tape recommended by insulation manufacturer.
- D. Place boards perpendicular to deck flutes with edges over flute surface for bearing support.
- E. Lay boards with edges in contact, but without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- F. Place additional layers of insulation with joints staggered minimum 6 inches from joints of previous layer. Fully tape all joints of EACH layer with joint tape recommended by insulation manufacturer.
- G. Apply no more insulation than can be covered with membrane in same day.
- H. Total insulation thickness shall be as indicated on Drawings.
- I. Place fasteners in accordance with wind uplift requirements, but not less than one fastener for every two square feet of insulation board area.

### 3.4 INSTALLATION - UNDERLAYMENT

- A. 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.
- B. Apply underlayment over entire roof surface, wrinkle free, in shingle fashion to shed water.
- C. Lower edge terminations and roof edge terminations to be as indicated on Drawings.
- D. Install underlayment laid perpendicular to slope.
- E. Weather lap side edges not less than 3-1/2 inches.
- F. Weather lap end laps not less than 6 inches and staggered 24 inches between courses.
- G. Turn up 4 inches onto roof penetrations and other vertical obstructions.

### 3.5 INSTALLATION - STANDING SEAM METAL ROOFING

- A. Install slip sheet over underlayment prior to installing roofing panels.
- B. Install roofing panels with long dimension perpendicular to eaves.
- C. Install roofing panels beginning at eaves. Panel to extend from eaves to ridges without traverse joints.
- D. Install clips to secure roof panels without deforming roof panels.
  - 1. Where indicated on Drawings, install clips spaced 24 inches o.c. maximum in order to receive future solar panels. The addition of solar panels using solar panel hardware clamps shall not void the roofing warranty.
- E. Sealant application in female leg of standing seam.
  - 1. Continuous bead applied prior to laying next panel over male leg of previously installed panel and prior to beginning mechanical seaming process.
  - 2. Sealant shall be as per panel manufacturers recommendation as overall system requirement.
- F. Machine form standing seam, forming a 180 degrees Double Lock seam, between adjacent roofing panels. Hand form joints where machine forming is not possible.
- G. Terminate roofing panels with sheet metal trim and flashing for watertight installation. Close and conceal openings between roofing panels, panel seams, and roof substrate.

- H. Seal metal joints watertight.
- I. Install snow guards in locations indicated on Drawings and in accordance with roofing panel manufacturer's written recommendations.

**3.6 INSTALLATION - FLASHING**

- A. 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.
- B. 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.
- C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- D. Secure flashing exposed edges with continuous cleats.
- E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Seal metal joints watertight.

**3.7 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

**3.8 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 43 13**  
**METAL SOFFIT PANELS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Manufactured preformed metal soffit panels and suspension system, with accessory components.
- 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 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. American Society of Civil Engineers (ASCE):
  - 1. ASCE 7-10 - Minimum Design Loads For Buildings And Other Structures
- C. ASTM International (ASTM):
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate dimensions, layout, joints, expansion joints, construction details, panel profiles, methods of anchorage, and interface with adjacent materials.
- C. Product Data: Submit data on panels and hanging system; include metal types, finishes, and characteristics.
- D. Design Data: Submit design calculations.
- 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 manufacturer warranty to cover degradation of panel finish, including color fading caused by exposure to weather.
  - 1. Warranty Duration:
    - a. Thirty (30) years
- C. Furnish five (5) year installer warranty to cover defects in water tightness and integrity of seals.

## PART 2 PRODUCTS

### 2.1 METAL SOFFIT PANELS

- A. Manufacturers:
  - 1. Petersen Aluminum Corp. (PAC). (Basis of Design)
  - 2. AEP-Span.
  - 3. ATAS International, Inc.
  - 4. Dimensional Metal, Inc.
  - 5. Metal Roofing Systems, Inc.
  - 6. McElroy Metal, Inc.
  - 7. Berridge Manufacturing Company.
- B. System Description:
  - 1. Soffit System: Preformed and prefinished metal soffit system; site assembled; with suspension framing system. Engineer system to be installed with concealed anchors and to permit expansion and contraction.
- C. Performance / Design Criteria:
  - 1. Design system and size system components and anchorage to safely withstand Live Loads, Dead Loads and Wind Loads as indicated on Drawings for the Structural Design and in accordance with ASCE 7-10 and in compliance with the State Building Code for the State in which the project is located.
  - 2. Maximum Allowable Deflection of Panel: 1/180 of span.

### 2.2 COMPONENTS

- A. Exterior Panel and Other Sheet Materials: Factory formed and finished.
  - 1. Material:

- a. Precoated Steel Sheet; 22 gage (0.0299 inch) minimum thickness.
    - b. Precoated Aluminum Sheet; 20 gage (0.032 inch) minimum thickness.
  2. Profile:
    - a. Flush, Center “V” Groove; 1 inch thick.
  3. Edges:
    - a. Interlocking.
  4. Width:
    - a. 12 inches.
  5. Venting:
    - a. Full-vented.
- B. Precoated Metal Sheet:
  1. Precoated Aluminum: ASTM B209, manufacturer’s standard alloy and temper; shop precoated with fluorocarbon coating.
    - a. Exposed Exterior Surfaces: Color as selected by Architect from submitted samples.
- C. Trim, Closure Pieces, Caps, Flashings, Facias and Infills: Same material, thickness and finish as exterior panel sheets; brake formed to required profiles.
- D. 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 / Design Criteria.
    - a. Minimum Requirements:
      - 1) Main Runners: Cold rolled channels, galvanized finish; 16 gage, 1-1/2 inches deep.
      - 2) Hanger Wire: 12 gage, galvanized, soft annealed steel wire.
      - 3) Hat Channels: ASTM C645; 25 gage, galvanized.

### 2.3 ACCESSORIES

- A. Fasteners:
  1. Stainless steel fasteners.
    - a. Factory finished to match panel finish, where is exposed to view.
- B. Sealants: Silicone type as specified in Section 07 90 00 - Joint Protection.
- C. Field Touch-up Paint: As recommended by material manufacturer.

### 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 SHOP FINISHING

- A. Exposed Finish: Fluoropolymer Coating System; manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil (0.023 mm); conforming to AAMA 2604.
- B. Unexposed Finish: Manufacturer’s standard coating, minimum 0.5 mil dry film thickness; compatible with finish system, as recommended by finish system manufacturer.

**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.

**3.3 INSTALLATION**

- A. Install metal panels and support system in accordance with Performance / Design Criteria and manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with concealed bituminous paint. Allow to cure prior to installation.
- C. Main Runners: Suspend from building structure; parallel to soffit panels installation; spaced not greater than 48 inches o.c.
- D. Hat Channels: Secure perpendicular to main runners; as required for attachment of metal panels and spaced not greater than 24 inches o.c.
- E. Add struts as required to resist upward pressure.
- F. Fasten metal panels to suspension system; aligned and level.
- G. Use concealed fasteners unless otherwise approved by Architect.
- H. 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.

**END OF SECTION**



**SECTION 07 62 00****SHEET METAL FLASHING AND TRIM****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes flashings and counterflashings, and fabricated sheet metal items, as indicated in Schedule.
- B. Related Sections:
  - 1. Section 07 41 13 - Metal Roof Panels.
  - 2. Section 07 71 23 - Manufactured Gutters and Downspouts.
  - 3. Section 07 90 00 - Joint Protection.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels, 2013.
  - 2. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum, 2012.
- B. ASTM International:
  - 1. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
  - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. Sheet Metal and Air Conditioning Contractors:
  - 1. SMACNA - Architectural Sheet Metal Manual.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.
- 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.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with these specifications and SMACNA (ASMM) - Architectural Sheet Metal Manual.

- B. Installation shall comply with the current NRCA Roofing and Water Proofing Manual, 5th Edition, 2001, where applicable.
- C. Installation shall comply with the sheet metal system and component manufacturers' published installation manuals and guidelines and all referenced standards therein.
- D. Installation of sheet metal flashings incorporated into roofing system shall meet all minimum requirements published by the membrane manufacturer in addition to all requirements specified and detailed herein.
- E. Work to be free of leaks in all weather conditions.

## 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 sheet metal work with minimum five (5) years documented experience.

## 1.6 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 in conjunction with roofing pre-installation meeting.

## 1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work with construction related to or interfacing with this Work.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- C. Storage: Store materials within areas designated or approved by the Owner. Ensure materials remain dry, covered and not in contact with the ground.
- D. Handling: 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. ASTM B209 Aluminum Alloy Sheet and Plate, alloy and temper 3003-H14.
  - 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: As selected by Architect from submitted samples.
3. Expansion Joint Cover.
4. Expansion Joint Cleat.
5. Closure Metal.
6. Receiver.
7. Counterflashing.
8. Slip Flashing.
9. Miscellaneous Exposed Trim.

## 2.2 MILL FINISHED ALUMINUM

- A. ASTM B209 Aluminum Alloy Sheet and Plate, alloy and temper 3003-H14.
  1. Thickness: 0.050 inch (50-mil).
  2. Finish: Mill.
  3. Continuous Cleat.

## 2.3 STAINLESS STEEL

- A. Type 304 as tested in accordance with ASTM A240/A240M, fully annealed.
  1. Thickness: 0.040 inch, unless indicate otherwise on Drawings or in this Section.
  2. Finish:
    - a. Smooth; No. 2D.
  3. Miscellaneous stainless steel flashing.

## 2.4 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Sealant: Silicone sealant specified in Section 07 90 00.

## 2.5 FABRICATION

- A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet metal, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with batten seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- H. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.
- I. Seal metal joints.

### **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.
- 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.

#### **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 starter and edge strips, and cleats before starting installation.

#### **3.3 INSTALLATION**

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- C. Seal metal joints watertight.

#### **3.4 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Monitor and inspect Work during installation to ensure compliance with specified requirements.

**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. Supports and Accessories.
- B. Related Requirements:
  - 1. Section 07 41 13 - Metal Roof Panels.
  - 2. Section 07 62 00 - Sheet Metal Flashing and Trim.
  - 3. Section 07 90 00 - Joint Protection.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, 2014.
- C. Sheet Metal and Air Conditioning Contractors:
  - 1. SMACNA (ASMM) - Architectural Sheet Metal Manual, 7th Edition, 2012.

**1.3 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.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with these specifications and SMACNA (ASMM) - Architectural Sheet Metal Manual.
- B. Installation shall comply with the current NRCA Roofing and Water Proofing Manual, 5th Edition, 2001, where applicable.

- C. Installation shall comply 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.

### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in sheet metal work with minimum five (5) years documented experience.

### 1.6 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.

### 1.7 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 inlet.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- C. Storage: Store materials within areas designated or approved by the Owner. Ensure materials remain dry, covered and not in contact with the ground.
- D. Handling: 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. ASTM B209 Aluminum Alloy Sheet and Plate, alloy and temper 3003-H14.
  - 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: As selected by Architect from submitted samples.
  - 3. Gutters.

4. Downspout and Downspout Outlet.

## 2.2 COMPONENTS

- A. Gutters And Downspouts:
  1. Gutters: Pre-Finished Aluminum; 0.050 inch thick; profile as indicated on Drawings.
  2. Downspouts: Pre-Finished Aluminum; 0.040 inch thick; profile as indicated on Drawings.
- B. 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. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
  2. Configuration and Profile:
    - a. As indicated on Drawings.
  3. Finish: Manufacturer's standard factory applied powder coat finish.
    - a. Color:
      - 1) To be selected by Architect from submitted samples.
  4. Accessories: Compatible with and appropriate for installation of downspout boots.
    - a. Stainless steel fasteners and building wall anchors.
    - b. Neoprene gaskets and rubber coupling.

## 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 gutters and downspouts of profiles and sizes indicated on Drawings.
- B. Fabricate with required connection pieces.
- C. Form sections to shapes indicated on Drawings, square and accurate in size, 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. Fabricate gutter and downspout accessories; seal 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. Install products in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/8 inch per foot minimum to drains.
- D. 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 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:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
  - 4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- C. Underwriters Laboratories Inc.:
  - 1. UL 263 - Fire Tests of Building Construction and Materials.
  - 2. UL 1479 - Fire Tests of Through-Penetration Firestops.
  - 3. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
  - 4. UL - Fire Resistance Directory.

**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 PERFORMANCE REQUIREMENTS**

- A. Conform to UL or WH for fire resistance ratings and surface burning characteristics.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

**1.5 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 or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

## 1.6 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 gage 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 cfm per foot 0.30 inches water gage pressure differential
- E. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage 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.

## 1.7 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.

## 1.8 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 3 days after installation of materials.
- D. Provide ventilation in areas to receive solvent cured materials.

## **PART 2 PRODUCTS**

### **2.1 FIRESTOPPING**

- A. Manufacturers:
  - 1. A/D Fire Protection Systems, Inc.
  - 2. Hilti Corp.
  - 3. 3M Fire Protection Products
  - 4. Nelson Firestop Products
  - 5. Specified Technologies
  - 6. United States Gypsum Co.
  - 7. 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 CA/DHS.
  - 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 CA/DHS.
  - 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 CA/DHS.
  - 5. Firestop Pillows: Formed mineral fiber pillows.

### **2.2 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 CA/DHS.
- 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 40 00 - Quality Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive firestopping.

### **3.2 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install damming materials to arrest liquid material leakage.

### **3.3 APPLICATION**

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Compress fibered material to maximum 40 percent of its uncompressed size.
- E. 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.
- F. 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 sealants and joint backing, 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:
  - 1. ASTM C834 - Standard Specification for Latex Sealants.
  - 2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  - 3. ASTM C1193 - Standard Guide for Use of Joint Sealants.
  - 4. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
- B. California Department of Health Services:
  - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

**1.3 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. Samples: Submit two samples illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.
- E. Indoor Air Quality Certificates:
  - 1. Certify volatile organic compound content for each interior sealant and related primer.
- F. Warranty Sample: As specified in this section.

**1.4 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

**1.5 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

**1.6 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with sections referencing this section.

**1.7 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.
- B. Provide 20 year manufacturer's weatherseal and non-staining warranty.
- C. Warranty: Include coverage for replacement of installed sealant and accessories for adhesion and cohesion failure, degradation of sealant, failure of sealant to cure, failure to maintain watertight seal, and staining of substrate.

**PART 2 PRODUCTS****2.1 JOINT SEALERS**

- A. Silicone Sealant: ASTM C920, Grade NS, Class 25; single component, neutral curing, non-sagging, non-staining, fungus resistant, non-bleeding.
  - 1. Manufacturers:
    - a. Dow Chemical Company (Basis of Design).
    - b. General Electric Company, Silicone Products Division
    - c. Pecora Corporation.
  - 2. Color: Colors as selected.
  - 3. Movement Capability: Plus and minus 25 percent.
  - 4. Service Temperature Range: -65 to 180 degrees F.
  - 5. Shore A Hardness Range: 15 to 35.
- B. Acrylic Sealant: ASTM C920, Grade NS, Class 12-1/2; single component, solvent curing, non-staining, non-bleeding, non-sagging.
  - 1. Manufacturers:
    - a. BASF, Sonneborn (Basis of Design).
    - b. Pecora Corporation.
    - c. Sika Corporation.
    - d. Tremco.
  - 2. Color: White.
  - 3. Movement Capability: Plus and minus 12-1/2 percent.
  - 4. Service Temperature Range: -13 to 180 degrees F.
  - 5. Shore A Hardness Range: 25 to 50.
  - 6. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Class 25; single component, chemical curing, non-staining, non-bleeding, self-leveling type.
  - 1. Color: Gray.
  - 2. Movement Capability: Plus and minus 25 percent.
  - 3. Service Temperature Range: -40 to 180 degrees F.
  - 4. Shore A Hardness Range: 20 to 35.
- D. Polyurethane Sealant: ASTM C920; polyurethane based, non-sag elastomeric sealant; Grade NS, Uses M and A; single or multi-component; paintable.
  - 1. Manufacturers:

- a. Sika Corporation (Basis of Design).
- b. BASF, Sonneborn.
- c. Pecora Corporation.
- d. Substitutions: Section 01 60 00 - Product Requirements.
2. Color: To be selected by Architect from manufacturer's full range.
3. Movement Capability: Plus and minus 35 percent, minimum; ASTM C719.
4. Service Temperature Range: Minus 40 to 170 degrees F.
5. Shore A Hardness Range: 20 to 45; ASTM C661.
6. Tensile Stress: 125 - 175 psi at 21 days; ASTM D412.
7. Elongation to Break: 550 percent, minimum; ASTM D412

## 2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 40 00 - Quality Control: Verification of existing conditions before starting work.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

### 3.2 PREPARATION

- A. Section 01 40 00 - Quality Requirements: 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. Perform installation in accordance with ASTM C1193.
- B. 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.
- C. Install bond breaker where joint backing is not used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tool joints concave.

### **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.

### **3.6 SCHEDULE**

- A. Exterior Joints for Which No Other Sealant Type is Indicated: Silicone – DOWSIL 795.
- B. Control and Expansion Joints in Paving: Silicone – Self Leveling.
- C. Control, Expansion, and Soft Joints in Masonry, and Between Masonry and Adjacent Work: Silicone – DOWSIL 790.
- D. Lap Joints in Exterior Sheet Metal Work: Silicone – DOWSIL 795.
- E. Joints Between Exterior Metal Frames and Adjacent Work (except masonry): Silicone – DOWSIL 795.
- F. Interior Joints at Vertical and Underside of Concrete Panels and Planks: Polyurethane type.
- G. Under Exterior Door Thresholds: Clear silicone – DOWSIL 999A.
- H. Interior Joints for Which No Other Sealant is Indicated: Acrylic – BASF, Sonneborn Sololac.
- I. Control and Expansion Joints in Interior Concrete Slabs and Floors: Silicone – Self Leveling.
- J. Joints Between Plumbing Fixtures and Walls and Floors, and Between Counter tops and Walls: White silicone - sanitary type.

**END OF SECTION**



**SECTION 07 95 00**  
**EXPANSION CONTROL**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes expansion joint 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:
  - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes, 2014.
  - 2. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric), 2013.
  - 3. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles, 2010.

**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 EXPANSION JOINT ASSEMBLIES**

- A. Manufacturers:
  - 1. MM Systems Corporation. (Basis of Design)
  - 2. Architectural Art Mfg., Inc.
  - 3. Construction Specialties, Inc.
  - 4. Balco, Inc.
  - 5. Watson Bowman Acme Corp.

**2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS**

- A. Floor to Floor Joints: Flushline System FSS-100, color as selected by Architect from submitted samples.
- B. Wall to Wall Joints: Interior Masonry MM Corp ESS-100, color as selected by Architect from submitted samples.
- C. Wall to Wall Corner Joints: Interior Masonry ESS-100, color as selected by Architect from submitted samples.
- D. Wall to GWB Ceiling Joints: VSGL-200, color as selected by Architect from submitted samples.
- E. Wall to Acoustic Ceiling Joints: VSGL-200, color as selected by Architect from submitted samples.
- F. Ceiling Joints at Suspended Ceiling: VSG-200, color as selected by Architect from submitted samples.
- G. Exterior Wall Joints at Masonry Walls: ESS-100, color as selected by Architect from submitted samples.

**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 having fire rating equivalent to that of assembly into which it is installed.
  - 1. Acceptable Evaluation Agencies: UL, ULC, and Intertek.

**2.4 MATERIALS**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
  - 1. Colors: As selected by Architect from submitted samples.
- 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 submitted samples.

## 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. Install components and accessories in accordance with manufacturer's instructions.
- B. Align materials and cover assemblies as indicated on the Drawings.
- C. Align work plumb and level, flush with adjacent surfaces.
- D. Rigidly anchor to substrate to prevent misalignment.

- E. Where indicated, apply field sealant to exterior joint material, both sides of joint.

**3.4 PROTECTION**

- 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. 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; 2011.
  2. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
  3. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames; 2014.
  4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- B. Americans With Disabilities Act (ADA):
1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- 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.
  2. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
  3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. International Code Council (ICC):
1. ICC A117.1 - Accessible and Usable Buildings and Facilities.
- 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, Fire Windows.
  2. NFPA 101 - Life Safety Code.
  3. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives; 2019.

4. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
  5. NFPA 257 - Standard On Fire Test For Window And Glass Block Assemblies; 2017.
- G. Steel Door Institute (SDI):
1. SDI 117 - Tolerances, 2013.
- H. Underwriters Laboratories Inc.:
1. UL (Dir) - Online Certifications Directory; current edition.
  2. UL 9 - Standard for Fire Tests of Window Assemblies.
  3. UL 10B - Fire Tests of Door Assemblies.
  4. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  5. UL 1784 - Air Leakage Tests of Door Assemblies.

### 1.3 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.

### 1.4 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.

### 1.5 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.

**1.6 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.

**1.7 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 compliance with overall fire rated separation requirements.
- C. Coordinate Work with frame and door opening construction and door hardware and glazing installation.
- 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.

**1.8 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.
  - 2. Curries.
  - 3. Pioneer Industries.
  - 4. Republic Doors and Frames.
  - 5. Steelcraft.
  - 6. 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 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 the following;
  4. 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.
  5. Gasketing: Provide gasketing and edge sealing as necessary to achieve leakage limit.
  6. 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. Level A Physical Performance; 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. Coating apply 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 14 16**  
**FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes flush wood doors; flush and flush glazed configuration; fire rated and non-rated.
- B. Related Requirements:
  - 1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  - 2. Section 08 11 13 - Hollow Metal Doors and Frames: Metal frames for wood doors.
  - 3. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts.
  - 4. Section 08 71 00 - Door Hardware.
  - 5. Section 08 80 00 - Glazing.

**1.2 REFERENCES**

- A. Architectural Woodwork Institute:
  - 1. AWI - Quality Standards Illustrated.
- B. Forest Stewardship Council:
  - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- C. Hardwood Plywood and Veneer Association:
  - 1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- D. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
  - 2. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- E. Underwriters Laboratories Inc.:
  - 1. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.
- F. California Department of Health Services:
  - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit information on door core materials and construction, and on veneer species, type and characteristics.
- C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.
- D. 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.

#### **1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with AWI Quality Standard Section 1300, Premium Grade.
- B. Finish doors in accordance with AWI Quality Standard Section 1500.
- C. Fire Rated Door Construction: Conform to the following:
1. UL 10C - Positive Pressure Fire Test.
- D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated requirements as indicated on Drawings.
- E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.

#### **1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

#### **1.6 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 Section 1300.

#### **1.7 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with door opening construction, door frame and door hardware installation.
- C. Coordinate fire rating of metal frames to fire rating requirements of doors and wall construction for compliance with overall fire rated separation requirements.

#### **1.8 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.
- B. Furnish manufacturer's "Life of Installation" warranty for interior doors.
1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

### **PART 2 PRODUCTS**

#### **2.1 FLUSH WOOD DOORS**

- A. Manufacturers:
1. Oshkosh Architectural Door Company.
  2. Graham Wood Doors/ASSA ABLOY.
  3. Algoma Hardwoods Inc.
  4. Eggers Industries.
  5. Marshfield Door Systems.
  6. VT Industries.

- 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Solid core flush wood doors; wood veneer facing material; fire rated and non-rated types; flush and flush glazed design; factory pre-fit; shop finished site finished; wood doors.
  - 1. Flush Interior Doors: 1-3/4 inches thick; solid core, hot-press five ply construction, fire rated as indicated on Drawings.
- C. Interior Door Faces:
  - 1. Transparent Finished Faces: Wood veneer.
    - a. Species:
      - 1) Red Oak.
    - b. Veneer Cut:
      - 1) Rift cut.
    - c. Veneer Matching: Book matched.
    - d. Face Matching: Balanced. Pair match multiple door leaves in single opening.

## 2.2 COMPONENTS

- A. Solid Core, Non-Rated: AWI Section 1300, Type PC - Particleboard.
  - 1. Interior Composite Wood Products: Meets California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- B. Solid Core, Fire Rated: AWI Section 1300, Type FD rating as scheduled; Category A for positive pressure fire test.
- C. Interior Veneer Facing: AWI Custom quality wood, plain sliced, with balanced match matched grain, for transparent finish. Pair match multiple door leaves in single opening.
- D. Facing Adhesive: Type I - waterproof.
  - 1. Interior Adhesives: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

## 2.3 ACCESSORIES

- A. Hardware: As specified in Section 08 71 00 - Door Hardware.
- B. Glazing Stops: Wood, of same species as door facing, with metal clips for rated doors, mitered corners.

## 2.4 FABRICATION

- A. Fabricate doors in accordance with AWI Quality Standards requirements.
- B. Furnish lock blocks at lock edge and top of door for closer for hardware reinforcement.
- C. Vertical Exposed Edge of Stiles: Wood veneer matching door facing.
- D. Bond edge banding to cores.
- E. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Furnish solid blocking for through bolted hardware.
- F. Factory fit doors for frame opening dimensions identified on shop drawings.
- G. Provide edge clearances in accordance with AWI 1300.

**2.5 SHOP FINISHING**

- A. Finish work in accordance with AWI - Section 1500 Factory Finishing; Custom Quality; Stained Transparent Type:
  - 1. Conversion Varnish.
  - 2. Color:
    - a. As selected by Architect from submitted samples.
- B. Seal door top edge with color sealer to match door facing.

**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. Install doors in accordance with AWI Quality Standards requirements.
- B. Coordinate installation of doors with installation of frames specified in Section 08 11 13.
- C. Coordinate installation of doors with installation of door hardware specified in 08 71 00.
- D. Coordinate installation of glass and glazing specified in Section 08 80 00.
- E. Wood Glazing Stops: Recess fasteners and finish recess holes to flush and to match wood finish.

**3.4 INSTALLATION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Conform to AWI requirements for fit and clearance tolerances.
- C. Conform to AWI Section 1300 requirements for maximum diagonal distortion.
- D. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over imaginary 36 x 84 inches surface area.
- E. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over imaginary 36 x 84 inches surface area.

**3.5 ADJUSTING**

- A. Section 01 73 00 - Execution: Adjusting.
- B. Adjust door for smooth and balanced door movement and latching.

**3.6 SCHEDULE**



- A. Refer to Door and Frame Schedule on Drawings.

**END OF SECTION**



**SECTION 08 17 43****INTEGRATED COMPOSITE DOOR OPENING ASSEMBLIES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes fiber reinforced polyester (FRP) faced aluminum doors and frames.
- B. Related Requirements:
  - 1. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
  - 2. Section 08 80 00 - Glazing.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
  - 2. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix), 2017.
- B. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 3. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
  - 4. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.

**1.3 SYSTEM DESCRIPTION**

- A. Aluminum framed entrance system with aluminum doors faced with fiber reinforced polyester faces.

**1.4 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.
- 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.

**1.5 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.

## 1.6 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 three (3) years documented experience.

## 1.7 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.

## 1.8 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 INTEGRATED COMPOSITE DOOR OPENING ASSEMBLIES

- A. Manufacturers:
  - 1. Cline Aluminum Doors.
  - 2. Commercial Door Systems.
  - 3. Kawneer Co., Inc.
  - 4. Special-Lite, Inc.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description:
  - 1. Aluminum Frame: Non-thermally broken; applied door stops.
  - 2. Door: Fiber reinforced polyester faced aluminum framed doors.
  - 3. Door Thickness: As indicated on Drawings, but not less than 1-3/4 inches thick.
  - 4. Door Size: As indicated on Drawings.

### 2.2 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.
- B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.
- C. Door Face: Fiber reinforced polyester, 0.120 inch thick; pebble finish.
- D. Reinforcement for Hardware: Provide minimum internal 3/16" steel reinforcing.
- E. Insulation:
  - 1. 25 psi density polystyrene core.
- F. Hardware:
  - 1. Coordinate with Section 08 71 00 – Door Hardware and provide door hardware for types of doors, applications and hardware indicated:
    - a. Weatherstripping: Wool pile, continuous and replaceable.
    - b. Hinges: Specified in Section 08 71 00. Continuous type, non-removable pin.
    - c. Threshold: Specified in Section 08 71 00. Extruded aluminum, one piece for each door opening, ribbed surface.
    - 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: Exposed hardware to match hardware finishes specified in Section 08 71 00.
- G. Fasteners: Stainless steel.
- H. Vision Lights:
  - 1. Manufacturer's integral aluminum frame, factory glazed with 1 inch insulated tempered glass as specified in Section 08 80 00 – Glazing for glazing type. Allow for thermal movement.

### 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. Door configuration indicating Stiles and Rails:
  - 1. Side Stiles: As indicated on Drawings, but not less than 5-1/2 inches wide, reinforced minimum 3/16 inch thick.
  - 2. Top and Bottom Rails: As indicated on Drawings, but not less than 6 inches wide, reinforced minimum 3/16 inch thick
- C. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- D. Prepare components to receive anchor devices. Fabricate anchors.
- E. Arrange fasteners and attachments to conceal from view.
- F. Prepare components with heavy duty internal reinforcement for door hardware.
- G. Reinforce framing members for imposed loads.

### 2.4 SHOP FINISHING

- A. Painted Aluminum Surfaces: AA-M12C12R1x non-specular as fabricated mechanical finish, chemically cleaned, and prepared for applied coating; with organic coating.
  - 1. High Performance Organic Coating: Fluoropolymer coating system complying with AAMA 2604 minimum two-coat, with minimum 70 percent polyvinylidene fluoride resin.
  - 2. Color: To match door frame in which door is set.

- B. FRP: As selected by Architect from manufacturer's full range of colors and 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. 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. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- B. Provide alignment attachments and shims to permanently fasten system to building structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.
- D. Provide thermal isolation where components penetrate or disrupt building insulation.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Set thresholds in bed of mastic and secure.
- G. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.
- H. Install infill panels using method required to achieve performance criteria.
- I. 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 31 13**  
**ACCESS DOORS AND FRAMES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes non-rated access doors and panels with frames.
  - 1. Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
  - 2. Coordinate exact locations with various trades to assure proper placement of access doors and panels.
- B. Related Requirements:
  - 1. Section 04 20 00 - Unit Masonry: Placement of access frame unit anchors in masonry partitions.
  - 2. Section 09 21 16 - Gypsum Board Assemblies: Placement of access frame unit anchors in gypsum board partitions.
  - 3. Section 09 90 00 - Painting and Coating: Field paint finish.
  - 4. Divisions of Work such as plumbing, HVAC and electrical construction requiring access doors.

**1.2 REFERENCES**

- A. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- B. Underwriters Laboratories Inc.:
  - 1. UL - Building Materials Directory.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations and details of adjoining Work.
- C. Shop Drawings: Indicate exact position of access door units.
- D. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures.
- B. Project Record Documents: Record actual locations of access units.

**1.5 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work with work requiring controls, valves, traps, dampers, cleanouts, and similar items requiring operation being located behind finished surfaces.

**PART 2 PRODUCTS****2.1 ACCESS DOORS AND PANELS**

- A. Manufacturers:
  - 1. Acudor Products, Inc.
  - 2. J. L. Industries.
  - 3. Karp Associates, Inc.
  - 4. Nystrom Products Co.
  - 5. Milcor LTD, Partnership.
  - 6. 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.

**2.2 FABRICATION**

- A. 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. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
  - 2. Lock: Screw driver slot for quarter turn cam lock.
- C. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

**2.3 SHOP FINISHING**

- A. Base Metal Protection: Prime coat units with baked on primer.
- B. Finish: 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. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.

1. Set concealed frame type units flush with adjacent finished surfaces.
- B. Position unit to provide convenient access to concealed work requiring access.

**END OF SECTION**



**SECTION 08 33 23**  
**OVERHEAD COILING DOORS**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Exterior overhead coiling doors.
  - 2. Non-fire-rated.
  - 3. Manual operation.
  - 4. Operating hardware.
- B. Related Requirements:
  - 1. Section 07 90 00 - Joint Protection: Sealing joints between frames and adjacent construction.

**1.2 REFERENCES**

- A. Standards References:
  - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
  - 2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
  - 3. ITS (DIR) - Directory of Listed Products; current edition.
  - 4. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
  - 5. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
  - 6. NEMA MG 1 - Motors and Generators; 2014.
  - 7. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
  - 8. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
  - 9. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.
  - 10. UL 864 - Standard for Safety Control Units and Accessories for Fire Alarm Systems, 2014.

**1.3 SUBMITTALS**

- A. See Section 01 33 00 - Submittal Procedures: Requirements, for 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, door panels profile, head/floor/jamb seals, locking hardware, anchorage methods, hardware locations, and installation details. 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. 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.

#### **1.4 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 QUALITY ASSURANCE**

- A. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

#### **1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
  - 1. Adequate plant capacity to furnish quality, sizes, and quantity of products required without delaying progress of the work.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and IDEA Certified Installers and service technicians on staff.

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

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Storage and Protection: Store materials in accordance with manufacturer's recommendations.
- C. Protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- D. Prevent physical damage.

#### **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 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate keying requirements with Owner.
- C. For Doors 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.

#### **1.10 WARRANTY**

- A. Provide manufacturer's warranty of motor, springs, counterbalance and finish of the system for three (3) years or 20,000 cycles, whichever comes first. Manufacturer's warranty for door to be two (2) years.

## **PART 2 PRODUCTS**

### **2.1 EXTERIOR COILING DOORS - TYPE A**

- A. Manufacturers:
  - 1. Roll Up Doors Direct - Model 750. (Basis of Design)
  - 2. Overhead Door Corporation.
  - 3. Cookson Co.
  - 4. Cornell Iron Works, Inc.
  - 5. Raynor Garage Door.
  - 6. Wayne-Dalton, a Division of Overhead Door Corporation
  - 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Capable of withstanding the following positive and negative wind loads without undue deflection or damage to components:
  - 1. For exterior exposed systems, provide designed system with sized system components and anchorage to safely withstand Live Loads, Dead Loads and Wind Loads as indicated on Drawings for the Structural Design and in accordance with ASCE 7-10 and in compliance with the State Building Code for the State in which the project is located. Include design to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
- C. Operation: Design door assembly and all operational components to operate for not less than 20,000 cycles.
- D. Slat Curtain Material:
  - 1. Steel.
- E. Curtain thickness:
  - 1. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation.
    - a. Minimum R-value of 8.1.
- F. Nominal Slat Size: 2 inches wide x required length.
- G. Finish:
  - 1. Factory painted. Color as selected by Architect from submitted samples.
- H. Guides: Angles; galvanized steel.
- I. Hood Enclosure:
  - 1. Match curtain material and finish.
- J. Operation:
  - 1. Manual hand chain lift operation.
- K. Mounting:
  - 1. As indicated on Drawings.
- L. Locking Devices:
  - 1. Side bolt on inside with lock.

### **2.2 MATERIALS**

- A. Curtain Construction: Interlocking slats.

1. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
  2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
  3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure at the following door locations:
    - a. All doors.
- B. Steel Slats:
1. Minimum thickness, 20 gage, ASTM A653/A653M galvanized steel sheet.
  2. Galvanizing: Minimum G90/Z275 coating.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Guides:
1. Steel angles, ASTM A36/A36M, hot-dip galvanized per ASTM A 123/A 123M.
    - a. Size At Interior Doors: As indicated on Drawings.
    - b. Size At Exterior Doors: As required to resist wind loads.
- E. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
1. Minimum thickness, 22 gage.
  2. Finish to match curtain finish.
- F. Lock Hardware:
1. Latching Mechanism: Inside mounted, adjustable keeper, spring activated latch bar feature to keep in locked or retracted position.
  2. Latch Handle: Manufacturer's standard.
  3. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.
  4. Manual Chain Lift: Provide padlockable chain keeper on guide.
- G. 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

## **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. Install units in accordance with manufacturer's instructions.
- B. Install fire-rated doors in accordance with NFPA 80.
- C. Use anchorage 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 unit 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: Testing, adjusting, and balancing.
- B. Adjust coiling door, hardware and operating assemblies for smooth and quiet operation.
- C. Test security and fire alarm system interface for required functionality.

### **3.6 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean coiling door and components.
- C. Remove unneeded labels and visible markings.

**END OF SECTION**



**SECTION 08 33 26**  
**OVERHEAD COILING GRILLES**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Manual 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.

**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 SYSTEM DESCRIPTION**

- A. Manual Operation: Manual push up unit with overhead counter balance device, requiring 25 lbs. nominal force to operate.

**1.4 DESIGN REQUIREMENTS**

- A. Manual Operation: Design grille assembly to operate for not less than 30,000 cycles.

**1.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Manual Operation: Submit general construction, component connections and details.
- 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.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Indicate lubrication requirements and frequency, and periodic adjustments required.

## **1.7 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.

## **1.8 DELIVERY STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Follow manufacturer's instructions.

## **1.9 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.

## **1.10 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.

## **1.11 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.

## PART 2 PRODUCTS

### 2.1 OVERHEAD COILING GRILLES

- A. Manufacturers:
  - 1. Cornell/Cookson, Inc. - VisionAire ESG10. (Basis of Design)
  - 2. Clopay Building Products.
  - 3. Atlas Roll-Lite Overhead Doors.
  - 4. Mahon Door Corporation
  - 5. Wayne-Dalton, a Division of Overhead Door Corporation.
  - 6. 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 to allow shutter to be secured.
    - a. Manual Doors: Manufacturer's standard cylinder dead lock on inside at door jamb, key operated from exterior.
  - 2. Cylinders: Furnished under Section 08 71 00, installed as part of Work of this section.
  - 3. Handle: Inside center mounted, adjustable keeper, spring activated latch bar with feature to keep in locked or retracted position; interior and exterior handle.
  - 4. A chain operated curtain shall be designed so that the door immediately stops upward or downward travel and is maintained in a stationary position when the hand chain is released by user.

### 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.

**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. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- B. Securely and rigidly brace and support components suspended from structure.
- C. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- D. For Grilles Requiring Electrical Connections: Coordinate with this Section, Division 26 - Electrical, and Drawings.
  - 1. Electrical Service: Install wiring from electrical service location to unit 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.
- E. 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. Following completion of installation, including related work by others, lubricate, test, and adjust grilles for easy and quiet operation, free from warp, twist, or distortion.

**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 grille and components as recommended by manufacturer.
- C. Remove labels and visible markings.
- D. Remove surplus materials and debris from the site.

**3.7 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Provide protection against damage.

**3.8 DEMONSTRATION AND TRAINING**

- A. Section 01 79 00 – Demonstration and Training.
- B. Provide demonstration, training and maintenance procedures to Owner’s designated representatives.

**END OF SECTION**





**SECTION 08 41 13****ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS (ADD-4)****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 17 43 - Integrated Composite Door Opening Assemblies.
  4. Section 08 14 16 - Flush Wood Doors
  5. Section 08 44 13 - Glazed Aluminum Curtain Walls.
  6. Section 08 71 00 - Door Hardware:
    - a. Provide reinforcement in storefront framing members to accommodate hardware items other than items specified in this section.
    - b. Preparation of storefront framing members to accommodate electrical hardware devices such as security access readers and automatic operators.
  7. Section 08 80 00 - Glazing: Glazing for aluminum-framed entrances and storefronts.
  8. Division 26 - Electrical:
    - a. Coordination for electrical service for electrical hardware devices such as security access readers and automatic operators.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
1. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
  2. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
  3. AAMA 611, AA-M12C22A41 - Clear Anodized Aluminum Surfaces.
  4. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
  5. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
  6. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
  7. AAMA SFM-1 - Aluminum Store Front and Entrance Manual.
- B. American Society of Civil Engineers:
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
  2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  5. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  6. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  7. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- D. SSPC: The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

### 1.3 SYSTEM DESCRIPTION

- A. Aluminum-Framed Storefront System: Includes tubular aluminum sections with supplementary internal support framing 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.

### 1.4 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.
  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 Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.
- 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 sp, 72 degrees F, 40 Percent RH without seal failure.

- H. 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.
- I. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.45 Btu/sq ft per hour per 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.

## 1.5 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 system interface and maintenance of continuity of building envelope air and weather barrier components by others.
  - 2. Provide sealed calculations demonstrating compliance with wind loading per ASCE 7.
  - 3. Include details of core stile and rail construction, trim for lites and all other components.
  - 4. Include details of finish hardware mounting.
  - 5. Include shop and field sealants by manufacture and product name, and locate 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.

**1.6 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: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- D. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.

**1.7 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.

**1.8 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 sprayed coatings which bond when exposed to sunlight or weather. Provide for adequate ventilation through wrappings.

**1.9 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.

**1.10 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 ten (10) year manufacturer warranty against excessive degradation of metal finishes. Include provision for replacement of units with excessive fading, chalking, peeling, blistering or flaking.

**PART 2 PRODUCTS****2.1 ALUMINUM-FRAMED STOREFRONTS**

- A. Exterior Storefronts: Constructed along exterior of building envelope.
  - 1. Extruded aluminum frame members with internal reinforcement of aluminum or shaped steel structural section as required to withstand imposed loads, including loads imposed by operating doors and hardware of types and sizes indicated.

2. Frames thermally broken from exterior exposed surfaces.
  3. Frame size, configuration, dimensions and profile: As indicated on Drawings.
  4. Double pane insulated glazing and infill panels.
  5. Glass, glazing panels and panel position at frame: As indicated on Drawings.
  6. Exterior Subsills: High performance type, profile of extruded aluminum, thermally broken, with back flange turned up and sealed end dams each end.
  7. Internal weep drainage system to drain to exterior.
  8. Manufacturers:
    - a. Kawneer Co., Inc.
      - 1) Tri-Fab VG 451T, Center Glazed. (Basis of Design)
    - b. Oldcastle Building Envelope.
    - ~~e.~~ EFCO Corp. (ADD-4)
    - d. Tubelite.
    - e. United States Aluminum.
    - f. YKK AP America.
    - g. Substitutions: Section 01 60 00 - Product Requirements.
- B. Interior Storefronts: Constructed as partitions between building interior spaces.
1. Extruded aluminum frame members with internal reinforcement of aluminum or shaped steel structural section as required to withstand imposed loads, including loads imposed by operating doors and hardware of types and sizes indicated.
  2. Frames not thermally broken.
  3. Frame size, configuration, dimensions and profile: As indicated on Drawings.
  4. Single pane non-insulated glazing and infill panels.
  5. Glass, glazing panels and panel position at frame: As indicated on Drawings.
  6. Manufacturers:
    - a. Kawneer Co., Inc.
      - 1) Tri-Fab VG 451, Center Glazed. (Basis of Design)
    - b. Oldcastle Building Envelope.
    - ~~e.~~ EFCO Corp. (ADD-4)
    - d. Tubelite.
    - e. United States Aluminum.
    - f. YKK AP America.
    - g. Substitutions: Section 01 60 00 - Product Requirements.
- C. Same manufacturer must be used for:
1. Aluminum-Framed Entrances and Storefronts.
  2. Glazed Aluminum Curtain Walls.

## 2.2 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.
- B. Sheet Aluminum: ASTM B209, 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:
  1. Exterior Aluminum-Framed Storefront Systems: ASTM A36/A36M; shaped to suit aluminum framing and mullion sections; galvanized in accordance with ASTM A123/A123M.
  2. Interior Aluminum-Framed Storefront Systems: ASTM A36/A36M; shaped to suit aluminum framing and mullion sections; shop primed.
- E. Structural Supporting Anchors Attached to Structural Steel:

1. Design to suite attachment requirements.
- F. Structural Supporting Anchors Attached to Reinforced Concrete Members:
1. Design to suite attachment requirements.
- G. Fasteners: Provide Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened. 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 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, and other hardware indicated in other sections.
    - c. Coordinate storefront frames with the specified doors, types, weight and hardware and as indicated on Drawings. 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.
  4. Glass and Glazing Panels: As indicated on Drawings. Double pane insulated tempered for exterior doors. Single pane tempered for interior doors.
  5. Glazing Stops Profile: As indicated on Drawings.
  6. Stiles: As indicated on Drawings. Coordinate with door hardware attachment and operating requirements.
  7. Top Rail: As indicated on Drawings. Coordinate with door hardware attachment and operating requirements.
  8. Bottom Rail: As indicated on Drawings.
  9. 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. Lock Cylinders: Specified in Section 08 71 00.

- 7. Other hardware as may be indicated on Drawings or in Section 08 71 00.
- 8. 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 gage, 0.040 inch, minimum.
  - 2. Concealed Flashings: Sheet aluminum.
    - a. Thickness: 22 gage, 0.025 inch, minimum.
- N. Firestopping: As specified in Section 07 84 00.
- O. Storefront System Sealants: As recommended by storefront system manufacturer; compatible with glazing panels, infill panels, framing members, flashings and 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.

### **2.3 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. 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.
- 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.

### **2.4 SHOP FINISHING**

- A. Anodized Aluminum Finish:
  - 1. Class I Clear Anodized Finish: AAMA 611, AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Color and Gloss: As selected by Architect from submitted samples.
- C. Touch-Up Materials: As recommended by finish manufacturer for field application.
- D. 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.
- E. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.
- F. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.
- G. 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. Install wall system in accordance with engineered design, manufacturer's instructions and AAMA SFM-1 - Aluminum Storefront and Entrance Manual.
- B. Installation to interface with and maintain continuity of building envelope air and weather barrier components by others.
- C. 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.
    - b. Electrical life safety and security devices.
- D. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- E. Provide alignment attachments and shims to permanently fasten system to building structure.
- F. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.
- G. Provide thermal isolation where components penetrate or disrupt building insulation.
- H. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.
- I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.



- J. Install integral flashings and integral joint sealers.
- K. Set thresholds in bed setting sealant and secure.
- L. Install hardware using hardware manufacturer's templates. Refer to Section 08 71 00 for door hardware requirements other than specified in this section.
- M. Glazing:
  - 1. Coordinate installation of glass with Section 08 80 00 - Glazing; separate glass from metal surfaces.
- N. Install system weather seal sealants, seals, gaskets and glazing and infill panels to achieve performance criteria.
- O. Install perimeter sealant and back 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: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

### **3.5 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, 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.

**END OF SECTION**



**SECTION 08 44 13**  
**GLAZED ALUMINUM CURTAIN WALLS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes:
1. Glazed aluminum curtain wall 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 curtain wall frames and glazing.
  3. Section 08 17 43 - Integrated Composite Door Opening Assemblies.
  4. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts: Storefront systems including storefront entrance doors, frames, and glazed lites.
  5. Section 08 71 00 - Door Hardware:
    - a. Provide reinforcement in curtain wall framing members to accommodate hardware items other than items specified in this section.
    - b. Preparation of curtain wall framing members to accommodate electrical hardware devices such as security access readers and automatic operators.
  6. Section 08 80 00 - Glazing: Glazing for glazed aluminum curtain walls.
  7. Division 26 - Electrical:
    - a. Coordination for electrical service for electrical hardware devices such as security access readers and automatic operators.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
1. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
  2. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
  3. AAMA 611, AA-M12C22A41 - Clear Anodized Aluminum Surfaces.
  4. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
  5. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
  6. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
  7. AAMA MCWM-1 - Metal Curtain Wall Manual.
- B. American Society of Civil Engineers:
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
  2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  5. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  6. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
  7. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
- D. SSPC: The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

### 1.3 SYSTEM DESCRIPTION

- A. Curtain Wall System: Includes tubular aluminum sections with self-supporting framing, 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.

### 1.4 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.
  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 1/175 for panes under 13 feet - 6 inches; and 1/240 plus 1/4 inch for spans over 13 feet - 6 inches; 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 Infiltration: Limit air infiltration through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.
- 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 sp, 72 degrees F, 40 Percent RH without seal failure.

- H. 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.
- I. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.45 Btu/sq ft per hour per 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.

## 1.5 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 system interface and maintenance of continuity of building envelope air and weather barrier components by others.
  - 2. Provide sealed calculations demonstrating compliance with wind loading per ASCE 7.
  - 3. Include details of core stile and rail construction, trim for lites and all other components.
  - 4. Include details of finish hardware mounting.
  - 5. Include shop and field sealants by manufacture and product name, and locate 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 supplied meet or exceed specified requirements.
- H. Installation Data: Special installation requirements.
- I. Field Quality Control Submittals:
  - 1. Reports of required field tests.

**1.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with AAMA MCWM-1 - Metal Curtain Wall 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: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- D. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.
- E. Field Testing: As indicated in Part 3 Execution in this section.

**1.7 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.

**1.8 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 sprayed coatings which bond when exposed to sunlight or weather. Provide for adequate ventilation through wrappings.

**1.9 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.

**1.10 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 ten (10) year manufacturer warranty against excessive degradation of metal finishes. Include provision for replacement of units with excessive fading, chalking, peeling, blistering or flaking.

**PART 2 PRODUCTS****2.1 GLAZED CURTAIN WALL SYSTEM**

- A. Manufacturers:
  - 1. Exterior Curtain Wall Systems:
    - a. Kawneer Co., Inc. - 1600 Wall System 1. (Basis of Design)

- b. Oldcastle Building Envelope.
  - c. EFCO Corp.
  - d. United States Aluminum.
  - e. Vistawall Architectural Products.
  - f. YKK AP America.
  - g. **Tubelite, Inc (ADD-1)**
  - h. Substitutions: Section 01 60 00 - Product Requirements.
- B. Same manufacturer must be used for:
- 1. Aluminum-Framed Entrances and Storefronts.
  - 2. Glazed Aluminum Curtain Walls and Entry Doors.
- C. Product Description: Glazed aluminum curtain wall, thermally broken with interior tubular section insulated from exterior glass retaining member; matching stops and glass retaining member of sufficient size and strength to provide bite on glass; drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system; internal mullion baffles to eliminate "stack effect" air movement within internal spaces.
- 1. Reinforced Mullion: Extruded aluminum cladding with internal reinforcement of shaped steel structural section.

## 2.2 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.
- B. Sheet Aluminum: ASTM B209, 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:
  - 1. Exterior Glazed Aluminum Curtain Wall Systems: ASTM A36/A36M; shaped to suit aluminum framing and mullion sections; galvanized in accordance with ASTM A123/A123M.
  - 2. Interior Glazed Aluminum Curtain Wall Systems: ASTM A36/A36M; shaped to suit aluminum framing and mullion sections; shop primed.
- E. Structural Supporting Anchors Attached to Structural Steel:
  - 1. Design to suite attachment requirements.
- F. Structural Supporting Anchors Attached to Reinforced Concrete Members:
  - 1. Design to suite attachment requirements.
- G. Fasteners: Provide Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened. 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 specified in Section 08 80 00 - Glazing.
- K. Doors:
  - 1. Material: As indicated on Drawings.
  - 2. Thickness: As indicated on Drawings.
  - 3. Curtain Wall 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 frames with the specified doors, types, weight and hardware and as indicated on Drawings. Provide aluminum 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 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. Glazing Stops Profile: As indicated on Drawings.
  5. Stiles: As indicated on Drawings. Coordinate with door hardware attachment and operating requirements.
  6. Top Rail: As indicated on Drawings. Coordinate with door hardware attachment and operating requirements.
  7. Bottom Rail: As indicated on Drawings.
  8. Finish: For aluminum framed doors, finish to match curtain wall 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 gage, 0.040 inch, minimum.
  2. Concealed Flashings: Sheet aluminum.
    - a. Thickness: 22 gage, 0.025 inch, minimum.
- N. Firestopping: As specified in Section 07 84 00.
- O. Curtain Wall System Sealants: As recommended by curtain wall system manufacturer; silicone type, with adhesion in compliance with ASTM C794; compatible with glazing panels, infill panels, framing members, flashings and other components and accessories.
- P. Glazing Gaskets and Accessories: As recommended by curtain wall 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.



**2.3 FABRICATION**

- A. Fabricate system 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.

**2.4 SHOP FINISHING**

- A. Anodized Aluminum Finish:
  - 1. Class I Clear Anodized Finish: AAMA 611, AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Color and Gloss: As selected by Architect from submitted samples.
- C. Touch-Up Materials: As recommended by finish manufacturer for field application.
- D. 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.
- E. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.
- F. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.
- G. 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. Install wall system in accordance with engineered design, manufacturer's instructions and AAMA MCWM-1 - Metal Curtain Wall Manual.
- B. Installation to interface with and maintain continuity of building envelope air and weather barrier components by others.
- C. Coordinate with installers of other products to be installed as integral or surface mounted components to the glazed aluminum curtain wall system.
  - 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.
- D. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- E. Provide alignment attachments and shims to permanently fasten system to building structure.
- F. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent Work.
- G. Provide thermal isolation where components penetrate or disrupt building insulation.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed setting sealant and secure.
- J. Install hardware using hardware manufacturer's templates. Refer to Section 08 71 00 for door hardware requirements other than specified in this section.
- K. Glazing:
  - 1. Coordinate installation of glass with Section 08 80 00 - Glazing; separate glass from metal surfaces.
- L. Install system weather seal sealants, seals, gaskets and glazing and infill panels to achieve performance criteria.
- M. Install perimeter sealant and back to achieve performance criteria conforming with installation criteria specified in Section 07 90 00.

### 3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
- C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

- D. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

**3.5 ADJUSTING**

- A. Section 01 73 00 - Execution: Testing and adjusting.
- B. Adjust operating hardware for smooth operation.

**3.6 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove protective material from prefinished 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 moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

**3.7 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect finished Work from damage.

**END OF SECTION**



SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes:

- 1. Mechanical and electrified door hardware for:
  - a. Swinging doors.
- 2. Electronic access control system components, including:
  - Electronic access control devices.
- 3. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

- 1. Windows
- 2. Cabinets (casework), including locks in cabinets
- 3. Signage
- 4. Toilet accessories
- 5. Overhead doors

C. Related Sections:

- 1. Division 01 Section "Alternates" for alternates affecting this section.
- 2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
- 3. Division 26 sections for connections to electrical power system and for low-voltage wiring.
- 4. Division 28 sections for coordination with other components of electronic access control system.

1.03 REFERENCES

A. UL - Underwriters Laboratories

- 1. UL 10B - Fire Test of Door Assemblies
- 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
- 3. UL 1784 - Air Leakage Tests of Door Assemblies

4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
1. Sequence and Format for the Hardware Schedule
  2. Recommended Locations for Builders Hardware
  3. Key Systems and Nomenclature
- C. ANSI - American National Standards Institute
1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

#### 1.04 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.

B. Action Submittals:

1. Product Data: Technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
  - a. Wiring Diagrams: For power, signal, and control wiring and including:
    - 1) Details of interface of electrified door hardware and building safety and security systems.
    - 2) Schematic diagram of systems that interface with electrified door hardware.
    - 3) Point-to-point wiring.
    - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated, and tagged with full description for coordination with schedule.
  - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
  - a. Door Index; include door number, heading number, and Architects hardware set number.
  - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
  - c. Quantity, type, style, function, size, and finish of each hardware item.
  - d. Name and manufacturer of each item.
  - e. Fastenings and other pertinent information.
  - f. Location of each hardware set cross-referenced to indications on Drawings.
  - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
  - h. Mounting locations for hardware.

- i. Door and frame sizes and materials.
  - j. Name and phone number for local manufacturer's representative for each product.
  - k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include operational descriptions for: egress, ingress (access), and fire/smoke alarm connections.
    - 1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
  - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
  - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
  - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
  - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
    - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
  - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.
- C. Informational Submittals:
- 1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
  - 2. Product data for electrified door hardware:
    - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
  - 3. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
    - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    - b. Catalog pages for each product.
    - c. Factory order acknowledgement numbers (for warranty and service)
    - d. Name, address, and phone number of local representative for each manufacturer.
    - e. Parts list for each product.
    - f. Final approved hardware schedule, edited to reflect conditions as-installed.
    - g. Final keying schedule
    - h. Copies of floor plans with keying nomenclature

- i. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
- j. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

#### 1.05 QUALITY ASSURANCE

- A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  - 1. Warehousing Facilities: In Project's vicinity.
  - 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
  - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
  - 4. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
    - a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
- B. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
  - 1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC).
  - 2. Can provide installation and technical data to Architect and other related subcontractors.
  - 3. Can inspect and verify components are in working order upon completion of installation.
  - 4. Capable of producing wiring diagrams.
  - 5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.
- C. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- D. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
- G. Keying Conference



1. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
  - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - b. Preliminary key system schematic diagram.
  - c. Requirements for key control system.
  - d. Requirements for access control.
  - e. Address for delivery of keys.

#### H. Pre-installation Conference

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

#### I. Coordination Conferences:

1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
  1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
  1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
  2. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
  1. Promptly replace products damaged during shipping.
  2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
  3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys to Owner by registered mail or overnight package service.

### 1.07 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

### 1.08 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated.
    - a. Closers:
      - 1) Mechanical: 30 years.
    - b. Automatic Operators: 2 years.
    - c. Exit Devices:
      - 1) Mechanical: 3 years.
      - 2) Electrified: 1 year.
    - d. Locksets:
      - 1) Mechanical: 10 years.
      - 2) Electrified: 1 year.
    - e. Continuous Hinges: Lifetime warranty.
    - f. Key Blanks: Lifetime
  - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

### 1.09 MAINTENANCE

- A. Maintenance Tools: Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

- B. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

## 2.02 MATERIALS

### A. Fasteners

- 1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
  - 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
  - 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
  - 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
- 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

## 2.03 HINGES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Ives 5BB series.
- 2. Acceptable Manufacturers and Products: Bommer BB series, McKinney TA/T4A series, Stanley FBB Series.

### B. Requirements:

- 1. Provide hinges conforming to ANSI/BHMA A156.1.
- 2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
  - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
  - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
- 3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 4. 2 inches or thicker doors:
  - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins
8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
10. Provide mortar guard for each electrified hinge specified.

## 2.04 CONTINUOUS HINGES

### A. Aluminum Geared

1. Manufacturers:
  - a. Scheduled Manufacturer: Ives.
  - b. Acceptable Manufacturers: Select, Stanley.
2. Requirements:
  - a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
  - b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
  - c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
  - d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
  - e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
  - f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
  - g. Install hinges with fasteners supplied by manufacturer.
  - h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.05 ELECTRIC POWER TRANSFER

### A. Manufacturers:

- a. Scheduled Manufacturer: Von Duprin EPT-10.
- b. Acceptable Manufacturers: ABH PT1000, Securitron CEPT-10.

- B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
- C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.06 FLUSH BOLTS

### A. Manufacturers:

- 1. Scheduled Manufacturer: Ives.
- 2. Acceptable Manufacturers: Burns, Rockwood.

### B. Requirements:

- 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

## 2.07 CYLINDRICAL LOCKS – GRADE 1

### A. Manufacturers and Products:

- 1. Owner Preferred Manufacturer and Product: Schlage ND series.
- 2. Acceptable Manufacturers and Products: Sargent 11-Line, Corbin-Russwin CL3100 series.

### B. Requirements:

- 1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
- 2. Cylinders: Refer to "KEYING" article, herein.
- 3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
- 4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
- 5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
- 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
- 7. Provide electrified options as scheduled in the hardware sets.
- 8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
  - a. Lever Design: Schlage Sparta.

## 2.08 AUXILIARY LOCKS

### A. Deadlocks:

- 1. Manufacturers and Products:
  - a. Owner Preferred Manufacturer and Product: Schlage L400 series.
  - b. Acceptable Manufacturers and Products: Arrow D series, Corbin-Russwin DL4000 series.

2. Requirements:
  - a. Provide mortise deadlock series conforming to ANSI/BHMA A156 and function as specified.
  - b. Cylinders: Refer to “KEYING” article, herein.
  - c. Provide deadlocks with standard 2-3/4 inches (70 mm) backset. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
  - d. Provide manufacturer’s standard strike.

## 2.09EXIT DEVICES

### A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product: Von Duprin 99/33A series.
2. Acceptable Manufacturers and Products: Detex Advantex Series, Precision APEX 2000 series.

### B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer’s approved strikes.
8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Provide dogging indicators (CDSI/HDSI) for visible indication of dogging status.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
  - a. Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
  - b. Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
  - c. Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.
  - d. Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90 degree engagement with strike to prevent door and frame separation under high static load.
  - e. Bottom Latchbolt: Minimum of 0.44 inch (11 mm) engagement with strike.

- f. Product Cycle Life: 1,000,000 cycles.
  - g. Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
  - h. Latch release does not require separate trigger mechanism.
  - i. Cable and latching system characteristics:
    - 1) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
    - 2) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
    - 3) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
    - 4) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
    - 5) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.
16. Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
17. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

## 2.10ELECTRIC STRIKES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Von Duprin 6000 Series.
- 2. Acceptable Manufacturers and Products: Folger Adam 300 Series, HES 1006 Series.

### B. Requirements:

- 1. Provide electric strikes designed for use with type of locks shown at each opening.
- 2. Provide electric strikes UL Listed as burglary-resistant.
- 3. Where required, provide electric strikes UL Listed for fire doors and frames.
- 4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

## 2.11POWER SUPPLIES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 series.
- 2. Acceptable Manufacturers and Products: Securitron BPS series, Security Door Controls 600 series.

### B. Requirements:

- 1. Provide power supplies approved by manufacturer of supplied electrified hardware.
- 2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.

3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
  - a. 12/24 VDC Output, field selectable.
  - b. Class 2 Rated power limited output.
  - c. Universal 120-240 VAC input.
  - d. Low voltage DC, regulated and filtered.
  - e. Polarized connector for distribution boards.
  - f. Fused primary input.
  - g. AC input and DC output monitoring circuit w/LED indicators.
  - h. Cover mounted AC Input indication.
  - i. Tested and certified to meet UL294.
  - j. NEMA 1 enclosure.
  - k. Hinged cover w/lock down screws.
  - l. High voltage protective cover.

## 2.12CYLINDERS

### A. Manufacturers:

1. Scheduled Manufacturer: Best.

### B. Requirements:

1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide the following keyway: Match existing.

### C. Construction Keying:

1. Replaceable Construction Cores.
  - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
    - 1) 3 construction control keys
    - 2) 12 construction change (day) keys.
  - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

## 2.13KEYING

- A. Provide cylinders/cores keyed into Owner's existing factory registered keying system.
- B. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- C. Requirements:
  1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
    - a. Master Keying system as directed by the Owner.



2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
  - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
  - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
4. Identification:
  - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
  - b. Identification stamping provisions must be approved by the Architect and Owner.
  - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
  - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
  - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
  - a. Change (Day) Keys: 3 per cylinder/core.
  - b. Permanent Control Keys: 3.
  - c. Master Keys: 6.

#### 2.14 KEY CONTROL SYSTEM

##### A. Manufacturers:

1. Scheduled Manufacturer: Telkee.
2. Acceptable Manufacturers: HPC, Lund.

##### B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
  - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
  - b. Provide hinged-panel type cabinet for wall mounting.

#### 2.15 KEY MANAGEMENT SOFTWARE

##### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Best Keystone 600N.
2. Acceptable Manufacturers and Products: Schlage SITEMASTER 200, Corbin-Russwin KeyWizard.

##### B. Requirements:

1. Software: Provide tracking, issuing, collecting and transferring information regarding keys. Provide customized query, reporting, searching capability, comprehensive location hardware listings, display key holder photos and signature for verification, and provide automatic reminders for maintenance, back-ups and overdue keys.
2. Provide training for Owner's personnel on proper operation and application of key management software.

## 2.16 DOOR CLOSERS

### A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product: LCN 4010/4110 series.
2. Acceptable Manufacturers and Products: Corbin-Russwin DC8000 series, Sargent 281 series.

### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.17 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN Senior Swing.
2. Acceptable Manufacturers and Products: Besam Swingmaster MP, Horton 4000LE series.

### B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
  - a. Opening: Powered by DC motor working through reduction gears.

- b. Closing: Spring force.
  - c. Manual, hydraulic, or chain drive closers: Not permitted.
  - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
  - e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
  3. Provide drop plates, brackets, or adapters for arms as required to suit details.
  4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
  5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
  6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
  7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

## 2.18DOOR TRIM

### A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

### B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

**2.19 PROTECTION PLATES****A. Manufacturers:**

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

**B. Requirements:**

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:
  - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
  - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
  - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

**2.20 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS****A. Manufacturers:**

1. Scheduled Manufacturers: Glynn-Johnson.
2. Acceptable Manufacturers: Rixson, Sargent.

**B. Requirements:**

1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

**2.21 DOOR STOPS AND HOLDERS****A. Manufacturers:**

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

**B. Provide door stops at each door leaf:**

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

## 2.22 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

### A. Manufacturers:

1. Scheduled Manufacturer: Zero International.
2. Acceptable Manufacturers: National Guard, Reese.

### B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Size of thresholds:
  - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
  - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

## 2.23 SILENCERS

### A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

### B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

## 2.24 MAGNETIC HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturer: LCN.
2. Acceptable Manufacturers: Rixson, Sargent.

### B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

## 2.25 COAT HOOKS

- A. Manufacturers:
  - 1. Scheduled Manufacturer: Ives.
  - 2. Acceptable Manufacturers: Burns, Trimco.
- B. Provide coat hooks as specified.

## 2.26 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
  - 1. Hinges at Exterior Doors: BHMA 630 (US32D)
  - 2. Continuous Hinges: BHMA 628 (US28)
  - 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
  - 4. Protection Plates: BHMA 630 (US32D)
  - 5. Overhead Stops and Holders: BHMA 630 (US32D)
  - 6. Door Closers: Powder Coat to Match
  - 7. Wall Stops: BHMA 630 (US32D)
  - 8. Weatherstripping: Clear Anodized Aluminum
  - 9. Thresholds: Mill Finish Aluminum

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Custom Steel Doors and Frames: HMMA 831.
  - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  - 1. Replace construction cores with permanent cores as indicated in keying section.
- I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
  - 5. Testing and labeling wires with Architect's opening number.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- L. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.03 FIELD QUALITY CONTROL

- A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.
  - 1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

### 3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
  - 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.06 DOOR HARDWARE SCHEDULE

- A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. Hardware Sets:



HARDWARE SET NO. 01

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD EPT	<input type="checkbox"/>	628	IVE
1	EA	POWER TRANSFER	EPT10	<input type="checkbox"/>	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-99-EO 24 VDC	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
1	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	SET	GASKETING	BY DOOR/FRAME MANUFACTURER			
1	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC	<input type="checkbox"/>	LGR	SCE
			Coordinate Power Supply Requirement with Security Provider			
1	EA	DIAGRAM	ELEVATION			DLR
1	EA	DIAGRAM	POINT TO POINT			DLR

COORDINATE WITH ALL RELATED TRADES. ENTRY BY CREDENTIAL OR KEY OVERRIDE.

DOOR CAN BE ELECTRICALLY DOGGED.

PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY RETRACT LATCHBOLT AND ALLOW ENTRY.

UPON LOSS OF POWER DOOR IS LOCKED. DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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## HARDWARE SET NO. 02

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	PANIC HARDWARE	CDSI-99-L-DT-17	<input type="checkbox"/>	626	VON
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	SET	GASKETING	BY DOOR/FRAME MANUFACTURER			
1	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

## HARDWARE SET NO. 03

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	PANIC HARDWARE	CDSI-99-L-NL-17	<input type="checkbox"/>	626	VON
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
1	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			

## HARDWARE SET NO. 04

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	PANIC HARDWARE	CDSI-99-L-DT-17	<input type="checkbox"/>	626	VON
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
1	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			

HARDWARE SET NO. 05

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	ELEC CLASSROOM LOCK	AD-400-CY-70-MTK-SPA-B 4AA	<input type="checkbox"/>	626	SCE
			BATTERY			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	GASKETING	188SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 06

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	REMOVABLE MULLION	KR4954	<input type="checkbox"/>	689	VON
1	EA	PANIC HARDWARE	LD-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
2	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
2	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
2	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	<input type="checkbox"/>	BK	ZER
1	SET	GASKETING	BY DOOR/FRAME MANUFACTURER			
1	SET	MEETING STILE SEAL	BY DOOR/FRAME MANUFACTURER			
2	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL  
MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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HARDWARE SET NO. 07

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	GASKETING	188SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 08

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	REMOVABLE MULLION	KR4954	<input type="checkbox"/>	689	VON
1	EA	PANIC HARDWARE	LD-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	MORTISE CYLINDER	1E74		626	BES
2	EA	PERMANENT CORE	AS REQUIRED		626	BES
2	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
2	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
2	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	GASKETING	188SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	MULLION SEAL	8780NBK PSA	<input type="checkbox"/>	BK	ZER
1	SET	MEETING STILE SEAL	BY DOOR/FRAME MANUFACTURER			
2	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL  
MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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HARDWARE SET NO. 09

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	ELECTRIC STRIKE	6400 FSE 12/24 VAC/VDC	<input type="checkbox"/>	US32D	VON
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30 Provides anchorage for 5th screw used w/Cush Arm		689	LCN
1	EA	BLADE STOP SPACER	4110-61 Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used		689	LCN
1	EA	REMOTE PUSH BUTTON	SUPPLIED BY ACCESS CONTROL PROVIDER		626	
1	EA	POWER SUPPLY	PS902 120/240 VAC Coordinate Power Supply Requirement with Security Provider	<input type="checkbox"/>	LGR	SCE
1	EA	DIAGRAM	ELEVATION			DLR
1	EA	DIAGRAM	POINT TO POINT			DLR

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

REMOTE RELEASE AT RECEPTION DESK TO RELEASE ELECTRIC STRIKE AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 10

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	CLASSROOM X STORERM	ND70X80BD SPA XN12-006	<input type="checkbox"/>	626	SCH
1	EA	ELECTRIC STRIKE	6400 FSE 12/24 VAC/VDC	<input type="checkbox"/>	US32D	VON
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	CREDENTIAL READER	SUPPLIED BY ACCESS CONTROL PROVIDER			
1	EA	REMOTE PUSH BUTTON	SUPPLIED BY ACCESS CONTROL PROVIDER		626	
1	EA	POWER SUPPLY	PS902 120/240 VAC Coordinate Power Supply Requirement with Security Provider	<input type="checkbox"/>	LGR	SCE
1	EA	DIAGRAM	ELEVATION			DLR
1	EA	DIAGRAM	POINT TO POINT			DLR

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. DOOR CAN BE UNLOCKED FROM CORRIDOR TO RECEPTION.

PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY RELEASE STRIKE AND ALLOW ENTRY TO RECEPTION OR CORRIDOR.

REMOTE RELEASE AT RECEPTION DESK TO RELEASE ELECTRIC STRIKE AND ALLOW ENTRY TO CORRIDOR.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DEADLOCK TO BE USED AFTER HOURS TO LOCK RECEPTION FROM CORRIDOR.

HARDWARE SET NO. 11

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	<input type="checkbox"/>	626	SCH
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 12

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	<input type="checkbox"/>	626	SCH
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE



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## HARDWARE SET NO. 13

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 14

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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## HARDWARE SET NO. 15

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 16

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
2	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 17

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.  
 ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.  
 DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.  
 DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 18

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.  
 ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.  
 DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.  
 DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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## HARDWARE SET NO. 19

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
1	EA	GASKETING	770AA-S	<input type="checkbox"/>	AA	ZER
1	EA	DOOR BOTTOM	369AA	<input type="checkbox"/>	AA	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 20

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 21

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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HARDWARE SET NO. 22

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 23

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 24

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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## HARDWARE SET NO. 25

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 26

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

## HARDWARE SET NO. 27

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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## HARDWARE SET NO. 28

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 29

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

## HARDWARE SET NO. 30

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	<input type="checkbox"/>	626	IVE
1	EA	DUST PROOF STRIKE	DP2	<input type="checkbox"/>	626	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
1	EA	SURFACE CLOSER	4111 SCUSH INACTIVE LEAF ACTIVE LEAF	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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## HARDWARE SET NO. 31

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	<input type="checkbox"/>	626	IVE
1	EA	DUST PROOF STRIKE	DP2	<input type="checkbox"/>	626	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
			INACTIVE LEAF			
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
			ACTIVE LEAF			
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

## HARDWARE SET NO. 32

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	GASKETING	488SBK PSA	<input type="checkbox"/>	BK	ZER

## HARDWARE SET NO. 33

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
1	EA	GASKETING	488SBK PSA	<input type="checkbox"/>	BK	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.



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## HARDWARE SET NO. 34

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
1	EA	GASKETING	488SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	DOOR BOTTOM	369AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

## HARDWARE SET NO. 35

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
1	EA	GASKETING	488SBK PSA	<input type="checkbox"/>	BK	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 36

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	<input type="checkbox"/>	626	SCH
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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## HARDWARE SET NO. 37

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 38

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 39

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	DBL CYL STORE LOCK	ND66BD SPA	<input type="checkbox"/>	626	SCH
2	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
1	EA	GASKETING	770AA-S	<input type="checkbox"/>	AA	ZER
1	EA	DOOR BOTTOM	369AA	<input type="checkbox"/>	AA	ZER

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## HARDWARE SET NO. 40

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 41

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 42

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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## HARDWARE SET NO. 43

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK TRIM AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 44

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PANIC HARDWARE	CD-9927-NL-LBR	<input type="checkbox"/>	626	VON
1	EA	PANIC HARDWARE	LD-9927-EO-LBR	<input type="checkbox"/>	626	VON
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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## HARDWARE SET NO. 45

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PANIC HARDWARE	9927-EO-LBR	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-9927-EO-LBR	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993S-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY			
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK TRIM AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 46

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PANIC HARDWARE	9927-EO-LBR	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993S-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SHCUSH	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK TRIM AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 47

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	MORTISE CYLINDER	1E74		626	BES

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## HARDWARE SET NO. 48

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PANIC HARDWARE	CD-99-DT	<input type="checkbox"/>	626	VON
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SHCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

## HARDWARE SET NO. 49

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (USE WIDE THROW HINGES SIZED FOR FRAME DIMENSIONS AT 180 DEGREE SWING DOORS)	<input type="checkbox"/>	652	IVE
2	EA	FIRE EXIT HARDWARE	9949-EO-F-LBL	<input type="checkbox"/>	626	VON
2	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)	<input type="checkbox"/>	689	LCN
1	EA	GASKETING	488SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	ASTRAGAL	BY DOOR/FRAME MANUFACTURER			

DOORS NORMALLY HELD OPEN. UPON LOSS OF POWER OR FIRE ALARM, WALL MAGNETS TO RELEASE AND DOORS WILL CLOSE. DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS

## HARDWARE SET NO. 50

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 5 X 4.5	<input type="checkbox"/>	652	IVE
2	EA	PANIC HARDWARE	9927-L-BE-LBR-17	<input type="checkbox"/>	626	VON
2	EA	SURFACE CLOSER	4111 EDA (SWING 180 @ DOOR S204	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)	<input type="checkbox"/>	689	LCN
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

DOORS NORMALLY HELD OPEN BY WALL MAGNETS. UPON LOSS OF POWER OR FIRE ALARM, MAGNETS TO RELEASE.

HARDWARE SET NO. 51

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 5 X 4.5	<input type="checkbox"/>	652	IVE
2	EA	PANIC HARDWARE	9927-L-BE-LBR-17	<input type="checkbox"/>	626	VON
2	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 52

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
2	EA	PANIC HARDWARE	9927-L-BE-LBR-17	<input type="checkbox"/>	626	VON
2	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 53

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK TRIM AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

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## HARDWARE SET NO. 54

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
2	EA	RIM CYLINDER	1E72		626	BES
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
1	EA	GASKETING	770AA-S	<input type="checkbox"/>	AA	ZER
1	EA	DOOR BOTTOM	369AA	<input type="checkbox"/>	AA	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK TRIM AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

## HARDWARE SET NO. 55

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
			(USE WIDE THROW HINGES SIZED FOR FRAME DIMENSIONS AT 180 DEGREE SWING DOORS)			
2	EA	PANIC HARDWARE	9949-EO-LBL	<input type="checkbox"/>	626	VON
2	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)	<input type="checkbox"/>	689	LCN

DOORS NORMALLY HELD OPEN. UPON LOSS OF POWER OR FIRE ALARM, WALL MAGNETS TO RELEASE AND DOORS WILL CLOSE. DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS



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HARDWARE SET NO. 56

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 57

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	ARMOR PLATE	8400 36" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 58

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	<input type="checkbox"/>	626	IVE
1	EA	DUST PROOF STRIKE	DP2	<input type="checkbox"/>	626	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
			INACTIVE LEAF			
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
			ACTIVE LEAF			
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 59

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PANIC HARDWARE	CD-99-NL	<input type="checkbox"/>	626	VON
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	MORTISE CYLINDER	1E74		626	BES
2	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SHCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 60

Provide each with the following:

Add Hardware Set No. 60.1 at Doors 161.1 and 161.3:  
 60.1 shall be the same as Hardware Set No. 60 with the addition of  
 1 EA FIRE/LIFE WALL MAG SEM7850 AS REQ (12/24/120V AC/DC TRI VOLT) 689 LCN

**ADDM-1**

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	CLASSROOM DEAD LOCK	L463L	<input type="checkbox"/>	626	SCH
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PUSH PLATE	8200 6" X 16"	<input type="checkbox"/>	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	<input type="checkbox"/>	630	IVE
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
			(SWING 180 DEGREES @ DOOR 161.3)			
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP/HOLDER	WS45/WS45X	<input type="checkbox"/>	626	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

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## HARDWARE SET NO. 61

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	PUSH PLATE	8200 6" X 16"	<input type="checkbox"/>	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	<input type="checkbox"/>	630	IVE
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

## HARDWARE SET NO. 62

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	PUSH PLATE	8200 6" X 16"	<input type="checkbox"/>	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	<input type="checkbox"/>	630	IVE
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

## HARDWARE SET NO. 63

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	CLASSROOM LOCK	ND70BD SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

END OF SECTION



**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 17 43 - Integrated Composite Door Opening Assemblies: 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 10 28 00 - Toilet Accessories: Glazing for metal framed mirrors specified in this section.

**1.2 REFERENCES**

- A. American National Standards Institute:
1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety.
- B. American Society of Civil Engineers:
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- C. ASTM International:
1. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
  2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
  3. ASTM C1036 - Standard Specification for Flat Glass; 2011.
  4. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass; 2012.
  5. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
  6. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
  7. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
  8. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.
  9. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
  10. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- D. Consumer Products Safety Commission (CPSC); Code of Federal Regulations (CFR):
1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.

- E. Glass Association of North America:
  1. GANA (GM) - GANA Glazing Manual; 2009.
  2. GANA (SM)- GANA Sealant Manual; 2008.
  3. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
- F. National Fenestration Rating Council Incorporated:
  1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.
  2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
  3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
- G. National Fire Protection Association:
  1. NFPA 80 - Standard for Fire Doors, Fire Windows.
  2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- H. Underwriters Laboratories Inc.:
  1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  2. UL - Building Materials Directory.

### 1.3 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.
  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 for resistance of wind loads for glass and glazing units.
- F. Manufacturer's Certificate: Certify sealed insulating glass units, meets or exceeds specified requirements.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following standards:
  1. GANA (GM) - GANA Glazing Manual; 2009.
  2. GANA (SM)- GANA Sealant Manual; 2008.
  3. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
  4. Maintain one copy of each document on site.
- B. Fire Rated Door Glazing: Tested in accordance with one of the following and complying with NFPA 80.
  1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.

2. UL 10C.
  3. Maintain one copy of each document on site.
- C. Apply label from agency approved by authority having jurisdiction to identify each fire rated glass lite.
  - D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years of documented experience.
  - E. 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.
  - F. Installer Qualifications: Company specializing in performing work of this section with minimum five (5) years of documented experience.

### **1.5 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.

### **1.6 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 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Extra Insulating Glass Units: One (1) percent (minimum of one) of each type and size.

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Provide type and thickness of glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  1. Wind Loads: Design and size glass units and system to safely withstand Live Loads, Dead Loads and Wind Loads as indicated on Drawings for the Structural Design and

- in accordance with ASCE 7-10 and in compliance with the State Building Code for the State in which the project is located. Include design to withstand loads caused by positive and negative wind pressures acting normal to plane of wall, including increased loads at building corners, as calculated in accordance with applicable code.
2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
  4. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, whichever is less with full recovery of glazing materials.
  5. Interior Glass Deflection: Maximum thickness of glass differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor.
  6. 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. Annealed Glass: ASTM C1036, Type I (transparent flat), Class 1 (clear), Quality-Q3.
  2. Heat-Treated Glass:
    - a. Heat-Strengthened Glass: ASTM C1048, Kind HS.
    - b. Fully Tempered Safety Glass: ASTM C1048, Kind FT; ANSI Z97.1 and 16 CFR 1201, Category I or II (size dependent).
  3. Tinted Glass: ASTM C1036, Type 1 (transparent flat), Class 2 (tinted), Quality-Q3, color and performance characteristics as indicated.
  4. Glass Lite Thicknesses: As indicated, but not less than 1/4 inch; provide greater thickness as required for exterior glazing wind load design.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass:
    - a. Complies with ANSI Z97.1 - Class A and 16 CFR 1201 - Category II impact test requirements.
  2. Interlayer: Polyvinyl Butyral (PVB).

## 2.3 INSULATING GLASS UNITS

- A. Glass Manufacturers must meet performance requirements indicated in this Section.
- B. Glass Manufacturers:
1. Guardian Industries Corporation. (Basis of Design)



2. Cardinal Glass Industries.
  3. Pilkington North America Inc.
  4. PPG Industries, Inc.
  5. Viracon, Apogee Enterprises, Inc.
  6. Substitutions: Section 01 60 00 - Product Requirements.
- 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: 1/2 inch, unless indicated otherwise in Schedule of IGU Types.
    - a. Purge interpane air space with dehydrated air, hermetically sealed.
    - b. Use Argon in lieu of Dehydrated Air only if indicated in Schedule of IGU Types.
  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 SCHEDULE - INSULATING GLASS UNIT TYPES

- A. Insulating Glass Units - Type IG1: Low-e Coated.
1. Outboard Lite: Clear float glass: ASTM C1036, Type 1, Class 1, Quality Q3.
    - a. Basis of Design: Guardian SunGuard SN 54.
    - b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface, ASTM C1376.
    - c. Properties:
      - 1) Heat-Strengthened to comply with performance requirements.
      - 2) Fully Tempered glass for safety where indicated on Drawings as IG1T.
  2. Inboard Lite: Clear float glass: ASTM C1036, Type 1, Class 1, Quality Q3.
    - a. Properties:
      - 1) Heat-Strengthened to comply with performance requirements.
      - 2) Fully Tempered glass for safety where indicated on Drawings as IG1T.
      - 3) Laminated glass for safety where indicated on Drawings – see Partial Elevations.. Laminated Inboard Lites are not required to be Heat-Strengthened or Tempered.
  3. Glass Unit Performance Characteristics:
    - a. Visible Light Transmittance (%): 54
    - b. Visible Light Reflectance Outdoors (%): 13
    - c. Winter U-Value Nighttime: 0.29
    - d. Solar Heat Gain Coefficient (SHGC): 0.28
    - e. Light to Solar Gain (LSG): 1.92
  4. Provide labeling where safety glazing labeling is required.
- B. Insulating Glass Units Type - IG3: TintedLow-e Coated.

1. Outboard Lite: Tinted float glass: ASTM C1036, Type 1, Class 2, Quality Q3
    - a. Basis of Design: Guardian SunGuard SNX 51/23; tinted – architect to select from manufacturer’s full range of colors..
    - b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface, ASTM C1376.
    - c. Properties:
      - 1) Heat-Strengthened to comply with performance requirements.
      - 2) Fully Tempered glass for safety where indicated on Drawings as IG3T.
  2. Inboard Lite: Clear float glass: ASTM C1036, Type 1, Class 1, Quality Q3
    - a. Properties:
      - 1) Heat-Strengthened to comply with performance requirements.
      - 2) Fully Tempered glass for safety where indicated on Drawings as IG3T.
      - 3) Laminated glass for safety where indicated on Drawings – see Partial Elevations.. Laminated Inboard Lites are not required to be Heat-Strengthened or Tempered.
  3. Glass Unit Performance Characteristics:
    - a. Visible Light Transmittance (%): 43
    - b. Visible Light Reflectance Outdoors (%): 11
    - c. Winter U-Value Nighttime: 0.29
    - d. Solar Heat Gain Coefficient (SHGC): 0.22
    - e. Light to Solar Gain (LSG): 1.99
  4. Provide labeling where safety glazing labeling is required.
- C. Insulating Glass Units - Type IG2: Tinted Low-e Coated; Translucent and Laminated.
1. Outboard Lite: Tinted float glass: ASTM C1036, Type 1, Class 2, Quality Q3.
    - a. Basis of Design: Guardian SunGuard SNX 51/23; tinted – architect to select from manufacturer’s full range of colors..
    - b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface, ASTM C1376.
    - c. Properties:
      - 1) Heat-Strengthened to comply with performance requirements.
  2. Inboard Lite: Laminated clear float glass; consisting of 2 layers of 1/8 inch glass; 0.030 translucent polyvinyl butyral interlayer, 0.030 inch thick. ASTM C1036, Type 1, Class 1, Quality Q3.
    - a. Properties:
      - 1) Laminated glass for diffused. light Laminated Inboard Lites are not required to be Heat-Strengthened.
  3. Glass Unit Performance Characteristics:
    - a. Visible Light Transmittance (%): 43
    - b. Visible Light Reflectance Outdoors (%): 11
    - c. Winter U-Value Nighttime: 0.29
    - d. Solar Heat Gain Coefficient (SHGC): 0.22
    - e. Light to Solar Gain (LSG): 1.99
  4. Provide labeling where safety glazing labeling is required.

## 2.5 SCHEDULE - SINGLE LITE GLASS UNIT TYPES

- A. Type FG: Interior Single Lite - Vision Glass.
  1. Applications: Interior glazing unless otherwise indicated.
  2. Glass Type: Annealed float glass.
  3. Tint: Clear.
  4. Total Thickness: 1/4 inch.
- B. Type SG: Interior Single Lite - Safety Glass; Non-fire-rated.
  1. Application: Locations as follows.

- a. Glazed lites in doors, except fire doors.
  - b. Glazed sidelights to doors, except in fire-rated walls and partitions.
  - c. Other locations required by applicable federal, state, and local codes and regulations.
  - d. Other locations indicated on the Drawings.
2. Glass Type: Fully Tempered (Kind FT) float glass.
  3. Tint: Match adjacent glass.
  4. Thickness: 1/4 inch.
- C. Type LG: Interior Single Lite - Safety Glass, Laminated.
1. Application: Locations indicated on Drawings.
  2. Glass Type; Laminated safety glass.
  3. Tint: Clear.
  4. Coating: None.
  5. Total Thickness: 1/4 inch.
- D. Type MR: Mirror Glass.
1. Fully Tempered Safety Glass, Kind FT, Type I (transparent flat), Class 1 (clear), Quality-Q3, with copper and silver coatings, and protective overcoating.
  2. Edges:
    - a. Flat Polished/Ground.
  3. Total 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.
- D. Structural Sealant Glazing (SSG) Adhesive: Structural silicone type as approved by both the metal framing system manufacturer and glass panels manufacturer.

## 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.
- E. Spacer Rod Diameter: As required for application.

- F. Glazing Gaskets: 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, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

### 3.4 INSTALLATION METHODS - Utilize installation method as required by manufacturer and glazing system design.

- A. 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.
- B. 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.
- C. 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.
- D. Installation - 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.
- E. Installation - 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. Laminated Safety Mirror Glass: ASTM C1172, Kind LM laminated mirror glass, ASTM C1036 Type 1 transparent flat, Class 1 clear, Quality Q1 mirror select.
  - 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 fixed 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. Air Movement and Control Association International, Inc.:
  - 1. AMCA 500- L - Laboratory Methods of Testing Louvers for Rating, 2015.
  - 2. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices, 2010.
- B. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. Green Seal:
  - 1. GC-03 - Anti-Corrosive Paints.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Design systems and size system components and anchorage to safely withstand Live Loads, Dead Loads and Wind Loads as indicated on Drawings for the Structural Design and in accordance with ASCE 7-10 and in compliance 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.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. 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.
- C. Product Data: Submit data describing design characteristics, maximum recommended air velocity, design free area, 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 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 Certification for Water Penetration, Air Performance, and Wind Driven Rain, in compliance with AMCA 500-L. 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 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

## **1.8 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.

## **1.9 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 WALL LOUVERS**

- A. Manufacturers:
  - 1. Construction Specialties Inc.
  - 2. Airline Products Co.
  - 3. Airolite.
  - 4. Arrow United Industries.
  - 5. Greenheck Corp.
  - 6. Ruskin.

- 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. Louver Blade Design: Drainable.
  - 1. Storm proof, sloped at 45 degrees, chevron style.
- F. Hinged Units: If indicated on Drawings, provide secondary frame to which louver frame is attached; non-ferrous hinges; all finishes to match colors selected by Architect.

## 2.2 COMPONENTS

- A. Aluminum: ASTM B221 6063 alloy, T5 temper; extruded shape.
- B. Bird Screen: Interwoven wire mesh of aluminum, 0.063 inch diameter wire, 1/2 inch open weave, square design.
- C. Insect Screen: 18 x 16 size aluminum mesh, set in aluminum frame.

## 2.3 ACCESSORIES

- A. Fasteners and Anchors: Concealed; stainless steel type.
- B. Flashings: Sheet aluminum.
- C. Sealants: Silicone type specified in Section 07 90 00.

## 2.4 FABRICATION

- A. Louver Blade: Slope and style as specified; reinforced with intermediate stiffeners if required for size indicated, material thickness of 0.064 inch minimum, integral and lateral rain water stops positioned on blade.
- B. Louver Frame: Channel shape, mechanically fastened corner joints, material thickness of 0.064 inch minimum. Form perimeter of frames with recessed channel to retain backer rod for sealant application.
- C. Intermediate Mullions: Concealed of extruded aluminum, profiled to suit louver frame.
- D. Head and Sill Flashings: Extruded to required shape, single length in one piece for each location.
- E. Screens: Install screen mesh in shaped frame, reinforce corner construction, shop install to louver with fasteners.
- F. Blank-Off Panel on Interior of Louver: Same material as louver and frame:
  - 1. Configuration: Composite panel.
  - 2. Face Material: Aluminum.
  - 3. Core: Rigid polyurethane.
  - 4. Thickness: 2 inches.
  - 5. Color: Exterior surface, flat black.

## 2.5 FACTORY FINISHING

- A. All Surfaces and Components: Factory applied; 100% Fluoropolymer Resin Powder Coat System. Finish thickness to be 1.5 to 3.0 mils. Polyester powder or solvent based fluoropolymer finishes not acceptable.

- B. Colors and Gloss: As selected by Architect from submitted samples.

### **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. Install louvers level and plumb.
- B. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- C. Secure louvers in opening framing with concealed fasteners.
- D. Install bird and insect screen and frame to interior of louver.
- E. Install bird screen and frame to intake louvers. Install insect screens to room louvers.
- F. 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. Strip protective finish coverings.
- C. Clean surfaces and components.

**END OF SECTION**

**SECTION 09 21 16**  
**GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Gypsum board and joint treatments.
  2. Backer board..
  3. Exterior sheathing.
  4. Exterior soffits.
  5. Metal framing and support systems.
  6. Acoustic attenuation insulation.
  7. Acoustic sealant and spray.
  8. Accessories and trim.
- B. Related Requirements:
1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  2. Section 05 40 00 - Cold-Formed Metal Framing.
  3. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood blocking for support of wall cabinets, toilet accessories and other wall mounted Work.
  4. Section 07 21 00 - Thermal Insulation: Insulation for gypsum board assemblies requiring thermal insulation.
  5. Section 07 90 00 - Joint Protection.

**1.2 REFERENCES**

- A. American National Standards Institute
1. ANSI A118.9 - Test Methods And Specifications For Cementitious Backer Units;1990.
- B. ASTM International:
1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2017.
  2. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members, 2015.
  3. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes, 2014.
  4. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products 2016.
  5. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.
  6. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
  7. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
  8. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
  9. ASTM C834 - Standard Specification for Latex Sealants; 2017.
  10. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2018.
  11. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.

12. ASTM C1104/C1104M - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation; 2013.
  13. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base, 2014.
  14. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
  15. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
  16. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013.
  17. ASTM C1304 - Standard Test Method for Assessing the Odor Emission of Thermal Insulation Materials; Reapproval 2013.
  18. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2018.
  19. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
  20. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
  21. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels. 2015.
  22. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
  23. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
  24. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
  25. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, 2016.
  26. ASTM E413 - Classification for Rating Sound Insulation; 2016.
  27. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- C. Gypsum Association:
1. GA-214 - Recommended Levels of Gypsum Board Finish; 2010.
  2. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
  3. GA-600 - Fire Resistance Design Manual Sound Control; 2012.
- D. International Organization for Standardization (ISO):
1. ISO 11600 - Building Construction - Jointing Products - Classification And Requirements For Sealants; 2002 with 2011 Amendments.
- E. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.
- F. Underwriters Laboratories Inc.:
1. UL - Fire Resistance Directory.
- G. California Department of Health Services:
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on metal framing; gypsum board and sheathing; joint treatment materials; and acoustic accessories.



- C. Shop Drawings: Indicate special details associated with fireproofing and acoustic accessories.
  - 1. Show type, weight, location, and spacing of members. Clearly identify attachments and connections using AWS symbols for welds, standard designations for fasteners. Show bracing, supplemental strapping, clips, and other accessories required.
  - 2. Delegated Engineering Design: Shop drawings shall be sealed by a licensed Professional Structural Engineer registered in the State in which the project is located and shall include structural calculations verifying compliance with the performance data specified and as noted on the building code data sheet of the drawings. It is the responsibility of such engineer that all provisions of the State Building Code, for the State in which the Work will be constructed, shall be met. Verify and coordinate stud depth with the partition schedule on the architectural drawings. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work. Show type, weight, location, and spacing of members. Clearly identify attachments and connections using AWS symbols for welds, standard designations for fasteners. Show bracing, supplemental strapping, clips, and other accessories required.
- D. Samples:
  - 1. Submit two sets of full ranges of manufacturer's options of items indicated under the heading of ACCESSORIES in this Section. Submit for selection by Architect.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with GA-214, GA-216 and GA-600.
- B. Fire Rated Wall Construction: Wall assembly fire rating to be as indicated on Drawings and as required by building code.

#### 1.5 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 three (3) years documented experience.
- C. Delegated Engineering Design: Design all metal stud and cold rolled steel framing using the engineering services of a Professional Structural Engineer experienced in design of this Work and licensed to perform professional engineering services in the State in which the project is located.

### PART 2 PRODUCTS

#### 2.1 INTERIOR GYPSUM BOARD MATERIAL

- A. Manufacturers:
  - 1. United States Gypsum Co. (Basis of Design)
  - 2. CertainTeed Corporation.
  - 3. G-P Gypsum Corp.
  - 4. National Gypsum Co.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Standard Gypsum Board: ASTM C1396/C1396M; 5/8 inch thick; maximum available length in place; ends square cut; tapered edges.
  - 1. Type X; fire resistant.
  - 2. Locations: All interior locations, unless indicated otherwise on Drawings.

- C. Abuse Resistant Gypsum Board: 5/8 inch thick; maximum available length in place; ends square cut; tapered edges.
1. USG – Firecode C Core. (Basis of Design)
  2. Locations: All interior locations, unless indicated otherwise on Drawings.
  3. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
  4. Surface Abrasion: Level 2, minimum, per ASTM C1629/C1629M.
  5. Indentation: Level 1, minimum, per ASTM C1629/C1629M.
  6. Soft Body Impact: Level 2, per ASTM C1629/C1629M.
  7. Hard Body Impact: Level 1, minimum, per ASTM C1629/C1629M.
  8. Locations: Use Abuse Resistant Gypsum Board on all interior walls, from finish floor extending up to 8 ft - 0 inches above finish floor, in the following rooms and areas:
    - a. All classrooms and rooms of instruction and teaching.
    - b. Media Center.
    - c. All circulation areas, corridors and passageways.
- D. Moisture Resistant Gypsum Board: 5/8 inch thick; maximum available length in place; ends square cut; tapered edges.
1. USG - Mold Tough Firecode C. (Basis of Design)
  2. Water Absorption: 5 percent, maximum, per ASTM C473.
  3. Mold Resistance: Score of 10, per ASTM D3273.
  4. Comply with ASTM C1396/C1396M for water resistant and exterior gypsum soffit board.
  5. Locations: Use Moisture Resistant Gypsum Board in the following rooms and areas:
    - a. All wet areas.
    - b. Kitchen bulkheads.

## 2.2 EXTERIOR GYPSUM BOARD MATERIAL

- A. Exterior Gypsum Sheathing Board: 5/8 inch thick; maximum available size in place; ends square cut; square edges
1. USG - Securock Glass-Mat Sheathing Firecode X. (Basis of Design)
  2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
  3. Tensile Bond: 15 psi, minimum, for cementitious and acrylic adhesives, per ASTM C297.
  4. Mold Resistance: Score of 10, per ASTM D3273.
- B. Exterior Gypsum Soffit Board: 5/8 inch thick; maximum available length in place; ends square cut; tapered edges.
1. USG - Mold Tough Firecode C. (Basis of Design)
  2. Comply with ASTM C1396/C1396M for water resistant and exterior gypsum soffit board.
  3. Suitable for paint.

## 2.3 FRAMING MATERIALS:

- A. Thicknesses provide here are minimum and subject to increase by Delegated Engineer's design requirements.
1. Studs: ASTM C645; galvanized sheet steel, 0.033 inch thick (20 gauge), C shape.
  2. Runners and Tracks: ASTM C645; galvanized sheet steel, 0.033 inch thick (20 gauge).
  3. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, 0.033 inch thick (20 gauge), C/H shape.
  4. Furring, Framing, and Accessories: ASTM C645; galvanized sheet steel, 0.033 inch thick (20 gauge).
- B. Galvanizing:
1. Interior Framing: G40.

2. Exterior Framing: G60.
- C. Fasteners: ASTM C1002; length to suit application.
- D. Framed Partition Head To Structure Connections: Provide one of the following.
  1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
  3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

#### 2.4 SUPPORT MATERIALS:

- A. Suspension systems: ASTM C635 heavy-duty main beam classification; ASTM A653/A653M zinc-coated hot dipped galvanized steel; ASTM C645 Standard specification for rigid furring channels for screw application of gypsum board.
- B. Accessories: Stabilizer bars, clips, splices, and perimeter moldings required for suspended grid system.
- C. Support Channels and Hangers: Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

#### 2.5 ACCESSORIES

- A. Acoustic Attenuation Insulation: Install at interior walls and ceilings where indicated on Drawings.
  1. Mineral Wool Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit.
    - a. Unfaced Type: ASTM C665 Type-I (unfaced); rated flame spread / smoke development of 25 / 50, or less, when tested in accordance with ASTM E84).
      - 1) Application Locations: Where indicated on Drawings.
    - b. Combustion Characteristics: Passes when tested in accordance with ASTM E136.
    - c. Fungi Resistance: Passes when tested in accordance with ASTM C1338.
    - d. Nominal Density: Minimum 2.5 pcf when tested in accordance with ASTM C303.
    - e. Corrosivity to Steel: Passes when tested in accordance with ASTM C665.
    - f. Blanket Width: Sized to fully friction fit space between framing members.
    - g. Blanket Thickness: Sized to fully friction fit cavity, but not less than 3-1/2 inches.
    - h. Manufacturers:
      - 1) Johns Manville.
      - 2) Knauf Insulation.
      - 3) Owens Corning.
      - 4) Rockwool.
- B. Acoustic Sealant: For exposed and concealed joints and annular spaces around through-penetrations. Type to be non-sag, paintable, non-staining latex sealant complying with ASTM C834, ASTM C919 and as follows:
  1. Basis of Design: As indicated on Drawings.

2. Sealant to reduce airborne sound transmission through head-of-wall and bottom-of-wall joints and openings to accommodate through-penetrations in building construction as demonstrated by testing representative assemblies in accordance with ASTM E90.
  3. Sound Transmission Class: Sealant to maintain STC ratings at sound rated partitions as indicated on the drawings.
  4. Flame-Spread and Smoke-Developed Ratings: Not to exceed 25, in accordance with ASTM E84.
  5. Mold and Mildew Resistance: Rating of zero (0), "no growth", in accordance with ASTM G21..
  6. Movement Capability: 12.5%, minimum, in accordance with ISO 11600.
  7. Sealant materials and methods shall conform to applicable governing codes and authorities having jurisdiction.
  8. Maximum volatile organic compound content to be in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Acoustic Sprays: For exposed and concealed joints; sprayable latex material complying with ASTM C919 and the following:
1. Basis of Design: As indicated on Drawings.
  2. Spray to reduce airborne sound transmission through head-of-wall joints in building construction as demonstrated by testing representative assemblies in accordance with ASTM E90.
  3. Sound Transmission Class: Spray to maintain STC ratings at sound rated partitions as indicated on the drawings.
  4. Flame-Spread and Smoke-Developed Ratings: Not to exceed 25, in accordance with ASTM E84.
  5. Mold and Mildew Resistance: Rating of zero (0), "no growth", in accordance with ASTM G21..
  6. Movement Capability: 12.5%, minimum, in accordance with ISO 11600.
  7. Spray materials and methods shall conform to applicable governing codes and authorities having jurisdiction.
  8. Maximum volatile organic compound content to be in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. Finishing Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise. Includes trims such as corner beads, edge trim, control joints and expansion joints.
1. Types: As detailed or required for finished appearance.
    - a. Continuous bead profile required for termination and protection of finish compound edge.
    - b. J-trim, without bead, is not allowed at gypsum board termination end unless indicated on Drawings.
  2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
- E. Expansion Beads (Control Joints): Install at locations indicated on Drawings and not less than 20 feet o.c.
- F. Joint Materials: ASTM C475/C475M; reinforcing tape, joint compound, and water.
- G. Gypsum Board Screws: ASTM C1002; length to suit application; unless otherwise specified in the Delegated Engineering Design.
1. Screws for Steel Framing: Type S; unless otherwise specified in the Delegated Engineering Design.

- H. Exterior Soffit Vents: One piece, perforated, ASTM B221 6063 T5 alloy aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

### **3.2 INSTALLATION**

- A. The following minimum installation requirements are subject to more stringent requirements as may be indicated in the design by the Delegated Engineering Design.
- B. Metal Stud Installation:
  - 1. Install studs in accordance with GA-216 and GA-600.
  - 2. Metal Stud Spacing: 16 inches on center.
  - 3. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
  - 4. Door Opening Framing: Reinforce openings as required for to withstand the forces imposed by the weight and operation of specified doors or operable panels, using not less than double studs at jambs and increased reinforcing as needed.
  - 5. Blocking: Screw wood blocking to studs. Install blocking as required for support of wall mounted construction, devices and equipment similar to, and not limited to, the following:
    - a. Toilet partitions and accessories; cabinet units; visual display surfaces; televisions and monitors; handrails; fixtures.
- C. Wall Furring Installation:
  - 1. Erect wall furring for direct attachment to concrete masonry walls.
  - 2. Erect furring channels vertically; space maximum 24 inches o.c., not more than 4 inches from abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
  - 3. Erect metal stud framing spaced 1/2 inches from concrete masonry walls, attached by adjustable furring brackets.
- D. Wall Furring for Fire Ratings: Install furring as required for fire resistance ratings indicated and to GA-600 requirements.
- E. Ceiling Framing Installation:
  - 1. Install in accordance with GA-216.
  - 2. Coordinate location of hangers with other work.
  - 3. Install ceiling framing independent of walls, columns, and above ceiling work.
  - 4. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.
  - 5. Laterally brace entire suspension system.
- F. Acoustic Accessories Installation:
  - 1. Acoustic Attenuation Insulation: Friction fit insulation within framing cavity in partitions tight within spaces, around cut openings, behind and around electrical and mechanical

- items within or behind partitions, and tight to items passing through partitions. Thickness as required to fill cavity.
2. Acoustic Sealant and Spray:
    - a. General: Comply with Drawings and acoustic sealant and spray manufacturer's written installation instructions for products and applications indicated.
    - b. Standards: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.
    - c. Install acoustic sealant backings of type indicated to support sealant and spray during application in accordance with manufacturer's written installation instructions.
    - d. Install acoustic sealant and spray free of air pockets, embedded foreign matter, sags and ridges.
    - e. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
      - 1) Remove excess acoustic sealant from surfaces adjacent to joint.
      - 2) Remove excess acoustic spray from surfaces adjacent to joint as indicated on the drawings.
      - 3) Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
      - 4) Provide concave joint configuration unless otherwise indicated.
- G. Gypsum Board Installation:
1. Install gypsum board in accordance with GA-216, and GA-600.
  2. Use screws when fastening gypsum board to metal furring or framing.
  3. Erect single layer gypsum board in most economical direction, with ends and edges occurring over firm bearing. Exception as follows:
    - a. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
  4. Erect exterior gypsum sheathing in accordance with ASTM C1280, horizontally, with edges butted and ends occurring over firm bearing.
  5. Double Layer Applications: Secure second layer to first with fasteners. Place second layer parallel to first layer. Offset joints of second layer from joints of first layer.
  6. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.
  7. Place control joints consistent with lines of building spaces as indicated on Drawings and not to exceed distances recommended in GA-216.
  8. Place corner beads at external corners. Use longest practical length.
  9. Edge Trim: Install LC Bead edge trim at locations where gypsum board abuts dissimilar materials. Allow appropriate space for application of appropriate sealant to seal and bridge between the gypsum finished edge trim and the dissimilar material.
  10. Control Joints: Place control joints consistent with lines of building space/features and as indicated in the drawings. When not indicated in the drawings, install control joints as follows:
    - a. Not more than 30 feet apart on walls over 50 feet long.
    - b. At ceilings, not more than 30 feet apart in both directions.
    - c. At interior and exterior gypsum and stucco soffits and bulkheads, at all inside corners of vertical surfaces not more than 30 feet apart on vertical and horizontal surfaces. Control joints installed on vertical surfaces shall continue, in alignment/direction and through corner finish, onto contiguous horizontal surface of like material (like treatment from horizontal surfaces to contiguous vertical surfaces).

- d. At interior and exterior soffits and bulkheads, not more than 30 feet apart on vertical and horizontal surfaces. Control joints installed on vertical surfaces shall continue, in alignment/direction and through corner finish, onto contiguous horizontal surface of like material (like treatment from horizontal surfaces to contiguous vertical surfaces).
- 11. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area indicated.

**H. Joint Treatment:**

- 1. Finish in accordance with GA-214 as listed in schedule at end of this Section.
- 2. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- 3. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- 4. Tape, fill, and sand exposed joints, edges, and corners to produce Finish Level as indicated in Schedule at end of this Section.

**3.3 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet in any direction.

**3.4 SCHEDULES**

- A. Finishes in accordance with Finish Level(s) indicated in GA-214:
  - 1. Level 1: Surfaces above finished ceilings and concealed from view.
  - 2. Level 5: All surfaces exposed to view (includes GWB that is painted or covered with adhered wall covering sheet materials).

**END OF SECTION**





**SECTION 09 30 00****TILING****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Tile and setting for floor applications.
  2. Tile and setting for wall applications.
  3. Thresholds.
  4. Trim and accessories.
  5. Non-ceramic trim.
- B. Related Requirements:
1. Section 03 30 00 - Cast-In-Place Concrete: Slabs on-ground and slabs above-ground.
  2. Section 04 20 00 - Unit Masonry.
  3. Section 09 21 16 - Gypsum Board Assemblies: Metal framed walls.

**1.2 REFERENCE STANDARDS**

- A. American National Standards Institute:
1. ANSI A108/A118/A136 - Installation of Ceramic Tile, 2018:
    - a. Includes ANSI A108.01, .02, .1A, .1B, .1C, .4, .5, .6, .8, .9, .10, .11, .12, .13, .14, .15, .16, and .17 - defines the installation of ceramic tile.
      - 1) ANSI A108.1A - Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar.
      - 2) ANSI A108.1B - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
      - 3) ANSI A108.11 - Interior Installation of Cementitious Backer Units.
      - 4) ANSI A108.13 - Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.
    - b. Include ANSI A118.1, .3, .4, .5, .6, .7, .8, .9, .10, .11, .12, .13, .15, and ANSI A136 - defines the test methods and physical properties for ceramic tile installation materials
      - 1) ANSI A118.1 - Dry-Set Cement Mortar.
      - 2) ANSI A118.3 - Chemical Resistant, Water Cleanable Tile-Setting and - Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
      - 3) ANSI A118.4 - Modified Dry-Set Cement Mortar
      - 4) ANSI A118.5 - Chemical Resistant Furan Mortars and Grouts for Tile Installation.
      - 5) ANSI A118.7 - High Performance Cement Grouts for Tile Installation.
      - 6) ANSI A118.8 - Modified Epoxy Emulsion Mortar/ Grout.
      - 7) ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.
      - 8) ANSI A118.10 - Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
      - 9) ANSI A118.11 - EGP (Exterior Glue Plywood) Modified Dry-Set Mortar.
      - 10) ANSI A118.12 - Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
      - 11) ANSI A118.15 - Improved Modified Dry-Set Cement Mortar.

- 12) ANSI A136.1 - Organic Adhesives for installation of Ceramic Tile.
  2. ANSI A137.1 - Standard Specification for Ceramic Tile, 2012 - Version 1.
  3. ANSI A137.2 - Standard Specifications for Glass Tile, 2013.
- B. ASTM International:
1. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, 2017.
  2. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete, 2016.
  3. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products, 2016.
  4. ASTM C650 - Standard Test Method for Resistance of Ceramic Tile to Chemical Substances, 2004.
  5. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications, 2016.
- C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2018.
- D. California Department of Health Services (CA/DHS):
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

### 1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on tile, mortar, grout, and accessories. Include manufacturer's recommendations for using installation of system components including, but not limited to, tile, setting materials, accessories, trim, grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, trim shapes and locations, junctions with dissimilar materials, control and expansion joints, termination edge conditions, accessories, areas receiving waterproofing membrane, and setting details.
- D. Samples for Initial Selections: Two manufacturer's complete set of color samples illustrating the full range of finishes, textures and colors available for each product; 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 sample 12 x 12 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Include recommended polishes, waxes and other restorative/protective products and methods

**1.6 QUALITY ASSURANCE**

- A. Perform work in accordance with ANSI A108/A118/A136 and TCNA (HB).
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum ten (10) years of documented experience.
- C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five (5) years of documented experience.
- D. Prior to grouting, prepare and protect the finish surfaces of tile work as needed to prevent staining of tile work during the grouting process and cleanup. Tile work that is stained by grout or other material is not acceptable tile work.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Protect adhesives and other temperature sensitive materials from freezing or overheating in accordance with manufacturer's instructions.

**1.8 FIELD CONDITIONS**

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

**1.9 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Stock Materials:
    - a. Five (5) percent full size units of each product type, size, color, shape, profile and surface finish combination installed, but not less than the following:
      - 1) 20 square feet of field tiles.
      - 2) 5 units of each trim and accessory.
      - 3) 16 linear feet of each type and color non-ceramic trim.
      - 4) 16 linear feet of threshold.

**PART 2 PRODUCTS****2.1 TILE**

- A. Manufacturers: All products of each type by the same manufacturer.
  - 1. Crossville Tile Company: [www.crossvilleinc.com](http://www.crossvilleinc.com).
  - 2. Dal-Tile Corporation: [www.daltile.com](http://www.daltile.com).
  - 3. Trinity Tile: [www.trinitytile.com](http://www.trinitytile.com).
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Porcelain Floor and Wall Tile: ANSI A137.1, standard grade.
  - 1. Moisture Absorption: 0.5 to 3.0 percent, tested in accordance with ASTM C373.
  - 2. Basis of Design:
    - a. Trinity Tile - As indicated on Drawings.
  - 3. Colors:
    - a. As indicated on Drawings.

4. Grout Joints Size:
    - a. As recommended by manufacturer.
  5. Sizes:
    - a. As indicated on Drawings.
  6. Thickness: As indicated on Drawings, but not less than 3/8 inch.
  7. Edges:
    - a. Cushioned.
  8. Surface Finishes:
    - a. As indicated on Drawings.
  9. Patterns:
    - a. As indicated on Drawings.
  10. Tile Trim: Refer to TRIM AND ACCESSORIES in this section.
- C. Quarry Tile: ANSI A137.1, standard grade.
1. Moisture Absorption: 0.5 to 3.0 percent, tested in accordance with ASTM C373.
  2. Chemical Resistance: Resistant, tested in accordance with ASTM C650.
  3. Basis of Design:
    - a. DalTile - Quarry Textures.
  4. Colors:
    - a. As indicated on Drawings.
  5. Grout Joints Size:
    - a. As recommended by manufacturer.
  6. Sizes:
    - a. As indicated on Drawings, but not less than 6 x 6 inches.
  7. Thickness: As indicated on Drawings, but not less than 1/2 inch.
  8. Surface Finishes:
    - a. Slip-resistant.
  9. Patterns:
    - a. As indicated on Drawings.
  10. Tile Trim: Refer to TRIM AND ACCESSORIES in this section.

## 2.2 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim Components: For Porcelain Tile Trim.
1. Metal Trim Type: To be installed as recommended by manufacturer and coordinated with tile installation materials.
    - a. Extruded Aluminum; factory finished.
    - b. Profile: Round to provide the following transitions.
      - 1) Provide coved inside corners and transitions from wall to floor.
      - 2) Provide bullnosed edge termination and fully rounded outside corners.
    - c. Colors, Finish, Size and Profiles:
      - 1) To be selected by Architect from submitted samples.
  2. Setting Materials:
    - a. As recommended by Trim Manufacturer and Tile Manufacturer for applicable substrates.
  3. Applications:
    - a. Open edges of wall tile.
    - b. Open edges of floor tile.
    - c. Wall corners, outside and inside.
    - d. Transitions between floor finishes of different heights and dissimilar types.
    - e. Expansion and control joints, floor and wall.
    - f. Floor to wall joints.
    - g. Borders and other trim as indicated on drawings.
  4. Manufacturers:

- a. Schluter-Systems: [www.schluter.com](http://www.schluter.com). (Basis of Design)
- B. Floor Tile Thresholds: Marble, White Carrarra color, honed finish; 2 inches wide by full width of wall or frame opening; both top edges beveled full length; without holes, cracks, or open seams.
  - 1. Thickness as required such that the finish top of adjacent flooring and top of threshold are as indicated on Drawing Detail(s).
  - 2. Applications: Locations indicated on Drawings and as follows.
    - a. At doorways where tile terminates.
    - b. At open edges of floor tile where adjacent finish floor is dissimilar flooring material or is at different height.

### 2.3 SETTING MATERIALS

- A. Bond Coat Materials: As recommended by tile manufacturer and TCNA for substrate types.
  - 1. Latex/Polymer Modified Portland Cement Bond Coat:
    - a. Complying with ANSI A118.4.
- B. Mortar Bed Materials: Thick-set mortar bed setting method.
  - 1. Pre-packaged or field-mixed; complying with ANSI A108.1A and ANSI A108.1B; includes portland cement, sand, latex additive, and water.

### 2.4 GROUT MATERIALS

- A. Manufacturers:
  - 1. Ardex Engineered Cements: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  - 2. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  - 3. Laticrete International, Inc.: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  - 4. MAPEI Corporation: [www.mapei.com](http://www.mapei.com).
  - 5. Merkrete, by Parex USA, Inc.: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
- B. High Performance Polymer Modified Grout: ANSI A118.7, polymer modified cement grout.
  - 1. Applications:
    - a. Use this type of grout where indicated and where no other type of grout is indicated.
  - 2. Use sanded grout for joints 1/8 inch wide and larger; if joint design is indicated to be less than 1/8 inch wide, use unsanded grout.
  - 3. Color(s): To be selected by Architect from full range of colors
  - 4. Basis of Design: Laticrete PermaColor Grout.
- C. Epoxy Grout: ANSI A118.3, chemical resistant and water-cleanable epoxy grout.
  - 1. Applications:
    - a. Use this type of grout where indicated and where no other type of grout is indicated.
    - b. All Quarry Tile work.
  - 2. Use sanded grout for joints 1/8 inch wide and larger; if joint design is indicated to be less than 1/8 inch wide, use unsanded grout.
  - 3. Color(s): To be selected by Architect from full range of colors.
  - 4. Basis of Design: Laticrete SpectraLock Pro Premium.

### 2.5 MAINTENANCE MATERIALS

- A. Tile Joint Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.

1. Applications: Control joints; tile surface change of plane; tile abutment joints to dissimilar materials such as, but not limited to, door frames, drains, gypsum wall board, concrete masonry units, and plumbing pipe penetrations.
  2. Color: Match grout color; sanded type.
  3. Products:
    - a. Same manufacturer as grout material or as per written recommendation from grout manufacturer.
- B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
1. Composition: Water-based colorless silicone.
  2. Products:
    - a. Same manufacturer as grout material or as per written recommendation from grout manufacturer.

## 2.6 ACCESSORY MATERIALS

- A. Waterproofing and Crack Isolation Membrane: Designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10 (waterproofing) and A118.12 (crack isolation).
1. Application: At locations indicated on Drawings and as follows.
    - a. Floor, base and wall tiling; at all thin-set locations; interior and exterior locations.
  2. Fluid or Trowel Applied Type:
    - a. Material: Synthetic rubber.
    - b. Thickness:
      - 1) 40 mils (1.00 mm), minimum, dry film thickness.
    - c. Products:
      - 1) Custom Building Products: RedGard Crack Prevention and Waterproofing Membrane: [www.custombuildingproducts.com](http://www.custombuildingproducts.com)
      - 2) Laticrete International, Inc.:
        - a) Laticrete Hydro Ban: [www.laticrete.com](http://www.laticrete.com)
      - 3) Merkrete, by Parex USA, Inc.: Merkrete Hydro Guard 2000: [www.merkrete.com](http://www.merkrete.com)
      - 4) TEC, an H.B. Fuller Construction Products Brand; TEC HydraFlex Waterproofing Crack Isolation Membrane: [www.tecspecialty.com](http://www.tecspecialty.com)
- B. Cleavage Membrane: At location indicated on Drawings and as follows.
1. Application: Under mortar bed of thick mortar bed tile installation method.
  2. Material: 4 mil (0.1 mm) thick polyethylene film; complying with ASTM C171 or D4397.
- C. Reinforcing Metal Fabric:
1. Welded Wire Fabric: 2 x 2 inches (51 by 51 mm) size weave of 16/16 wire size; welded fabric; galvanized steel; complying with ASTM A1064/A1064M.
    - a. Application: Suspended in mortar bed of thick mortar bed tile installation method.
  2. Expanded Diamond Metal Lath: 3.4 lb/sq yd, self-furring expanded diamond metal lath, complying with ANSI A108.1A (1.0 - 1.2, 1.4 and 5.1).
    - a. Application: Tack welded or mechanically fastened to metal substrate (e.g. metal floor of Walk-In Cooler/Freezer) for mortar bed of thick mortar bed tile installation method.
- D. Backer Board: Fiber-Reinforced Water-Resistant Gypsum Tile Backing Board; ASTM C1278.

**PART 3 EXECUTION****3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- D. Verify that sub-floor surface cracks can be repaired, to include compatible crack isolation membrane, as required to prevent defects from occurring in the tiling work and finish. Otherwise, remove and replace defective concrete.
- E. Verify that sufficient solid anchorage materials are installed for anchoring other work elements that are to be secured through tile.
- F. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- G. Verify that sub-floor slopes to drains where slopes are indicated in contract documents.
- H. For mortar bed method of tile installation, verify that sub-floor is recessed deep enough to accommodate mortar bed thickness variations to achieve slope to floor drains.
- I. Verify the areas that are to receive specified waterproofing membrane prior to proceeding with thin-set method and mortar bed method of tile installations.
- J. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- K. Verify that required floor-mounted utilities and devices are at correct location and elevation.
- L. Verify that floor drains are aligned as indicated on Drawings or, otherwise, aligned parallel with room walls.

**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 surrounding work from damage.
- D. Vacuum clean surfaces and damp clean.
- E. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- F. Install backing board in accordance with ANSI A108.11, board manufacturer's instructions and tile setting adhesive manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
- G. Prepare substrate surfaces for installation of waterproofing membrane in accordance with waterproofing manufacturer's instructions.
- H. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

**3.3 INSTALLATION - GENERAL**

- A. Install tile, transition and termination trim, accessories, setting materials, grout, joint sealants and all tile work in accordance with applicable requirements of ANSI A108.1A through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base, and wall joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size.
- E. Wall Corners: Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Construct expansion, control and contraction joints in compliance with TCNA (HB) Methods prescribed for joint condition.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- K. Prior to grouting, prepare and protect the finish surfaces of tile work as needed to prevent staining of tile work during the grouting process and cleanup. Tile work that is stained by grout or other material is not acceptable tile work.
- L. Grout tile joints unless otherwise indicated. Grout joints to be without voids, cracks, excess mortar or excess grout, or too little grout.
- M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- N. Install tile sealant at tile abutment joints to dissimilar materials such as door frames, drains, GWB, CMU and plumbing pipe penetrations; tile surface change of plane.
- O. Apply grout sealer in accordance with manufacturer's instructions.

### 3.4 INSTALLATION - FLOORS: THIN-SET METHOD

- A. To be used at locations where concrete substrate IS NOT DEPRESSED.
- B. Install in accordance with TCNA (HB) Method as follows:
  - 1. Method F113A with waterproofing membrane.
    - a. Waterproofing and Crack Isolation Membrane; ANSI A118.10 (waterproofing) and A118.12 (crack isolation), specified in this Section.
      - 1) Where wall tile does not extend above the floor tile wall base, extend the membrane up behind the wall base to within 1/4 inch of the top of the wall base.
      - 2) Where wall tile extends above the floor tile wall base and waterproofing membrane continues behind wall tile, waterproofing is to be continuous.
    - b. Bonding Coat:
      - 1) Latex/Polymer Modified Portland Cement Bond Coat; ANSI A118.4, specified in this Section.
    - c. Grout:
      - 1) High Performance Polymer Modified Grout: ANSI A118.7.

### 3.5 INSTALLATION - FLOORS: THICK MORTAR BED METHOD

- A. To be used at locations where concrete substrate IS DEPRESSED.
- B. Install in accordance with TCNA (HB) Method as follows:



1. Method F114.
  - a. Cleavage Membrane, as specified in this Section.
  - b. Mortar Bed with Welded Wire Reinforcing Fabric; as specified in the Section.
    - 1) Mortar Bed Thickness: Minimum 1-1/4 inches; maximum 2 inches.
  - c. Bonding Coat: Latex/Polymer Modified Portland Cement Bond Coat; ANSI A118.4, as specified in this Section.
  - d. Grout: Epoxy Grout; ANSI A118.3.

### 3.6 INSTALLATION - FLOORS: THICK MORTAR BED METHOD FOR WALK-IN COOLER/FREEZER

- A. Basis of Design: Install in accordance with Laticrete Technical Data Sheet TDS 121 - R 2013; Commercial Freezers and Coolers; for installing tile over metal insulated panel.
  1. Steel, metal or aluminum substrates must be rigid and meet the standard for maximum allowable deflection of L/360 for tile.
  2. Tack weld or mechanically fasten 3.4 lb per sq yd, expanded diamond metal lath complying with the current revision of ANSI A108.1 (3.3 Requirements for lathing and portland cement plastering), ANSI A108.02 (3.6 Metal lath) and ANSI A108.1A (1.0 - 1.2, 1.4 and 5.1). Apply latex-portland cement mortar as scratch/leveling coat comprised of 3701 Fortified Mortar Bed; or, 226 Thick Bed Mortar gauged with 3701 Mortar Admix over wire lath, concrete or masonry in compliance with current revision of ANSI A108.01 (3.3.5.1) and A108.1A (1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm.
  3. Install Laticrete HYDRO BAN or 9235 Waterproofing Membrane over the hardened concrete or mortar bed.
  4. Tile can then be installed with polymer thin-set mortar Laticrete 254 Platinum or 254R Platinum Rapid.
  5. Grout:
    - a. Laticrete - Spectralock 2000 IG: ASTM 118.5, furan grout, chemical resistant.
  6. Refer to Laticrete ES-S314 for a more complete description of this method.

### 3.7 INSTALLATION - WALLS: THIN-SET METHODS

- A. Interior and Exterior locations on masonry and concrete substrates.
  1. TCNA Method W202E with waterproofing membrane.
  2. Waterproofing Membrane; ANSI A118.10 (waterproofing), specified in this Section.
    - a. Where wall tile extends above the floor tile wall base and waterproofing membrane continues behind wall tile, waterproofing is to be continuous.
  3. Bonding Coat:
    - a. Latex/Polymer Modified Portland Cement Bond Coat; ANSI A118.4, specified in this Section.
    - b.
  4. Grout:
    - a. High Performance Polymer Modified Grout: ANSI A118.7.
- B. Interior locations on metal framed walls.
  1. TCNA Method W247 with waterproofing membrane.
    - a. Backer Board: Fiber-Reinforced Water-Resistant Gypsum Tile Backing Board; ASTM C1278.
    - b. Waterproofing Membrane; ANSI A118.10 (waterproofing), specified in this Section.
    - c. Bonding Coat:
      - 1) Latex/Polymer Modified Portland Cement Bond Coat; ANSI A118.4, specified in this Section.
    - d. Grout:

- 1) High Performance Polymer Modified Grout: ANSI A118.7.

### **3.8 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean tile and grout surfaces.

### **3.9 PROTECTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not permit traffic over finished floor surface for 4 days after installation.
- C. Protect tile construction from damage and stains.

### **3.10 SCHEDULE**

- A. Kitchens, Food Service Lines, Food Storage Areas, Dishwashing Areas, and other Kitchen connected ancillary rooms:
  1. Tile: Quarry Tile.
- B. Exterior Can Wash Area.
  1. Tile: Quarry Tile.
- C. All Tile Areas Not Indicated In Items A and B Above:
  1. Tile: Porcelain Tile.

**END OF SECTION**

**SECTION 09 51 13**  
**ACOUSTICAL PANEL CEILINGS**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Acoustic Panels.
  - 2. Suspended Metal Grid Ceiling Systems and Perimeter Trim.
  - 3. Suspended Acoustical Clouds.
  
- B. Related Requirements:
  - 1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  - 2. Section 04 20 00 - Unit Masonry.
  - 3. Section 07 95 00 – Expansion Control
  - 4. Section 09 21 16 - Gypsum Board Assemblies.
  - 5. Division 21 - Fire Suppression: Devices in ceiling system.
  - 6. Division 23 - HVAC: Devices in ceiling system.
  - 7. Division 26 - Electrical: Devices in ceiling system.
  - 8. Division 27 - Communications: Devices in ceiling system.
  - 9. Division 28 - Electronic Safety and Security: Devices in ceiling system.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings, 2013.
  - 2. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels, 2013.
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2016.
  - 4. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.2016.
  - 5. ASTM E1264 - Standard Classification for Acoustical Ceiling Products, 2014.
  
- B. Ceilings and Interior Systems Construction Association:
  - 1. CISCA - Acoustical Ceilings: Use and Practice.
  - 2. CISCA - Seismic Zone:
    - a. Seismic (Zones 0-2) Recommendations for Direct-hung Acoustical Tile and Lay-in Panel Ceilings, 2004.
    - b. Seismic (Zones 3-4) Guidelines for Seismic Restraint for Direct Hung Suspended Ceiling Assemblies, 2004.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  
- B. Product Data:
  - 1. Submit data on metal grid system components, acoustic panels and accessories.

- C. Shop Drawings: Show grid layout and dimensioning, panel layouts, lighting fixtures, air diffusers, grilles, and all other items exposed in acoustical ceilings, locations of seismic braces and hangers, and suspension, seismic and bracing details. Show details of junctions with other work or ceiling finishes, and special conditions.
- D. Provide seismic design of suspended ceiling systems under direct supervision of Professional Engineer experienced in design of this Work and licensed in State in which the project is located.
  - 1. Calculations showing that suspension systems will provide full compliance with seismic structural requirements, including the Seismic Design Category indicated on Structural Drawings. Calculations to be sealed by Professional Structural Engineer. Comply with CISCA - Seismic Zone requirements as dictated by the Seismic Design Category indicated on Structural Drawings.
- E. Samples: Submit two samples 6 x 6 inches in size illustrating material and finish of acoustic panels.
- F. Samples: Submit two samples each, 6 inches long, of suspension system main runner, cross runner, perimeter molding and seismic components.
- G. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

#### **1.4 QUALITY ASSURANCE**

- A. Conform to CISCA requirements.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

#### **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 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic panel installation.

#### **1.7 SEQUENCING**

- A. Section 01 30 00 - Administrative Requirements: Scheduling and sequencing.
- B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient air temperature and humidity level is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- C. Install acoustic panels after interior wet work is dry.

#### **1.8 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Furnish 200 sq ft of extra panels of each type and size of acoustical panel to Owner.

**PART 2 PRODUCTS****2.1 ACOUSTICAL PANEL CEILINGS**

- A. Manufacturers:
  - 1. Armstrong World Industries.
  - 2. Celotex Building Products.
  - 3. USG Interiors.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Performance / Design Criteria:
  - 1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1: 360.
  - 2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated according to ASCE 7 and applicable codes.

**2.2 ACOUSTIC PANELS**

- A. Basis of Design:
  - 1. As indicated on the Drawings
- B. Acoustic Panels (Type A): Ultima (1910), Square, ASTM E1264, conforming to the following:
  - 1. Classification: Type IV, Form 2, Pattern E, Fire Class A.
  - 2. Size: 24 x 24 inches.
  - 3. Thickness: 3/4 inches.
  - 4. Composition: Mineral fiber.
  - 5. Light Reflectance: 0.90 percent.
  - 6. NRC: 0.70.
  - 7. CAC: 35.
  - 8. Edge: Square.
  - 9. Surface Color: White.
  - 10. Surface Finish: Textured.
- C. NOT USED
- D. Acoustic Panels (Type B): Health Zone Ultima (1935), Square, ASTM E1264, conforming to the following:
  - 1. Classification: Type IV, Form 2 Pattern E, Fire Class A.
  - 2. Size: 24 x 24 inches.
  - 3. Thickness: 3/4 inch.
  - 4. Composition: Mineral fiber.
  - 5. Light Reflectance: 0.86 percent.
  - 6. NRC: 0.70
  - 7. CAC: 35.
  - 8. Edge: Square.
  - 9. Surface Color: White.
  - 10. Surface Finish: Light texture.
  - 11. Grid: Type 1 as specified in this Section.

**2.3 SUSPENDED METAL GRID**

- A. Basis of Design:
  - 1. Manufacturer to be same as manufacturer of ceiling panel to be installed.
- B. Suspended Metal Grid (Type 1):

1. Non-fire Rated Grid: ASTM C635/C635M, intermediate duty; exposed T; components die cut and interlocking.
2. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
3. Exposed Grid Surface Width:
  - a. As indicated on Drawings.
4. Grid Finish Color: White.
5. Accessories: Stabilizer bars, clips, splices, and perimeter moldings required for suspended grid system.
6. Support Channels and Hangers: Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
7. Perimeter Wall Angles:
  - a. As indicated on Drawings.

## 2.4 SUSPENDED ACOUSTICAL CLOUDS

- A. Basis of Design:
  1. As indicated on the Drawings.
- B. Perimeter Trim: Finish, height, bottom edge, profiles and configurations to be as indicated on Drawings.
  1. If not indicated on Drawings:
    - a. Finish: Match finish of suspended metal grid system to which trim is attached.
    - b. Height:
      - 1) 6 inches.
    - c. Width of return leg at bottom edge to be as required for secure attachment to components of suspended grid system, but not less than 7/16 inch wide. Bottom alignment to be flush with suspended grid system.
    - d. Curved and straight profiles and configurations to conform to layouts indicated on Drawings.

## 2.5 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  1. At Exposed Grid:
    - a. Provide L-shaped molding for mounting at same elevation as face of grid.
  2. Manufactured Corners: Provide single piece seamless corners conforming to corner angle or radius.
  3. Manufactured Radius: Provide seamless radius trim at maximum lengths practical but not less than 8 feet.
- C. Touch-up Paint: Type and color to match acoustic and grid units.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Examination, coordination and project conditions.
- B. Verify layout of hangers will not interfere with other work.

### 3.2 INSTALLATION

- A. Suspended Grid System:

1. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
  2. Install suspension system in accordance with manufacturer's seismic requirements and installation guide and in compliance with the Seismic Design Category design requirements.
  3. Install system capable of supporting imposed loads to deflection of 1/360 maximum.
  4. Locate system on room axis according to reflected plan.
  5. Ceiling areas over 1,000 SF must have horizontal restraint wire or rigid bracing.
  6. Ceiling areas over 2,500 SF must have seismic separation joints or full height partitions.
  7. Install after major above ceiling work is complete. Coordinate location of hangers with other work. Coordinate with sprinkler MEP work for oversized trim if not braced. Ceilings without rigid bracing must have 2" oversized trim rings for sprinklers and other penetrations.
  8. Ends of main beams and cross tees must be tied together to prevent their spreading.
  9. Cable trays and electrical conduits must be independently supported and braced.
  10. Suspended ceilings are subject to special inspection.
  11. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
  12. Do not allow suspension system components to touch ducts, pipes, conduit or other ceiling installations. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
  13. Do not hang suspension system from roof deck.
  14. Do not hang suspension system from non-structural building elements.
  15. Changes in ceiling plane must have positive bracing.
  16. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
  17. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
  18. Do not eccentrically load system, or produce rotation of runners.
  19. Perimeter Molding:
    - a. Install edge molding at intersection of ceiling and vertical surfaces.
    - b. Use longest practical lengths.
    - c. Install manufactured seamless corners.
    - d. Install manufactured seamless radius trim at curved walls and round columns.
    - e. Install at junctions with other interruptions.
  20. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
- B. Acoustic Panels:
1. Fit acoustic panels in place, free from damaged edges or other defects detrimental to appearance and function.
  2. Lay directional patterned panels as shown on the Drawings. Fit border trim neatly against abutting surfaces.
  3. Install panels after above ceiling work is complete.
  4. Install acoustic panels level, in uniform plane, and free from twist, warp, and dents.
  5. Cutting Acoustic Panels:
    - a. Cut to fit irregular grid and perimeter edge trim.
    - b. Cut square edges to field cut panels.
    - c. Double cut and field paint exposed edges of tegular panels.

6. Install hold-down clips to retain panels tight to grid system within 10 feet of exterior door.
7. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
8. Install safety clips on wood veneer panels 2 inches from outside edge of panel and at 24 inches on center.
9. Install acoustical insulation as indicated on Drawings.

**3.3 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**3.4 SCHEDULES**

- A. Refer to Reflected Ceiling Plans on Drawings for locations of panel types.

**END OF SECTION**



**SECTION 09 65 00**  
**RESILIENT FLOORING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Resilient tile flooring.
  - 2. Resilient wall base.
  - 3. Accessories.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Finishing of floor slab for resilient floor application.
  - 2. Sections indicating Plumbing, Electrical and Mechanical utility boxes, devices and trim.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source, 2017.
  - 3. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials, 2017.
  - 4. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
  - 5. ASTM F1861 - Standard Specification for Resilient Wall Base, 2016.
  - 6. ASTM F2170-16b - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
  - 7. ASTM F2195 - Standard Specification for Linoleum Floor Tile; 2013.
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source, 2015.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data describing physical and performance characteristics; include manufacturer's full range of sizes, patterns and colors available; include moldings, transition and edge trim as indicated on Drawings and otherwise recommended by manufacturer of Resilient Floor products; include installation instructions.
- C. Samples for Initial Selection: Two manufacturer's complete set of color samples illustrating the full range of finishes and colors available; 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 to be 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. Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Architect's acceptance of finish color, texture and pattern, and workmanship standards.
  - 1. Mock-up Size and Location: One typical room; location as indicated by Architect.
  - 2. Incorporation: Mock-up may be incorporated into the final construction upon Architect's approval.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

#### **1.5 QUALITY ASSURANCE**

- A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
- C. Smoke Density: 450 or less in accordance with ASTM E662.

#### **1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

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

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- C. Store all materials off of the floor in an acclimatized, weather-tight space.
- D. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

#### **1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- C. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

#### **1.9 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Resilient Tile Flooring: 50 sq ft of each type and color.
- C. Resilient Wall Base: 100 lineal feet of each type and color.

**1.10 WARRANTIES**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Vinyl Composition Tile: Provide five (5) year manufacturer's warranty.

**PART 2 PRODUCTS****2.1 RESILIENT TILE FLOORING**

- A. Vinyl Composition Tile:
  - 1. Basis of Design: As indicated on Drawings.
  - 2. Manufacturers:
    - a. Armstrong Flooring, Inc. (Basis of Design)
      - 1) Imperial Texture, Standard Excelon.
    - b. Mannington Commercial.
    - c. Johnsonite, a Tarkett Company.
    - d. Substitutions: Section 01 60 00 - Product Requirements.
  - 3. Minimum Requirements: Comply with ASTM F1066, of Class specified.
    - a. Class 1 - Solid color tile.
    - b. Class 2 - Through pattern tile.
    - c. Class 3 - Surface pattern tile.
  - 4. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
  - 5. Smoke Density: 450 or less in accordance with ASTM E662.
  - 6. Tile Size:
    - a. As indicated on Drawings.
    - b. To be selected by Architect.
    - c. 12 x 12 inches.
  - 7. Total Thickness: 0.125 inch.
  - 8. Colors and Patterns:
    - a. As indicated on Drawings.

**2.2 RESILIENT WALL BASE**

- A. Manufacturers:
  - 1. Johnsonite, a Tarkett Company (Basis of Design).
  - 2. Burke Flooring.
  - 3. Roppe Corp.
  - 4. Substitutions: Section 01 60 00 - Product Requirements
- B. Rubber Wall Base:
  - 1. Comply with ASTM F1861.
    - a. Type TS – Rubber, vulcanized thermoset.
    - b. Group 1 – Solid.
    - c. Style B – Top set, Cove.
  - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  - 3. Smoke Density: 450 or less in accordance with ASTM E662.
  - 4. Height:
    - a. 4 inches.
  - 5. Thickness: 0.125 inch thick.
  - 6. Finish: Satin.
  - 7. Length: Roll.
  - 8. Accessories: Premolded external corners and end stops.

9. Colors: Solid.
  - a. To be selected by Architect from submitted samples.
  - b.

### 2.3 RESILIENT STAIR COVERING

- A. Manufacturers:
  1. Johnsonite, a Tarkett Company.
  2. Burke Flooring.
  3. Roppe Corp.
  4. Substitutions: Section 01 60 00 - Product Requirements
- B. Rubber Stair Covering: Single piece nosing/tread/riser type. Full width and depth of stair nosing/tread/riser in one piece; nosing not less than 1-3/4 inches deep with contrasting color, non-slip abrasive strip insert.
  1. Manufacturers:
    - a. Johnsonite, a Tarkett Company (Basis of Design).
    - b. Substitutions: Section 01 60 00 - Product Requirements
  2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
  3. Smoke Density: 450 or less in accordance with ASTM E662.
  4. Nosing Nominal Thickness: Minimum 0.210 inch.
  5. Nosing Style: Square, capable of conforming and adhering to angle of riser below.
    - a. Bottom edge of nosing shall abut and join to top edge of riser covering material without gap or void and in manner as to prevent protruding trip hazard at bottom of nosing edge. Minimum 1-5/8 inch nosing turn-down onto riser below.
    - b. Integral non-slip abrasive nose strip; contrasting color complying with visually impaired requirements.
      - 1) Width as indicated on Drawings.
      - 2) Width to be 2 inches.
    - c. Integral photoluminescent (glow-in-the-dark) nose strip; 2 inches wide (1 inch along nose vertical face and 1 inch along nose top); contrasting color complying with visually impaired requirements.
  6. Tread Design Pattern:
    - a. As indicated on Drawings.
    - b. To be selected by Architect from submitted samples.
    - c. Round discs; raised.
    - d. Square discs; raised.
    - e. Hammered Surface.
  7. Stair Landings Flooring: Same manufacturer, material, color and pattern as the Stair Covering.
  8. Colors: Integral throughout product.
    - a. To be selected by Architect from submitted samples.

### 2.4 ACCESSORIES

- A. Subfloor Filler: Premix latex; types recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by resilient flooring manufacturer.
- C. Moldings, Transition and Edge Strips: As indicated on Drawings or as otherwise selected by Architect from Product Data submittals.
- D. Feature Strips: Of same material as tile. Width as indicated on Drawings.
- E. Sealer and Wax: Types recommended by resilient flooring product manufacturer.

**PART 3 EXECUTION****3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Examination, coordination and project conditions.
- B. Verify that surfaces are flat and smooth to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- D. Moisture Testing: Moisture emissions from concrete subfloors must not exceed 5 lbs per 1,000 psi per 24 hours via the Calcium Chloride Test Method and not exceed 85% internal concrete relative humidity as tested in accordance with ASTM F2170-16b. If more restrictive value are required by flooring product manufacturer, comply with the more restrictive values.
- E. The pH level of the subfloor surface shall not be higher than 9.9. If higher, subfloor must be neutralized.
- F. Cementitious Sub-floor Surfaces:
  - 1. Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH. Test in accordance with ASTM F710.
  - 2. Verify that substrates exhibit no carbonization or dusting.
- G. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- H. Verify that required floor-mounted utilities are in correct location.

**3.2 PREPARATION**

- A. Prepare substrates to receive work as recommended by work product manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is cured.
- D. Clean substrate.
- E. Apply primer as recommended by resilient flooring product manufacturer and where required to prevent "bleed-through" or interference with adhesion.

**3.3 INSTALLATION**

- A. General:
  - 1. Starting installation constitutes acceptance of sub-floor conditions.
  - 2. Install in accordance with manufacturer's written instructions and recommendations to ensure warranty requirements.
  - 3. Spread only enough adhesive to permit installation of materials before initial set.
  - 4. Fit joints and butt seams tightly.
  - 5. Set flooring in place, press with heavy roller to attain full adhesion. Sound top surface of installed flooring material to ensure there are no hollow sounds (a hollow sound may be an indication of flooring that is not adhered/bonded to substrate).
  - 6. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door (door in closed position).

7. Install edge transition strips at unprotected or exposed edges, where flooring terminates, where flooring transitions to dissimilar flooring finishes and as indicated on Drawings.
  8. Resilient Strips: Attach to substrate using adhesive.
  9. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
  10. Install flooring in recessed floor access covers, maintaining floor pattern.
  11. At movable partitions, install flooring under partitions without interrupting floor pattern.
  12. If feature strips/designs are indicated on Drawings, install feature strips/designs.
- B. Resilient Tile Flooring:
1. Mix tile from containers to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
  2. Unless flooring layout design is indicated otherwise on Drawings, lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
  3. Install tile to pattern indicated on Drawings. Allow minimum 1/2 full size tile width at room or area perimeter.
- C. Resilient Wall Base:
1. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
  2. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
  3. Install base on solid backing. Bond tightly to wall and floor surfaces. Bottom edge of wall base should be consistently in contact with finished flooring.
  4. Scribe and fit to door frames and other interruptions.
- D. Resilient Stair Coverings:
1. Install stair coverings in one piece for full width and depth of tread.
  2. Install stringers configured tightly to stair profile.
  3. Adhere over entire surface. Fit accurately and securely.
  4. Ensure the nosing fully conforms to the angle of the riser below and that the bottom edge abuts and joins the riser covering top edge without gap or void. Ensure that the bottom edge of the nosing does not create a protruding tripping hazard.

### 3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean, seal, and maintain resilient flooring products.

### 3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Prohibit traffic on resilient flooring for 48 hours after installation.
- C. Protect flooring work from stains and damage.

**END OF SECTION**

**SECTION 09 65 66**  
**RESILIENT ATHLETIC FLOORING**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes:
  - 1. Vinyl sheet flooring, adhesively installed with backing: ASTM F1303.
  - 2. Painted game lines.
  - 3. Wall base.
  - 4. Accessories.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast-in-Place Concrete: Coordinate compatibility of curing compounds for concrete slabs and floors with finish flooring installation requirements.
  - 2. Section 09 65 00 - Resilient Flooring: Base finish.
  - 3. Section 12 66 13 - Telescoping Bleachers: Coordinate quantity and size of bleacher support rollers to not exceed resilient athletic flooring load rating (psi).

**1.2 REFERENCES**

- A. ASTM International (ASTM)
  - 1. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing, 2004.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings:
  - 1. Fabrication and installation details.
  - 2. Layout, colors, and widths of game lines and graphics.
  - 3. Equipment locations including floor inserts for athletic equipment installed through flooring.
- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of finishes and colors available; submit for Architect's initial selections.
  - 1. Include color charts for game line and graphics paints.
- 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 12 x 12 inches mounted on solid backing. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. Include samples of game lines, illustrating colors selected.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- C. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F (21-35 degrees C) for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F (10 degrees C) or to go above 100 degrees F (38 degrees C).
- C. Coordinate installation of flooring with bleacher installation to provide adequate support for bleacher rollers.

**1.7 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide ten (10) year manufacturer's warranty in which manufacturer agrees to repair or replace sports flooring, including labor, that fails within specified warranty period.
- C. Provide two (2) year installer's warranty in which installer agrees to repair or replace sports flooring that fails due to poor workmanship or faulty installation within the specified warranty period.

**1.8 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Furnish extra materials, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Sheet Flooring: Furnish full-width rolls of not less than 10 linear feet for each 500 linear feet or fraction thereof, of each type, color, and pattern of flooring installed.

**PART 2 PRODUCTS****2.1 PREFORMED ATHLETIC FLOORING**

- A. Vinyl Sheet Flooring:
  - 1. Wearing Surface: Pure polyvinyl chloride, mechanically extruded and uniformly resilient material with uniform color throughout thickness. Comply with ASTM F1303.
  - 2. Backing: PVC foam. Comply with ASTM F1303.
  - 3. Sheet Thickness: Minimum 0.26 inch (6.5 mm).
  - 4. Sheet Width: Minimum 59 inches (1500 mm).
  - 5. Sheet Lengths: Minimum 49 feet (15 m).
  - 6. Ball Rebound: Minimum 96 percent.



7. Seaming Method: Welding with heat or chemical.
  8. Surface Texture: Embossed.
  9. Colors and Patterns: As selected by Architect from submitted samples.
  10. Game Lines and Graphics: High gloss coating as approved by vinyl flooring manufacturer.
    - a. Refer to Drawings for layouts.
    - b. Game Lines: Layout shall be as indicated on Drawings and in compliance with the current NFHS – Court and Field Diagram Guide.
  11. Top Coat: If recommended by vinyl flooring manufacturer to protect game lines, graphics and wearing surface. Clear.
  12. Manufacturers: All products by the same manufacturer.
    - a. Tarkett Sports
    - b. Shaw Rexcourt.
    - c. Connor.
    - d. Signature Sports Flooring.
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wall Base:
1. Provide as indicated in Section 09 65 00 - Resilient Flooring and on Drawings.
  2. Colors: As selected by Architect from samples submitted under Section 09 65 00.

## 2.2 ACCESSORIES

- A. Leveling Compound: Type recommended by flooring manufacturer for substrate conditions and bond for flooring adhesive.
- B. Flooring Adhesive: Waterproof; type recommended by flooring manufacturer for the flooring material and substrate conditions.

## 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 flooring. Proceed with installation only after unsatisfactory conditions have been corrected. Remove sub-floor ridges and bumps.
- C. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
  1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- E. Provide fluid applied moisture barrier if required by manufacturer to meet subfloor moisture requirements.

### 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. Prepare floor substrates as recommended by flooring and adhesive manufacturers. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- C. Floor Substrate Flatness: Use leveling compound and other remediation work as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius (1/1000); or a more stringent flatness requirement as recommended by flooring manufacturer.
- D. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- E. Thoroughly clean areas to receive flooring immediately before beginning installation.

### **3.3 INSTALLATION**

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Vinyl Sheet Flooring:
  1. Comply with manufacturer's installation instructions and recommendations and approved shop drawings.
  2. Unroll flooring and allow to relax before beginning installation.
  3. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive, overlapping end seams and double cutting, butting factory edges and compression fitting.
  4. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
  5. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
  6. Weld seams using techniques and equipment recommended by manufacturer.
  7. Lay out game lines using tape and taping machine approved by flooring manufacturer. Apply game line paint with roller, and allow to dry before removing tape.
  8. Apply transparent top coat over flooring if recommended by manufacturer for protection and to achieve a uniform finished appearance.
- C. Games Lines and Graphics: Refer to sheet flooring material description and subparagraphs therein.
- D. Install wall base.

### **3.4 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean flooring using methods recommended by manufacturer.

### **3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect finished flooring from construction traffic and maintain without damage.

**END OF SECTION**

**SECTION 09 65 95**  
**POLYMER PANEL FLOORING**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Solid polymer panels (Polyboard) on wood subfloor system.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Flooring system substrate.

**1.2 REFERENCES**

- A. APA-The Engineered Wood Association:
  - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- B. American Society for Testing and Materials.
  - 1. ASTM C365/C365M-16 - Standard Test Method for Flatwise Compressive Properties of Sandwich Cores.
  - 2. ASTM D785-08 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.
  - 3. ASTM D790-15e2 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 4. ASTM D4397-16 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Application.
- C. California Department of Health Services:
  - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Provide data for materials and accessories; include standard construction details, material descriptions, dimensions of individual components, profiles, assemblies and finishes.
- C. Shop Drawings: Indicate floor joint pattern and termination details.
  - 1. Indicate layout, dimensions, installation details, moisture protection, methods of attachment in construction, relationships and transitions to surrounding and adjacent construction, base and trim details, direction of panels and interface with floor boxes and devices.
    - a. Where 4 x 8 feet manufactured solid polymer panel flooring is indicated as finish floor, provide panel joint layout drawing. The intent is to avoid small pieces of panels around the perimeter edges.
  - 2. Indicate provisions for expansion and contraction, base and base corner details.
- D. Samples for Initial Selection: Submit two sets of manufacturer's samples; 2 x 3 inches in size; illustrating full range of colors and finishes available; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit three samples for each selected color and finish; minimum 8 x 8 inches and fastened to wood

substrate illustrating fastener applications as required in construction. Where finished panels involve normal color and texture variations, include sample sets showing the full range of variations expected.

- F. Installation Instructions: Indicate standard and special installation procedures. Include instructions for applying finishing system
- G. Maintenance Data: Include maintenance procedures and recommended maintenance materials.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit manufacturer's instructions for maintaining and resurfacing installed panels.

#### **1.5 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 performing work of the type specified in this section with minimum three (3) years of documented experience.

#### **1.6 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.

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

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in manufacturer's original packaging. Inspect for damage.
- C. Protect materials from damage and exposure to moisture.
- D. Support stored material as to protect from bending and warpage.

#### **1.8 FIELD CONDITIONS**

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. The concrete contractor shall furnish, install, and finish the concrete subfloors, depressing the slab sufficiently to accommodate the floor system. The slab shall be steel troweled to a true level and finished smooth and straight to a tolerance of 1/8 inch in a 10 foot radius. High spots shall be ground level and low spots filled in with approved leveling compounds by the concrete contractor to the full approval of the wood flooring contractor.
- C. The work in this section shall not be installed until all adjacent work (including flooring by others) is completed, and overhead work trades have finished in the floor areas. The building must be reasonably dry, all openings must be closed in, and permanent heating and air conditioning installed and working.
- D. The concrete subfloors shall be confirmed as dry by industry standard testing procedures, free of foreign materials, and turned over to the finish flooring contractor broom clean.

- E. Moderate room temperature of 65 degrees or more shall be maintained a week preceding material delivery and until and throughout the duration of the work. Humidity conditions within the building shall approximate the humidity conditions which will prevail when the building is occupied.
- F. Conditioning: Do not proceed with delivery and installation of flooring until after spaces to receive flooring are enclosed, dry, and maintained at approximately same humidity condition as planned for occupancy. Place flooring materials in spaces to be floored 7 days before starting installation. Open sealed packages of wood flooring to permit natural adjustment of moisture content. Maintain ambient temperature in range of 65 degrees F to 75 degrees F and a relative humidity range of 35 to 40 percent before, during, and after installation of wood flooring.

## 1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.10 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish 2 year manufacturer warranty against defects in materials and workmanship.
- C.

## 1.11 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Extra Flooring Material: Five (5) full sized panels of the type installed.

## PART 2 PRODUCTS

### 2.1 SOLID POLYMER PANEL FLOORING

- A. Description: Floating system; solid polymer panels; over 2 layers plywood subfloor; over wood sleepers with resilient pads; over vapor retarder; on concrete slab-on-grade.
- B. Solid Polymer Panels Manufacturer:
  - 1. Productions Unlimited, Inc. - Polyonyx+ Performance Flooring Panels.  
(www.productionsunlimitedinc.com)
- C. Components:
  - 1. Polyonyx+ Performance Flooring Panels. (www.productionsunlimitedinc.com)
    - a. Non-Slip surface finish.
    - b. Dimension: 4 x 8 feet.
    - c. Thickness: 1/2 inch.
    - d. Sheet weight: 67 pounds.
    - e. Color: Black.
    - f. Density: 0.85 grams per cubic centimeter.
    - g. Shore D Hardness: 98 per ASTM D785-08
    - h. Water Absorption: None.
    - i. Compressive Strength: 1,123 psi (both directions) per ASTM C365/C365M-16.
    - j. Flexural Strength: 2,470 psi per ASTM D790-15e2.
    - k. Texture: Textured on one side and smooth on opposite side. Coordinate with Architect for selection of which side is to be exposed (top).

1. Screw Fasteners: Black and as recommended by panel manufacturer.
2. Wood Subflooring System Fasteners: Type recommended by flooring manufacturer.
3. Sleepers and Shims: Standard grade, nominal 2 by 3 inches by 4 feet long, kiln dried Eastern hemlock, fir, pine, or spruce, pressure preservative-treated according to AWPA C2.
4. Wood Subflooring: 5/8 inch thick plywood; APA Rated Sheathing, span rating of 40/20; C-D Exposure 1; square edges; preservative-treated.
5. Vapor Retarder: ASTM D4397-16, black polyethylene sheet, 8 mil thick; 2 inch wide tape as recommended by vapor retarder manufacturer for continuous joint sealing.
6. Sheathing Paper: Plain building paper.

## 2.2 ACCESSORIES

- A. Cushion Blocks: Resilient pads, rubber material, unsealed air slots for resiliency; 2-1/4 x 3 inches size and 3/8 inch thick.
- B. Perimeter Springs: Flat spring steel, leaf shaped, with attachment clips, 0.093 x 1 x 9 inches size.
- C. Subflooring Fasteners: Screws of non-corrosive type; length as required to secure each subflooring layer into sleepers below.
- D. Transition Strip: Same material and finish as flooring material; profiles indicated.
- E. Vented Wall Base: Molded rubber; 4 inches high with toe minimum 3 inches x 3/8 inch thick; ventilating type; pre-molded outside corners; black color; adhesives as recommended by manufacturer.
- F. Nails and Screws: Non-corrosive type as recommended by flooring system manufacturer.

## 2.3 FABRICATION

- A. Attach resilient pads to bottom of sleepers at 12 inches on center.

## 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 this work.
- C. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/8 inch in a 10 foot radius.
- D. Before, beginning installation, verify that the full assembled and finished floor system will finish flush with adjacent dissimilar floor systems.

### 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. Broom clean concrete subfloor.

### 3.3 INSTALLATION

- A. Cushioned Sleepers:

1. Place vapor retarder over concrete subfloor surface, lapping edges and ends minimum 6 inches and tape for continuous seal; spot glue in place.
  2. Secure cushion blocks to underside of sleepers at 12 inches on center and at each end. Shim between blocks and sleepers for equal bearing on floor surface and to achieve level line of plus or minus 1/8 inch in a 10 feet radius.
  3. Place sleepers over vapor retarder; end to end at right angles to the direction of the finish wood flooring strips. Stagger end joints 24 inches minimum. Space sleepers 16 inches on center. Do not secure to concrete subfloor. Maintain an expansion void at walls and all vertical obstructions; void size as recommended by manufacturer, but no less than 1-1/2 inches.
- B. Wood Subflooring: Place two layers of plywood subflooring over sleepers.
1. Lay the first layer perpendicular to the sleepers, with end joints over sleepers, and secure to sleepers with fasteners at 12 inches on center or closer if recommended by manufacturer.
  2. Place sheathing paper between subflooring layers, lapping edges and ends 2 inches, staple in place.
  3. Lay the second layer in the same direction as first layer, with edge joints offset from first layer by 24 inches and end joints offset from first layer by one sleeper; secure to sleepers with fasteners at 12 inches on center.
- C. Prepare wood subfloor to receive solid polymer panel flooring in accordance with manufacturer's instructions.
- D. Broom clean wood subfloor.
- E. Sheathing Paper: Place over wood subfloor; lap edges and ends 2 inches, staple in place.
- F. Solid Polymer Panel Flooring:
1. Install in accordance with manufacturer's, MFMA, and NWFA instructions; predrill for screws; install screws in pattern recommended by panel manufacturer.
  2. Lay flooring panels parallel to front of stage and beginning at front of stage and progressing toward back of stage in running bond pattern. Verify alignment as work progresses.
  3. Terminate flooring at doorways at centerline of door (in closed position) where adjacent floor finish is dissimilar; install aluminum saddle type threshold of such width and thickness as to bridge the expansion joint.
  4. Where divider strips and transition strips are required, provide such strips in accordance with flooring manufacturer's recommendations and as indicated.
  5. Install edge strips at unprotected or exposed edges, and where flooring terminates.
  6. Secure edge strips before installation of flooring with stainless steel screws.
  7. Install flooring tight to floor access covers, unless indicated otherwise by manufacturer's installation recommendations.
  8. Install flooring under movable partitions, if any, without interrupting floor pattern.
  9. Provide expansion requirements in field and space at fixed walls and other interruptions as needed for expansion and contraction.
  10. At cushioned sleepers, install springs in perimeter expansion space at 24 inches.
- G. Install and finish wood trim and aprons as indicated on Drawings and specified in sections related to Finish Carpentry and Painting and Coating.
- H. Install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions. Miter inside corners and install premolded outside corners.
- I. Install floor sockets and inserts to a depth sufficient to ensure flush top surface with floor surface.

- J. Floor Boxes and Other Floor Devices: Coordinate installation of trim components with contractors that installed such boxes and devices.

**3.4 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean finished flooring in accordance with flooring manufacturer's instructions and DO NOT use products that can lower the surface friction coefficient.

**3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Place protective coverings over finished floors; do not remove coverings until Substantial Completion inspection by Architect. Resume protection until final completion.

**END OF SECTION**



**SECTION 09 66 23**  
**RESINOUS MATRIX TERRAZZO FLOORING**  
**(ALTERNATES 2 & 3)**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes resinous matrix terrazzo work for:
  - 1. Floors.
- B. Related Requirements:
  - 1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  - 2. Section 03 30 00 - Cast-In-Place Concrete: Concrete subfloor with broom finish.
  - 3. Section 07 90 00 - Joint Protection: Joint between terrazzo base and wall surface.
  - 4. Section 07 95 00 - Expansion Control: Building expansion joint covers.
  - 5. Section 09 65 00 - Resilient Flooring: Wall base.

**1.2 REFERENCES**

- A. National Terrazzo and Mosaic Association:
  - 1. NTMA - Terrazzo Specifications Guide.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data for divider strips, control joint strips, and sealer.
- C. Shop Drawings: Indicate divider strip and control joint layout, flooring material transitions, color patterns, and details of adjacent components.
- D. Samples for Initial Selection: Two manufacturer's complete set of color samples illustrating the full range of available finishes, colors, chip size and variations, chip gradation, matrix color, and divider and control joint strips; 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. Warranty: Submit sample warranty.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data:
  - 1. Submit installation testing and inspection reports.
  - 2. Submit procedures for stain removal, stripping, and sealing.
- C. Record Documentation of Substrate Cracks and Remedies:
  - 1. Submit scaled drawings and photographs that record locations of all substrate cracks and remedial construction applied to eliminate detrimental effect of such cracks on terrazzo flooring system.

2. Include drawings of all floor areas receiving terrazzo. For drawings sheets of areas without substrate cracks, indicate so on the respective sheet.
3. Survey for Record Documentation to be conducted prior to installation of terrazzo.
4. Record Documentation to be titled, "Record Documentation of Substrate Cracks and Remedies." Documentation to include dates and times of survey and remediation.
5. Contractor's project manager to certify Record Documentation with signature and certification date.

### **1.5 QUALITY ASSURANCE**

- A. Perform Work in accordance with NTMA recommendations contained in "Terrazzo Information Guide".

### **1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) five years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.

### **1.7 MOCKUP**

- A. Section 01 40 00 - Quality Requirements: Requirements for mockup.
- B. Mockup To Be Removed From Site At Completion:
  1. Construct mockup, 10 x 10 feet, illustrating finish work. Mockup to include concrete substrate, terrazzo flooring of each color divided by divider strips, divider strips illustrating installation at all substrate and terrazzo joint types.
  2. Locate mockup as to not interfere with project work and as approved by Architect and Owner.
  3. Mockup is not to remain as part of final construction. Remove mockup entirely from project site with consent of Architect and Owner. Restore project area effected by mockup and removal to completed conditions indicated in the contract documents.

### **1.8 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.

### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Store resin materials in dry, secure area.
- C. Maintain minimum temperature of 55 degrees F.
- D. Keep products away from fire or open flame.

### **1.10 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Do not install terrazzo when temperature is below 50 degrees F or above 90 degrees F.

- C. Maintain temperature within specified range 24 hours before, during, and 72 hours after installation of flooring.
- D. Provide ambient lighting level of 50 ft candles measured at floor surface.

**1.11 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate placement of terrazzo divider strips with locations of mechanical and electrical access covers, substrate control joints and expansion joints, and other items built in to terrazzo.

**1.12 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Special Warranty: Manufacturer and installer, jointly, agree to provide labor and material to repair (and if necessary to replace) components of terrazzo flooring system that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, loss of bond to substrate, cracks and damage due to normal wear and tear.
  - 2. Failures do not include the following:
    - a. Damage due to bubbling or loss of adhesion due to moisture penetration through the substrate.
    - b. Acts of God or other elements beyond scope of protection of this system.
  - 3. Warranty Period: Fifteen (15) years from date of Substantial Completion.
  - 4. Limitations:
    - a. In case of warranty claim, Owner will provide written notice to terrazzo manufacturer and installer within 60 days of problem's discovery.
    - b. Remedies provided by epoxy terrazzo flooring manufacturer and installer are limited to removal and replacement of failed terrazzo flooring areas.

**PART 2 RESINOUS MATRIX TERRAZZO**

- A. Manufacturers:
  - 1. Fritz Industries Inc.
  - 2. Key Resin Company
  - 3. Crossfield Products Corp.
  - 4. Sherwin-Williams Company
  - 5. Master Terrazzo Technologies
  - 6. Terrazzo&Marble Supply Companies
  - 7. Doyle Dickerson Terrazzo, Inc.
  - 8. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. Floors: Epoxy matrix, 1/4 inch thick.
  - 1. Matrix Color: To match Architects selection.
  - 2. Aggregate Color: As selected from domestic and imported chips.
  - 3. Aggregate Size: No. 0-1.
  - 4. Colors:
    - a. As selected by Architect from submitted samples.
- B. Wall Base:
  - 1. Type: As indicated in Section 09 65 00 - Resilient Flooring.

- 2. Colors: As selected by Architect from samples submitted under Section 09 65 00.
- C. Materials:
  - 1. Epoxy Matrix: Two component resin and epoxy hardener with mineral filler and color pigment, non-volatile, thermo-setting.
  - 2. Aggregate: Crushed marble, size of standard gradation and uniform coloration.
- D. Grit Finish: 1800 grit finish.

### 2.3 ACCESSORIES

- A. Divider Strips: Aluminum; exposed top edge; configuration as indicated on Drawings.
  - 1. At terrazzo changes in color, strip to have 1/8 inch wide exposed top.
  - 2. At all other strip locations, strip to have 1/16 inch wide exposed top. Such locations include substrate control joints (contraction joints) and isolation joints.
    - a. Where filler is required or indicated to fill void between vertical legs of two adjacent strips, use neoprene type as recommended by terrazzo matrix manufacturer. Color to be as selected by Architect from submitted samples.
- B. Divider Strip Attachment: Epoxy adhesive material as recommended by terrazzo flooring manufacturer and installer for substrate type and condition; continuously adhered.
- C. Strip Height: To suit thickness of terrazzo topping, with allowance for grinding.
- D. Anti-Crack Membrane: Liquid applied with fiberglass applied reinforcing mesh. Type recommended by terrazzo flooring manufacturer and installer.
- E. Temporary Sealer: Sealer to be slip-resistant and as recommended by terrazzo flooring manufacturer and installer to protect floor during construction and prior to final cleaning and sealer. Product similar to Terra Glaze by Spartan Chemical Company, Inc. or approved equal.
- F. Final Sealer: Sealer to be slip-resistant and as recommended by terrazzo flooring manufacturer and installer to be installed after final floor cleaning when building is substantially complete. Product similar to 3M Stone Floor Protection System with Scotchgard Stone Floor Protector.
- G. Cleaner: Liquid type, pH of 7; as recommended by terrazzo flooring manufacturer and installer.
- H. Subfloor Filler: Latex type.

### 2.4 MIXES

- A. Topping: Three parts aggregate chip; one part aggregate dust; one part matrix binder and hardener.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate surfaces are ready to receive work.
- C. Do not begin terrazzo work until concrete substrate has cured 28 days, minimum, and has dried to a moisture content as recommended by the terrazzo system manufacturer, but in no case greater than 12 percent moisture content.

**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 substrate of foreign matter.
- D. Prepare substrate in accordance with manufacturer's written recommendations.
- E. Collect and record data required, as specified in the CLOSEOUT SUBMITTALS article of this Section, for producing the "Record Documentation of Substrate Cracks and Remedies".
- F. At locations of existing cracks in floor substrate, apply anti-crack membrane with reinforcing mesh for full length of each crack.

**3.3 INSTALLATION**

- A. Install divider and control joint strips straight and level to locations indicated on Drawings.
- B. Provide control joints in concrete and terrazzo flooring per NTMA recommendations and as follows:
  - 1. Provide divider and control joint strips in accordance with NTMA standards.
  - 2. Provide terrazzo divider strip at all control joints in concrete slab.
  - 3. Provide control joint strips at all corner locations.
- C. Place terrazzo mix over prepared substrate to thickness indicated.
- D. Close area to allow undisturbed curing.
- E. Install wall base.
- F. Finishing:
  - 1. Finish terrazzo to NTMA requirements and as indicated in this Section.
  - 2. Produce terrazzo finish surface to match approved mock-up sample, with 70 percent chip exposed.
  - 3. Grind terrazzo surfaces with power disc machine; sequence with coarse to fine grit abrasive, using wet or dry method.
  - 4. Apply patch mix to match matrix over ground surface to fill honeycomb exposed during grinding.
  - 5. Remove patch coat by grinding, using fine grit abrasive.
  - 6. Finish to specified grit finish.
  - 7. Install temporary floor sealer.
  - 8. Provide floor protection cover board over finished terrazzo surfaces.

**3.4 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection and testing.
- B. Test installed terrazzo flooring for secure bond to substrate. Remove and replace terrazzo found not to be bonded to include flooring with a hollow sound beneath.

**3.5 MANUFACTURER'S FIELD SERVICES**

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Manufacturer to inspect work once during placement of flooring mixture onto prepared substrate and once at complete of installation. Manufacturer's inspector to provide

inspection report that included observed deficiencies and required remedies. If flooring delamination remedial work is required after completion of installation inspection, manufacturer's inspector to reinspect remedial work and provide inspection report. Submit all inspection reports to Architect and Owner and include copies in Closeout Submittals.

### **3.6 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Level (Except Surfaces Sloping to Drain): 1/8 inch.

### **3.7 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Scrub and clean terrazzo surfaces with cleaner and as recommended jointly by manufacturer and installer. Let dry.
- C. Install final floor sealer system. Let dry.

### **3.8 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not permit traffic over finished terrazzo surfaces.

**END OF SECTION**

**SECTION 09 68 13****TILE CARPETING****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Tile carpeting.
  - 2. Accessories.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Flooring substrate.
  - 2. Section 09 65 00 - Resilient Flooring: Base finish.
  - 3. Section 09 68 16: Sheet Carpet

**1.2 REFERENCES**

- A. American Association of Textile Chemists and Colorists (AATCC):
  - 1. AATCC 134 - Test Method for Electrostatic Propensity of Carpets, 2016.
  - 2. AATCC 174 - Test Method for Antimicrobial Activity Assessment of New Carpets, 2016.
- B. ASTM International (ASTM):
  - 1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method, 2017.
  - 2. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method, 2007.
  - 3. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials, 2016.
  - 4. ASTM D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products, 2010.
  - 5. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source, 2017.
  - 6. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials, 2017.
- C. Carpet and Rug Institute (CRI):
  - 1. CRI 104 - Standard for Installation of Commercial Carpet.
- D. Consumer Products Safety Commission:
  - 1. CPSC 16 CFR 1630 - Standard for the Surface Flammability of Carpets and Rugs.
- E. National Fire Protection Association:
  - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Heat Energy Source.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints, direction of carpet tiles, location of moldings and transition edge strips.

- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of colors, textures and pattern designs available; submit for Architect's initial selections. Include 6 inches long samples of moldings and transition edge strips.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected colors, textures and pattern designs; samples to be same product material type indicated for final Work; each sample 12 x 12 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 special procedures, perimeter conditions requiring special attention.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

#### 1.5 QUALITY ASSURANCE

- A. Materials to comply with the following independently tested performance criteria:
  1. Flammability: Passes, Pill Test (ASTM D2859 or CPSC 1630 (FF-1-70))
  2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
  3. Smoke Density: 450 or less in accordance with ASTM E662.
  4. Noise Reduction Coefficient: NRC Rating 0.30 (ASTM C423).
  5. Slip Resistance: Comply with ADA Guidelines, level surface (ASTM C1028).
  6. Carpet shall have been tested against and passed the Indoor Air Quality Carpet Testing Program requirements of CRI.
  7. Dimensional Stability: 0.1 % or less change Stability (Aachen Method Din 54318).
  8. Static Generation:
    - a. 3.5 kV or less at 20% R.H. at 70° F (AATCC 134 w/ neolite).
  9. Antimicrobial: Broad spectrum antimicrobial; permanent application in backing. Application must pass AATCC-174.
  10. VOC Limits: Provide carpet tile that complies with the following limits for VOC content when tested according to ASTM D5116:
    - a. Total VOCs: 0.5 mg/sq. m x h.
    - b. 4-PC (4-Phenylcyclohexene): 0.05 mg/sq. m x h.
    - c. Formaldehyde: 0.05 mg/sq. m x h.
    - d. Styrene: 0.4 mg/sq. m x h.
- B. Adhesive: Comply with the following criteria, unless the manufacturer's warranty requirements indicate otherwise.
  1. Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
  2. Adhesive VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:
    - a. Total VOCs: 10.00 mg/sq. m x h.
    - b. Formaldehyde: 0.05 mg/sq. m x h.
    - c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.
- C. 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.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience.
  - 1. FCIB or IFCI certified carpet installers.

**1.7 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.

**1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Store materials in compliance with the manufacturer's recommendations.
- C. In areas of installation, substrates and air conditions to be compliant with manufacturer's recommendations prior to beginning installation. After recommended conditions have been achieved, store materials in area of installation for 48 hours prior to installation.

**1.9 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Supply 100 square feet of carpet tiles of each pattern and color installed.

**1.10 WARRANTIES**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Carpet Tile: Furnish manufacturer's standard warranties covering the following:
  - 1. Lifetime Commercial Limited Warranty: Includes coverage for Fiber Abrasive Wear, Fiber Static Protection, Fiber Stain Warranty, Fiber Colorfastness to Light and Fiber Atmospheric Contaminants.

**PART 2 PRODUCTS****2.1 CARPET TILE**

- A. Manufacturers:
  - 1. Shaw Contract (Basis of Design).
  - 2. Interface
  - 3. Mannington
  - 4. Bentley
  - 5. Lees
  - 6. Collins & Aikman
  - 7. Substitutions: Section 01 60 00 - Product Requirements
- B. Carpet Tile Type CT-1: Manufactured in one color dye lot; conforming to the following criteria:
  - 1. Tile Size:
    - a. 24 x 24 inches.
  - 2. Pile Thickness:

- a. 0.112 inches.
- 3. Total Thickness:
  - a. 0.260 inches.
- 4. Tufted Weight: 17.0 oz/sq yd.
- 5. Construction:
  - a. Multi-level pattern loop.
- 6. Dye Method: 100 percent solution dyed.
- 7. Fiber:
  - a. Eco Solution Q SD nylon.
- 8. Gauge:
  - a. 1/12.
- 9. Stitches:
  - a. 9 per inch
- 10. Average Density:
  - a. 5,464 ounces per cubic yard.
- 11. Protective Treatment: SSP-Shaw Soil Protection.
- 12. Primary Backing Material:
  - a. Synthetic.
- 13. Secondary Backing Material:
  - a. Ecoworx.
- 14. Installation Pattern and Layout:
  - a. Ashlar, unless indicated otherwise on Drawings.
- C. Carpet Patterns and Colors per Type:
  - 1. CT-1: Shaw Contract - Field Tile 5T079; Color - 78326 Dwell.

## 2.2 WALL BASE

- A. Type: As indicated in Section 09 65 00 - Resilient Flooring.
- B. Color: As selected by Architect from samples submitted under Section 09 65 00.

## 2.3 ACCESSORIES

- A. Sub-Floor Filler: Latex Type recommended by flooring material manufacturer and compatible with substrate materials and conditions.
- B. Moldings and Transition Edge Strips:
  - 1. Rubber: Colors and profiles to be selected by Architect from submitted samples.
- C. Contact Adhesive: Comply with requirements of this Section and as recommended by carpet manufacturer and compatible with substrate materials and conditions.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify floor surfaces are smooth and flat within tolerances 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. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- E. Clean substrate.
- F. Verify concrete floors are ready for carpet installation by testing for moisture emission rate and alkalinity. Obtain instructions when test results are not within specified limits.
  - 1. Moisture emission rate: As recommended by carpet manufacturer and not greater than 3 lb per 1,000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
  - 2. Alkalinity: As recommended by carpet manufacturer and not greater than pH range of 5-9.

### **3.3 INSTALLATION**

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Comply with CRI 104 and manufacturer's recommendations.
- C. Do not mix carpet from different cartons unless from same dye lot.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Locate change of color or pattern between rooms under door centerline.
- F. Fully adhere carpet tile to substrate using adhesives and instructions in accordance with carpet manufacturer's recommendations.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Install wall base.
- I. Complete installation of moldings and transition edge strips, concealing exposed edges.

### **3.4 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean and vacuum carpet surfaces.

### **3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage and soiling.

**END OF SECTION**



**SECTION 09 68 16**  
**SHEET CARPETING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes carpet, fully adhered; and accessories.
- B. Related Sections:
  - 1. Section 09 65 00 - Resilient Flooring: Wall Base.

**1.2 REFERENCES**

- A. American Association of Textile Chemists and Colorists (AATCC):
  - 1. AATCC 134 - Test Method for Electrostatic Propensity of Carpets, 2016.
  - 2. AATCC 174 - Test Method for Antimicrobial Activity Assessment of New Carpets, 2016.
- B. ASTM International (ASTM):
  - 1. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials, 2016.
  - 2. ASTM D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products, 2010.
  - 3. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source, 2017.
  - 4. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials, 2017.
- C. Carpet and Rug Institute (CRI):
  - 1. CRI 104 - Standard for Installation of Commercial Carpet.
- D. Consumer Products Safety Commission (CPSC):
  - 1. CPSC 16 CFR 1630 - Standard for the Surface Flammability of Carpets and Rugs.
- E. National Fire Protection Association (NFPA):
  - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Heat Energy Source.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate layout of joints, direction of carpet pile, location of edge moldings.
- C. Product Data: Submit data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
  - 1. A seaming diagram for carpet installation shall be submitted for approval by New Hanover County Public System when finishes are submitted.
  - 2. The diagram shall be reviewed and approved by the Architect.
  - 3. Submit data verifying that all carpet and associated components are recyclable.
- D. Samples:
  - 1. Submit two carpet tiles illustrating color and pattern design for each carpet color selected. Matching roll carpet samples.
  - 2. Submit two, inch long samples of edge strip.

- E. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

#### 1.5 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
  - 1. Floor Finishes: Comply with one of the following:
    - a. Class I, minimum 0.45 watts/sq cm Class II, minimum 0.22 watts/sq cm when tested in accordance with NFPA 253.
    - b. CPSC 16 CFR 1630.
    - c. As tested by ASTM E648
- B. Carpet shall have been tested against and passed the Indoor Air Quality Carpet Testing Program requirements of CRI.
- C. Manufacturers Certification: Carpet materials shall comply with "Use of Materials Bulleting UM-44C" published by US Department of Housing and Urban Development (HUD) and are currently listed in HUD "Certified Product Directory" and so identified by imprint on back of carpet.
- D. Flammability: Passes, Pill Test (ASTM D2859 or CPSC 16 CFR 1630 (FF-1-70))
- E. Smoke Density: < 450 Flaming Mode (ASTM E662)
- F. Dimensional Stability: < 0.1% change Stability (Aachen Method Din 54318)
- G. Static Generation: < 2.5 kV at 20% R.H. at 70° F (AATCC 134 w/ neolite)
- H. Antimicrobial: Broad spectrum antimicrobial; permanent application in backing. Application must pass AATCC 174
  - 1. VOC Limits: Provide carpet tile that complies with the following limits for VOC content when tested according to ASTM D5116:
  - 2. Total VOCs: 0.5 mg/sq. m x h.
  - 3. 4-PC (4-Phenylcyclohexene): 0.05 mg/sq. m x h.
  - 4. Formaldehyde: 0.05 mg/sq. m x h.
  - 5. Styrene: 0.4 mg/sq. m x h.
- I. Adhesive: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- J. Adhesive VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D5116:
  - 1. Total VOCs: 10.00 mg/sq. m x h.
  - 2. Formaldehyde: 0.05 mg/sq. m x h.
  - 3. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.
- K. Maintain one copy of each document on site.

#### 1.6 QUALIFICATIONS

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

- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.
  - 1. FCIB or IFCI certified carpet installers.

### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Store materials in area of installation for 48 hours prior to installation.
  - 1. Cut carpet and lay in place to allow it to acclimate and “relax” prior to installation.

### 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish Flooring Contractor's ten (10) year warranty for defects in materials and workmanship.

### 1.9 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Supply two (2) percent of each carpet color and pattern selected for the project.

## PART 2 PRODUCTS

### 2.1 CARPET

- A. Manufacturers:
  - 1. Bentley.
  - 2. Interface.
  - 3. Mannington.
  - 4. Shaw Contract Group.
  - 5. Tandus.
  - 6. Substitutions: Section 01 60 00 - Product Requirements.

### 2.2 COMPONENTS

- A. Carpet to be manufactured in one color dye lot; conforming to the following criteria:
- B. Auditorium CPT-1:
  - 1. Basis of Design:
    - a. Mannington.
  - 2. Roll Size: Twelve (12) feet wide.
  - 3. Fiber:
    - a. Antron Legacy Type 6,6 nylon.
  - 4. Construction:
    - a. Pattern loop.
  - 5. Dye Method:
    - a. Solution/yarn.
  - 6. Gage: 1/12 inch.
  - 7. Stitches:
    - a. 10 per inch.
  - 8. Tufted Weight:

- a. 20 oz/sq yd.
- 9. Density Factor:
  - a. 6206 ounces per cubic yard.
- 10. Primary Backing Material: Synthetic
- 11. Secondary Backing Material:
  - a. Ultrabac RE with 10% Recycled Content.
- 12. Color:
  - a. Attest 3404.

### 2.3 ACCESSORIES

- A. Sub-Floor Filler: Latex Type recommended by flooring material manufacturer.
- B. Moldings and Edge Strips: Extruded aluminum, color as selected.
  - 1. Reducer and edge strips are to be mechanically fastened to the sub floor. Glue down strips shall not be allowed.
- C. Contact Adhesive: Recommended by carpet manufacturer.
- D. Seam Adhesive: Recommended by manufacturer.
- E. Provide banding for all exposed carpet edges.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify floor surfaces are smooth and flat within tolerances and are ready to receive work.
- C. Verify concrete floors are ready for carpet installation by testing for moisture emission rate and alkalinity. Obtain instructions when test results are not within specified limits.
  - 1. Moisture emission rate: Not greater than 3 lb per 1,000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
  - 2. Alkalinity: pH range of 5-9.

### 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. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- E. Clean substrate.
- F. Verify concrete floors are ready for carpet installation by testing for moisture emission rate and alkalinity. Obtain instructions when test results are not within specified limits.
  - 1. Moisture emission rate: Not greater than 3 lb per 1,000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
  - 2. Alkalinity: pH range of 5-9.



**3.3 INSTALLATION**

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install carpet tile in accordance with CRI 104.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Lay out carpet and locate seams in accordance with CRI 104 section 7.2 shop drawings:
  - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
  - 2. Do not locate seams perpendicular through door openings.
  - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
  - 4. Provide monolithic color, pattern, and texture match within each contiguous area.
- E. Install carpet tight and flat on subfloor, well fastened at edges, with uniform appearance.
- F. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.
  - 1. Seam sealer is required at all seams.
- G. Direct Glue-Down Installation: CRI 104 Section 8.
  - 1. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
  - 2. Apply seam adhesive. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
  - 3. Roll with appropriate roller for complete contact of adhesive to carpet backing.
- H. Trim carpet neatly at walls and around interruptions.
  - 1. No saddle or T-seams shall be allowed in doorways or high traffic areas.
- I. Complete installation of edge strips, concealing exposed edges.

**3.4 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. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean and vacuum carpet surfaces.

**3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Ventilate thoroughly all carpeted areas during and after installation, prior to occupancy.
- C. Protect the work against damage from construction operations and placement of equipment.

**END OF SECTION**



**SECTION 09 77 23**  
**FABRIC WRAPPED PANELS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Fabric wrapped acoustical panels
  - 2. Mounting systems.
- B. Related Requirements:
  - 1. Section 09 21 16 - Gypsum Board Assemblies.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
  - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
- B. Forest Stewardship Council:
  - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- C. California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Noise Reduction Coefficient (NRC):
  - 1. Minimum 1.10 when tested in accordance with ASTM C423.
  - 2. Sound Absorption Coefficients:
    - a. 125 Hz: 0.38
    - b. 250 Hz: 0.96
    - c. 500 Hz: 1.11
    - d. 1000 Hz: 1.11
    - e. 2000 Hz: 1.11
    - f. 4000 Hz: 1.28

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data including core construction and profile options, fabric, mounting options and accessory materials.
- C. Shop Drawings:
  - 1. Indicate layout and dimensions of acoustical wall panels, edge profiles, core materials, and fabric face.
  - 2. Indicate interface with adjacent materials.
- D. Samples for Initial Selection: Two manufacturer's complete set of color charts illustrating the full range and premium range of fabrics, patterns, finishes and colors available; include 12 x 12 inches panel core with mounting hardware secured, illustrating core construction; submit for Architect's initial selections.

- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected fabric, pattern, finish and color; each sample to be 12 x12 inches illustrating actual panel construction with mounting hardware secured. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions:
  - 1. Submit manufacturers written installation instructions.
  - 2. Submit special procedures, and perimeter conditions requiring special attention.
- G. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

### **1.5 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Submit fabric care and maintenance procedures, recommended fabric maintenance materials, and suggested schedule for fabric cleaning.

### **1.6 QUALITY ASSURANCE**

- A. Surface Burning Characteristics:
  - 1. Textile Wall Coverings:
    - a. Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

### **1.7 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.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in manufacturer's original packaging. Inspect for damage.
- C. Store materials indoors with environmental conditions as specified for installation.
- D. Acclimate materials to installation conditions for seventy-two (72) hours prior to installation.

### **1.9 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install acoustical wall treatment until space has been enclosed and is watertight, wet work is complete and dry and adjacent and related work is completed.
- C. Do not install acoustical wall until ambient temperature and humidity level will be continuously maintained at conditions indicated for Owner occupancy.

### **1.10 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.

- B. Provide 20 percent extra panels, but not less than 1 extra panel each, for every panel size, color, and pattern specified.
  - 1. Where calculation of required extra panels generates a fraction of a panel, the fraction is to be rounded up to another full panel.
  - 2. Include mounting hardware for each extra panel provided. Hardware to be same as was used for installed panels.

## **PART 2 PRODUCTS**

### **2.1 FABRIC WRAPPED PANELS**

- A. Manufacturers:
  - 1. Conwed Designscape.
  - 2. AVL Systems, Inc.
  - 3. Decoustics.
  - 4. Lamvin, Inc.
  - 5. Kinetics.
  - 6. Knoll Textiles (Basis of Design).
  - 7. Sound Seal.
  - 8. Wenger.
  - 9. Substitutions: Section 01 60 00 - Product Requirements.
- B. Components:
  - 1. Fiberglass Core: Rigid fiberglass board.
  - 2. Thickness:
    - a. 2 inches thick.
  - 3. Density: 6 pcf, minimum.
  - 4. Resin hardened at edges and hardware attachment locations.
  - 5. Edge Profile:
    - a. Chamfered edges.
  - 6. Fabric Covering: Manufacturer's premium polyester fabric with fire retardant treatment. Equivalent to Guilford of Maine Anchorage.
    - a. Colors as indicated on drawings.
- C. Accessories:
  - 1. Mounting Hardware: Manufacturer's standard concealed mechanical clip system.
- D. Fabrication:
  - 1. Fabricate Panel Sizes:
    - a. As indicated on Drawings.
  - 2. Bond fabric covering directly to the core material and return to the back to provide finished edges.
  - 3. Attach mounting hardware to back of panel.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate is flat, plumb and level and ready to receive the work of this section.
- C. Verify adjacent and related work is complete.

**3.2 INSTALLATION**

- A. Install panels plumb, level, in plane, and aligned.
- B. Line up edge and end joints.

**3.3 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/4 inch.
- C. Maximum Offset From Indicated Alignment: 1/16 inch.
- D. Maximum Out of Square: 1/4 inch difference in panel diagonals.

**3.4 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean exposed fabric faces.

**END OF SECTION**

**SECTION 09 90 00**  
**PAINTING AND COATING**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes surface preparation and field application of paints, stains, varnishes, intumescent paint, concrete floor sealer and other coatings.
- B. Related Sections:
  - 1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  - 2. Section 05 50 00 - Metal Fabrications: Shop primed items.
  - 3. Section 05 51 00 - Metal Stairs: Shop primed items.
  - 4. Section 09 72 14 - Tackable Wall Coverings: Trim.
  - 5. Sections including work indicated to receive painting and coating.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
  - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
- B. Master Painters Institute:
  - 1. MPI (APL) - Approved Products List; Master Painters and Decorators Association.
  - 2. MPI (APSM) - Architectural Painting Specification Manual.
- C. Painting and Decorating Contractors of America (PDCA):
  - 1. PDCA - Architectural Painting Specification Manual.
- D. SSPC: The Society for Protective Coatings:
  - 1. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 5th Edition, September 2016
  - 2. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2; 2015 Edition, 2015
  - 3. SSPC-SP 13 - Surface Preparation of Concrete.
- E. California Department of Health Services (CA/DHS):
  - 1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. Green Seal (GS):
  - 1. GC-03 - Anti-Corrosive Paints.
  - 2. GS-11 - Product Specific Environmental Requirements.
- G. South Coast Air Quality Management District (SCAQMD):
  - 1. SCAQMD Rule 1113 - Architectural Coatings.

**1.3 DEFINITIONS**

- A. Conform to ASTM D16 for interpretation of terms used in this section.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on all finishing products.
- C. Samples for Initial Selection: Submit two paper chip samples; 2 x 3 inches in size; illustrating range of colors, sheens and textures available for each surface finishing product indicated; submit for Architect's initial selections.
  - 1. For clear top coats on stained wood, samples to illustrate range of colors and sheens available as applied to wood species required in construction.
  - 2. For clear top coats on non-stained wood, samples to illustrate sheens available as applied to wood species required in construction.
- D. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected color, sheen and texture. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. For opaque paint samples, submit each on tempered hardboard; minimum 8 x 8 inches.
  - 2. For clear top coats on stained and non-stained wood; submit each on finished wood species required in construction; minimum 8 x 8 inches.
- E. Manufacturer's Installation Instructions: Submit special surface preparation procedures and substrate conditions requiring special attention.

**1.5 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

**1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Applicator: Company specializing in performing work of this section with minimum ten (10) years documented experience.

**1.7 MOCKUP**

- A. Section 01 40 00 - Quality Requirements: Mock-up requirements.
- B. Construct mockup, in one room, illustrating coating color, sheen, texture, and finish.
- C. Locate where directed by Architect.
- D. Incorporate accepted mockup as part of Work.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.



**1.9 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candle measured mid-height at substrate surface.

**1.10 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish five (5) year manufacturer warranty for paints and coatings.
- C. Contractor to provide a one (1) year warranty on all defects.
- D. Installer to provide a two (2) year warranty on all materials and workmanship.

**1.11 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Supply 1 gallon of each color, sheen, type and surface texture; store where directed by Owner.
- C. Label each container with color, sheen, type, surface texture and room locations, in addition to manufacturer's label.

**PART 2 PRODUCTS****2.1 PAINTS AND COATINGS**

- A. Manufacturers:
  1. The Sherwin-Williams Company (SW).
  2. Benjamin Moore (BM).
  3. PPG - Glidden Professional (GP) (GP is a product of PPG Architectural Finishes).
  4. PPG Architectural Finishes (PPG).
  5. Pratt & Lambert Paints (P&L) - Epoxy Coatings Only.
  6. Where a Basis of Design is indicated, equal products from the above list of manufacturers are allowed.
  7. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. All materials and paints shall be lead and mercury free and shall have low VOC content where possible.
- B. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:

1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
  2. For good flow and brushing properties.
  3. Capable of drying or curing free of streaks or sags.
  4. Interior Flat and Non-Flat Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
  5. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
  6. Interior Clear Wood Finishes: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.
1. Interior Clear Wood Finishes: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. Patching Materials: To be compatible with the substrate and paint/coating materials; use latex patching materials where compatible with substrate and paint/coating materials; use tinted or stainable patch materials where wood substrates are indicated to be stained.
- E. Recessed Fastener Head Filler Materials: To be compatible with the substrate and paint/coating materials; use latex filler materials where compatible with substrate and paint/coating materials; use tinted or stainable patch materials where wood substrates are indicated to be stained.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify surfaces are ready to receive Work as instructed by product manufacturer.
- C. Examine surfaces indicated to be finished prior to commencement of work. Report conditions capable of affecting proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces is in accordance with the coating manufacturer's recommendations and is below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Masonry, Concrete and Concrete Unit Masonry: 12 percent.
  3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  5. Concrete Floors and Traffic Surfaces: 8 percent.

**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. Preparations to be executed with methods and materials compatible with paints and coatings to be applied.
- C. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces thoroughly prior to applications.
- E. Seal marks and surfaces that might cause bleed through or staining of top coat.
- F. Remove marks and foreign matter from substrates indicated for transparent or semi-transparent coatings.
- G. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- H. Aluminum Surfaces Indicated for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- I. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- J. Gypsum Board Surfaces: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled fastener heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds. Fill minor defects with filler compound. Spot prime defects after repair.
- K. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- L. Concrete: Remove release agents, curing compounds, efflorescence, irregular surfacing, foreign matter, stains, chalk and laitance. Prepare surface as recommended by finishes manufacturer and according to SSPC-SP 13. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds the lesser of that permitted in manufacturer's written instructions and that indicated in this Section. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- M. Concrete Floors Requiring Seal Finish (Does not include Polished Concrete Floor Finishing, see Division 3):
  - 1. Use preparation procedures and products as recommended by manufacturer of concrete floor sealer.
- N. Unit Masonry Surfaces Indicated to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- O. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with patching material compatible with the plaster and the indicated coatings. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

- P. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand power tool wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- Q. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- R. Surfaces Indicated to Receive Fire-Retardant Intumescent Paint: Use preparation procedures and products as recommended by manufacturer of Intumescent Paint system.
- S. Metal Doors and Frames Indicated for Painting: Prime metal door top and bottom edge surfaces.
- T. Wood Surfaces:
  - 1. Indicated to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried and prime filled areas; sand between coats. For exterior applications, back prime concealed surfaces before installation.
  - 2. Indicated to Receive Transparent Finish: Wipe off dust and grit prior to application of finishing materials. Fill nail holes and cracks with stainable filler or filler tinted to match the intended final wood appearance. For exterior applications, prime concealed surfaces with indicated finish material.
- U. Glue-Laminated Wood Beams Indicated for Field Applied Finishing: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- V. Floor and Roof Concrete Planks: Where underside of planks is exposed to view, install continuous joint sealant materials to seal joints including joints between planks, around perimeters and voids.

### 3.3 APPLICATION

- A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- C. For concrete masonry units and other porous masonry and cementitious materials indicated to receive painting/coating, apply the primer coating as needed to fill all pinholes prior to applying finish top coats.
- D. Sand surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Where clear finishes are required, tint fillers to match wood and apply to match wood texture. Remove excess from surface.
- G. Prime concealed surfaces of interior woodwork with primer paint.
- H. Finishing Mechanical and Electrical Equipment:
  - 1. Paint shop primed equipment. Paint shop finished items occurring at interior areas.
  - 2. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately. Reinstall after paint is cured.
  - 3. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.

4. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
  5. Paint exposed conduit and electrical equipment occurring in finished areas.
  6. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
  7. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- I. Finishing Overhead Construction Indicated as Open To Structure (exposed to view):
1. This provision includes finishing of overhead construction above suspended ceilings and clouds that do not extend to wall. This condition allows overhead construction to be seen above and over the suspended ceiling or cloud. Therefore, such overhead construction must be painted to eliminate unsightly overhead conditions that are visible.
  2. This provision does not include mechanical and electrical utility rooms, unless indicated otherwise on Drawings.
  3. Apply fast-drying, flat interior dry-fall type alkyd to all overhead construction Work and surfaces. Such surfaces include, but are not limited to, roof decking, structural steel, bracing and supports, and mechanical and electrical work.
    - a. Dry-Fall application does not apply to the following:
      - 1) Items with manufacturer's fully prefinished final coatings such as light fixtures, life safety devices and required warning postings.
      - 2) Surfaces scheduled to receive manufacturer's fully prefinished final coatings or field applied coatings other than Dry-Fall. Such surfaces may include wood laminated beams and underside of wood plank ceilings.

### 3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

### 3.5 SCHEDULE - EXTERIOR SURFACES

- A. Surfaces Indicated to Receive 1-Hour Rated Fire-Retardant Intumescent Paint System:
  1. See Drawings for designated locations and applicable UL Design.
  2. Primer for Intumescent Paint System.
    - a. Albi 487S Primer.
  3. Intumescent Paint System.
    - a. Albi Clad 800, thickness as required to achieve the required fire-retardant rating. Minimum cure time is seven days before finish top coats can be applied (or longer if recommended by Intumescent Paint manufacturer).
  4. Finish with two top coats of finish paint as designated below for the substrate type.
- B. Steel - Unprimed:
  1. One coat of alkyd primer.
    - a. Benjamin Moore P-06 Super Spec HP Alkyd Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Sherwin-Williams All Surface Enamel Oil Primer.
  2. Two top coats of alkyd enamel, Semi-gloss.
    - a. Benjamin Moore 110 Moore's Alkyd High Gloss House Paint.
    - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
    - c. Sherwin-Williams SWP Exterior Gloss Oil Base Paint.

- C. Steel - Shop Primed:
1. Touch-up with alkyd primer.
    - a. Benjamin Moore P-06 Super Spec HP Alkyd Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Sherwin-Williams All Surface Enamel Oil Primer.
  2. Two top coats of alkyd enamel, Semi-gloss.
    - a. Benjamin Moore 110 Moore's Alkyd High Gloss House Paint.
    - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
    - c. Sherwin-Williams SWP Exterior Gloss Oil Base Paint.
- D. Steel - Galvanized:
1. One coat galvanize primer.
    - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Sherwin-Williams Galvite HS Primer.
  2. Two top coats of alkyd enamel, Semi-gloss.
    - a. Benjamin Moore 110 Moore's Alkyd High semi-gloss House Paint.
    - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
    - c. Sherwin-Williams SWP Exterior semi-gloss Oil Base Paint.
- E. Aluminum - Mill Finish:
1. One coat etching primer.
    - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Sherwin-Williams Galvite HS Primer.
  2. Two top coats of alkyd enamel, Semi-gloss.
    - a. Benjamin Moore 110 Moore's Alkyd High semi-gloss House Paint.
    - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
    - c. Sherwin-Williams SWP Exterior semi-gloss Oil Base Paint.
- F. Concrete Masonry Units:
1. Two coats of block filler.
    - a. Basis of Design: Sherwin-Williams - Loxon Block Surfacer A24W00200.
  2. Two top coats of latex, Flat.
    - a. Basis of Design: Sherwin-Williams - SuperPaint Exterior Acrylic Latex Flat A80xxxxxx Series.

### 3.6 SCHEDULE - INTERIOR SURFACES

- A. Surfaces Indicated to Receive 1-Hour Rated Fire-Retardant Intumescent Paint System:
1. See Drawings for designated locations and applicable UL Design.
  2. Primer for Intumescent Paint System.
    - a. Albi 487S Primer.
  3. Intumescent Paint System.
    - a. Albi Clad 800, thickness as required to achieve the required fire-retardant rating. Minimum cure time is seven days before finish top coats can be applied (or longer if recommended by Intumescent Paint manufacturer).
  4. Finish with two top coats of finish paint as designated below for the substrate type.
- B. Concrete Masonry Units:
1. Two coats of block filler.
    - a. Glidden Professional Bloxfil 4000 Heavy Duty Acrylic Block Filler.
    - b. Pittsburgh Paints 6-7 SpeedHide Int/Ext Masonry Block Filler
    - c. Sherwin-Williams PrepRite Interior/Exterior Latex Block Filler.
  2. Two top coats of latex, Eggshell.
    - a. Glidden Professional Ultra-Hide 150 Interior Latex Eggshell 1412V Series.

- b. Pittsburgh Paints SpeedHide Interior Acrylic Latex Eggshell 6-4xx Series.
  - c. Sherwin-Williams ProMar 200 Zero VOC Interior Latex Eggshell.
- C. Concrete Masonry Units - Epoxy Paint:
- 1. Locations:
    - a. Kitchen, Serving Areas and connecting Rooms and Areas with Doors and Openings to Kitchen and Serving Areas.
      - 1) One coat of light weight mortar skim coat. (See Unit Masonry 04 20 00).
      - 2)
      - 3) Two top coats, minimum, of epoxy top coat.
      - 4) Apply additional coats as required to achieve even surface finish acceptable to the local Health Department having jurisdiction.
      - 5) All surfaces must be acceptable to Health Department officials and pass the “ketchup test” parameters.
    - b. Dining Rooms, Locker Rooms, Toilets and Janitor Closets.
      - 1) Two coats of epoxy block filler.
      - 2) Two top coats of epoxy top coat.
  - 2. Epoxy Block Filler.
    - a. As recommended by top coat manufacturer for specific substrate
  - 3. Epoxy Top Coats of acrylic epoxy, Semi-gloss.
    - a. PPG Architectural Pitt-Glaze WB1 Interior Pre-Catalyzed Water-Borne Acrylic Epoxy Semi-Gloss, 16-5xx Series (MPI 153).
    - b. Pratt & Lambert Krylon Industrial PreCat Water-Borne Acrylic Epoxy Semi-Gloss, K000Z72xx Series (MPI 153).
    - c. Sherwin-Williams Pro Industrial Pre-Catalyzed Water Based Acrylic Epoxy Semi-Gloss, K46xxxxxx Series (MPI 153).
- D. Concrete Floors Requiring Seal Finish: (Does not include Polished Concrete Floor Finish, see Division 3)
- 1. One coat Penetrating Liquid Densifier: Lithium silicate sealer, hardener, and densifier.
    - a. Manufacturers:
      - 1) Prosoco - Consolideck LS. (Basis of Design)
      - 2) Convergent Concrete Technologies - Pentra-Sil (NL).
      - 3) Substitutions: Section 01 60 00 - Product Requirements.
    - b. Apply in accordance with manufacturer’s recommendations.
  - 2. Two coats Protective Surface Treatment: Lithium silicate hardener.
    - a. Manufacturers:
      - 1) Prosoco - Consolideck PolishGuard. (Basis of Design)
      - 2) Convergent Concrete Technologies - Pentra-Guardl (HP).
      - 3) Substitutions: Section 01 60 00 - Product Requirements.
    - b. Apply in accordance with manufacturer’s recommendations.
- E. Steel - Unprimed:
- 1. One coat of acrylic primer.
    - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
    - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
  - 2. Two top coats of acrylic enamel, Semi-gloss.
    - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
    - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
    - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.

- d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
- F. Steel - Primed:
- 1. Touch-up with acrylic primer.
    - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
    - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
  - 2. Two top coats of acrylic enamel, Semi-gloss.
    - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
    - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
    - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.
    - d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
- G. Steel - Galvanized:
- 1. One coat acrylic primer.
    - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
    - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
    - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
    - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
  - 2. Two top coats of acrylic enamel, Semi-gloss.
    - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
    - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
    - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.
    - d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
- H. Gypsum Board Walls:
- 1. One coat of latex primer sealer.
    - a. Benjamin Moore Ultra Spec 500 Waterborne Interior Latex Primer, N534 (MPI 50).
    - b. PPG Architectural Speedhide Interior Latex Sealer Quick-Drying, 6-2 (MPI 50).
    - c. Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W02600 (MPI 50).
  - 2. Two top coats of latex enamel, Eggshell.
    - a. Benjamin Moore Regal Select Premium Interior Paint & Primer Eggshell, 549/K549 (MPI 44, MPI 138).
    - b. PPG Architectural Speedhide Interior Enamel Latex Eggshell, 6-411 (MPI 44).
    - c. Sherwin-Williams ProMar 400 Zero VOC Eg-Shel, B20W046xx (MPI 44).
- I. Gypsum Board Walls - Epoxy Paint:
- 1. Locations:
    - a. Kitchen, Serving Areas and connecting Rooms and Areas with Doors and Openings to Kitchen and Serving Areas.
    - b. Dining Rooms, Locker Rooms, Toilets and Janitor Closets.
  - 2. One coat of epoxy primer sealer.
    - a. As recommended by top coat manufacturer for specific substrate.
  - 3. Two top coats of acrylic epoxy, Semi-gloss.



- a. PPG Architectural Pitt-Glaze WB1 Interior Pre-Catalyzed Water-Borne Acrylic Epoxy Semi-Gloss, 16-510 Series (MPI 153).
  - b. Pratt & Lambert Krylon Industrial PreCat Water-Borne Acrylic Epoxy Semi-Gloss, K000Z7200 Series (MPI 153).
  - c. Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Acrylic Epoxy Semi-Gloss, K46W00151 Series (MPI 153).
- J. Gypsum Board Ceilings and Bulkheads:
- 1. One coat of latex primer sealer.
    - a. Benjamin Moore Eco Spec WB Interior Latex Primer, N372/F372 372 (MPI 50, MPI 149).
    - b. PPG Architectural Speedhide Interior Latex Sealer Quick-Drying, 6-2 (MPI 50).
    - c. PPG Architectural Speedhide Interior Zero VOC Latex Sealer, 6-4900XI (MPI 50).
    - d. Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W02600 (MPI 50).
  - 2. Two top coats of latex, Eggshell.
    - a. Benjamin Moore Regal Select Premium Interior Paint & Primer Eggshell, 549/K549 (MPI 44, MPI 138).
    - b. PPG Architectural Speedhide Interior Enamel Latex Eggshell, 6-411 (MPI 44).
    - c. Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20W12651 (MPI 52).
- K. Insulated Coverings - Canvas and Cotton:
- 1. One coat of latex primer sealer.
    - a. Same as "Gypsum Board Ceilings".
  - 2. Two top coats of latex, Flat.
    - a. Same as "Gypsum Board Ceilings".
- L. Dry Fall (Dry Fog)
- 1. One coat of primer sealer.
    - a. As recommended by top coat manufacturer for each substrate type.
  - 2. Two top coats of latex, Flat.
    - a. Benjamin Moore Super Kote 5000 Dry Fall Acrylic Latex Flat (MPI 118).
    - b. PPG Architectural Speedhide Super Tech WB Interior Dry Fog Flat Latex (MPI-118).
    - c. Sherwin-Williams Waterborne Acrylic DryFall (MPI 118).
- M. Wood - Transparent Top Coat on Stained and Non-Stained Wood:
- 1. Filler coat (for open grained wood only).
  - 2. One coat sealer.
    - a. To be compatible with other finish application materials.
  - 3. Three top coats of transparent acrylic coating, Semi-gloss.
    - a. Benjamin Moore Aqua Plastic Waterborne Urethane Clear Semi-Gloss 1WB-1410 (MPI 129).
    - b. PPG Architectural Interior Varnish, 100% Acrylic Crystal, Semi-Gloss 194100 (MPI 129).
    - c. Sherwin-Williams Minwax Water Based Polyurethane Clear Semi-Gloss 63020/71032 (MPI 129).
- N. Wood - Stain:
- 1. Penetrating Stain
    - a. To be compatible with other finish system materials, including transparent top coats.
  - 2. One coat sealer.
    - a. To be compatible with other finish system materials.

3. Three top coats; refer to “Wood - Transparent Top Coat” above.
- O. Wood - Painted:
1. One coat of prime sealer.
    - a. As recommended by top coat manufacturer for specific substrate.
  2. Two top coats of latex, Semi-gloss.
    - a. Benjamin Moore Ultra Spec 500 Waterborne Interior Gloss N540 (MPI 54).
    - b. PPG Architectural Speedhide Interior Enamel Latex Semi-Gloss 6-5XX (MPI 54).
    - c. Sherwin-Williams ProMar 400 Zero VOC Interior Latex Gloss B21W04651 (MPI 54).
- P. Colors and Locations for painting and coating applications:
1. Drawings and Schedules on Drawings provide additional information regarding Colors (Basis of Design) and Locations.
    - a. Other Colors and Locations as selected by Architect.

**END OF SECTION**

**SECTION 10 11 00**  
**VISUAL DISPLAY SURFACES (ADD-6)**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Markerboards.
  - 2. Projection Screen Markerboards.
  - 3. Graphic (Music) Markerboards.
  - 4. Tackboards.
- B. Related Requirements:
  - 1. Section 04 20 00 - Unit Masonry: Substrate construction.
  - 2. Section 09 21 16 - Gypsum Board Assemblies: Substrate construction.

**1.2 REFERENCES**

- A. American National Standards Institute:
  - 1. ANSI A135.4 - Basic Hardboard.
  - 2. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. ASTM International:
  - 1. ASTM A424 - Standard Specification for Steel, Sheet, for Porcelain Enameling.
  - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. California Department of Health Services:
  - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on types of visual display surfaces, components and accessories included in this Section.
- C. Shop Drawings: Indicate wall elevations, dimensions, anchor details and joint locations of units and finishes. Include a schedule of unit descriptions to be installed, sorted by room numbers from Drawings.
- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of finishes and colors available for each visual display type; include full range of finish trim options. 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 12 x 12 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures.
- B. Submit Operation and Maintenance Data. Include specifications for manufacturer recommended markers to be used on markerboards.

**1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

**1.6 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**1.7 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish five (5) year manufacturer's warranty for visual display surfaces other than markerboards.
  - 1. Warranty shall cover replacement of Work found to be defective in material or installation.
- C. Furnish fifty (50) year manufacturer's warranty for Porcelain-on-Steel Markerboards.
  - 1. Warranty shall cover replacement of defective Porcelain-on-Steel Markerboards due to discoloration, excessive fading of color, crazing, cracking or flaking. Warranty does not cover the cost of removal or reinstallation.

**1.8 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Markers: Provide one (1) pack of red, blue and green markers for each markerboard installed. Markers to be type as recommended by markerboard manufacturer.

**PART 2 PRODUCTS****2.1 VISUAL DISPLAY BOARDS**

- A. Manufacturers:
  - 1. Marsh Industries Inc.
  - 2. Claridge Products and Equipment.
  - 3. Ghent Manufacturing Inc.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. Sheet Steel: ASTM A424, Type I, commercial quality.
- B. Particleboard: ANSI A208.1, wood chips, set with waterproof resin binder, sanded faces.
  - 1. Interior Composite Wood Products: Meets California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Hardboard: ANSI A135.4, tempered, smooth face.
- D. Foil Backing: Aluminum foil sheet, 0.015 inch thick.
- E. Composition Cork: Formulation of pure cork granules, compounded with linseed oils, rosin binders, mineral fillers and pigments to form a uni-colored composition cork on burlap backing reinforcing; color as selected.
- F. Frames, Maprails, Tackstrips, Trim and Chalkrails: Aluminum extrusions, ASTM B221, 6061 alloy, T5 temper.

- G. Adhesives: Type used by manufacturer.
  - 1. Interior Adhesives: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

## 2.3 ACCESSORIES

- A. Map Supports: Formed aluminum sliding roller brackets, to fit map rail. Provide one pair of map supports for each markerboard type.
- B. Flag Holders: Formed steel bored to receive 1 inch diameter flag staff, bracketed to fit top rail of markerboard. Provide one flag holder for each markerboard type.
- C. Cleaning Instruction Plate: Provide instructions for markerboard cleaning on metal plate fastened to perimeter frame near Chalkrail.
- D. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

## 2.4 FABRICATION

- A. Markerboards:
  - 1. Manufactured and factory assembled units
  - 2. Outer Face Sheet: 24 gauge steel face with porcelain enamel finish fused to the steel sheet face.
    - a. Face Sheet shall be a magnetic, non-porous surface and shall wipe clean with an eraser or dry cloth.
    - b. Deposition coat of 2.0 to 2.5 mils on front of steel.
    - c. Deposition coat of 1.5 to 2.0 mils on back of steel.
    - d. Porcelain enamel steel writing and erasing coat system, totaling 3.5 to 4.5 mils over front surface.
    - e. Firing temperature must be no less than 1450 deg. F.
    - f. Hardness of writing surface shall be uniform in color and texture.
    - g. Reflectance Factor: To be no more than 20% or less than 15%, nor vary as a result of wear.
    - h. Writing surface shall be no less than 6.5 MOH's scale.
    - i. Color: As selected from manufacturer's standard colors.
  - 3. Backing Core: Particle board, 1/2 inch thick.
  - 4. Backing Surface: 0.015 in. aluminum sheet vapor barrier; moisture retardant, laminated with suitable, low VOC emitting adhesive to prevent delamination.
  - 5. Lamination of all materials to be factory type only, with adhesives. Hand lamination is not acceptable.
  - 6. Splice Joint: Concealed spline of sheet steel.
  - 7. Chalkrail: Extruded aluminum; triangular profile, one piece full length of markerboard, cast aluminum end closures; concealed fasteners.
    - a. At physical activity spaces such as weight lifting rooms, dance studios, gyms and multi-purpose rooms, do not provide protruding chalkrails; rather, provide recessed type for markers and erasers.
  - 8. Maprail: Extruded aluminum with one (1) inch wide continuous tackable composition cork insert and with maprail end stops/closures. Provide above full length of markerboard surfaces.
  - 9. Size: As indicated on Drawings.
  - 10. Locations: As indicated on Drawings.
- B. Projection Surface (Screen) Markerboards: NOT USED.

- C. Graphic (Music) Markerboards: Same fabrication as Markerboards and with the following provisions:
1. Graphic Lines - "Fused-On" lining for porcelain enamel steel writing surfaces where indicated on drawings. Painted-On-Lines are not acceptable
    - a. Music Staff Lines:
      - 1) Five (5) Lines Each Staff.
      - 2) 1 inch Between Each Line.
      - 3) 3 to 5 inches Space Between Each Staff (equal spaces).
      - 4) 5 inches Border at Top & Bottom.
      - 5) Line Thickness: 1/16 inch.
      - 6) Length of lines as shown on Drawings.
  2. Size: As indicated on Drawings.
  3. Locations: As indicated on Drawings.
- D. Tackboards:
1. Manufactured and factory assembled units.
  2. Outer Facing:
    - a. Seamless composition cork sheet; 1/4 inch thick; laminated under pressure to backing core.
    - b. Color: As selected by Architect from submitted samples.
  3. Backing Core: Hardboard, 1/4 inch thick.
  4. Backing Surface: 0.015 in. aluminum sheet vapor barrier; moisture retardant, laminated with suitable, low VOC emitting adhesive to prevent delamination.
  5. Lamination of all materials to be factory type only, with adhesives. Hand lamination is not acceptable.
  6. Splice Joint: Concealed spline of sheet steel.
  7. Maprail: Extruded aluminum with one (1) inch wide continuous tackable composition cork insert and with maprail end stops/closures. Provide above full length of markerboard surfaces.
  8. Size: As indicated on Drawings.
  9. Locations: As indicated on Drawings.
- E. Aluminum Frames, Trim and Components: Extruded aluminum; not less than 0.062 inch thick aluminum alloy; size and shape as indicated and to suite use and installation type; straight factory applied for factory assembled display units; single length extrusions when possible; keep joints to a minimum; concealed fasteners; mitre corners to an aligned, hairline closure without sharp edges.
1. Color:
    - a. Clear anodized aluminum.

## 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.
- C. Examine products to be installed for damage and other conditions detrimental to completion of the Work.
- D. Verify substrate construction and required internal wall blocking is sufficient and ready to receive Work.
- E. Verify that positioning dimensions are as indicated on Drawings.

**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 as locations and heights as shown on the Drawings.
- C. Secure all work and factory assembled units level and plumb with concealed fastening hardware.
- D. Butt adjoining panels tight with concealed spline to hairline joint.

**3.4 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Cover markerboard surfaces with protective cover, taped to frame.
- C. Remove temporary protective cover at Final Inspection.

**3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage.

**3.6 SCHEDULE (ADD6)**

A. Tackboard

1. TB – 3'-4" h x 2'-8" w
2. TB1 – 4'-0" h x 6'-0" w
3. TB2 – 4'-0" h x 8'-0" w

**END OF SECTION**



**SECTION 10 14 00****SIGNAGE (ADD-1)****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes:
  1. Room Identification Signs.
  2. Fire Protection Signs.
  3. Applied Vinyl Graphics.
  4. Notification Signs.
  5. Dimensional Letter Signs.
  6. Dedication Plaque.
  7. Warning Stencils.
  8. LED Sign at Entry Drive.
- B. Related Requirements:
  1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
  2. Sections related to identification of Plumbing, HVAC and Electrical work.
  3. Sections related to Civil and Site work.

**1.2 REFERENCES**

- A. American Iron and Steel Institute (AISI).
- B. American National Standards Institute (ANSI):
  1. ANSI Z97.1 - Safety Glazing Materials Used In Buildings – Safety Performance Specifications And Methods Of Test; 2015.
- C. Americans with Disabilities Act (ADA):
  1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM International (ASTM):
  1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
  2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
  3. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
  4. ASTM E2072 - Standard Specification for Photoluminescent (Phosphorescent) Safety Markings; 2014.
- E. Code of Federal Regulations (CFR):
  1. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- F. International Code Council (ICC):
  1. ICC A117.1 - Accessible and Usable Building and Facilities; 2009.
- G. UL Standards (UL):
  1. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.

**1.3 DESIGN REQUIREMENTS**

- A. Conform to current local and state building codes; ADA Standards; 36 CFR 1191; and ICC A117.1 guidelines for manufacture and installation of interior identification signs
- B. Conform to current International Fire Code requirements.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data describing the material, fabrication standards and characteristics of the sign systems indicated in the Section and other Contract Documents.
- C. Shop Drawings: Indicate sign types, styles, lettering font, copy, graphics, features, foreground and background colors, locations, overall dimensions of each sign and attachment method. If electrical or communication wiring is required, indicate requirements and connection locations.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for each sign type; include color options for backgrounds, graphics and copy; 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 6 x 8 inches illustrating sign type, sign features, graphics and method of attachment. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

**1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package signs, labeled in name groups.
- C. Store adhesive attachment tape at ambient room temperatures.

**1.7 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install signs when ambient temperature is lower than recommended by manufacturer.
- C. Maintain this minimum temperature during and after installation of signs.

**1.8 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. LED Sign at Entry Drive: Provide warranties indicated in the description of the LED Sign at Entry Drive in this Section.

**PART 2 PRODUCTS****2.1 SIGNS**

- A. Manufacturers:
1. Acorn Sign Graphics.
  2. APCO Graphics.
  3. ASI Sign Systems.
  4. Bayuk Graphic Systems, Inc.
  5. Best Sign Systems.
  6. Interface Architectural Signage, Inc.
  7. InPro Corporation (Signscape).
  8. Mohawk Sign Systems.
  9. Rowmark, LLC
  10. Scott Sign Systems, Inc.
  11. Signage Industries Corporation.

**2.2 COMPONENTS**

- A. Room Identification Signs: Includes signs for rooms and area identification, unlighted exit signs, areas of refuge, and elevators and stairs related signs as indicated on Drawings.
1. Photopolymer face fused to phenolic sheet (0.145 inch total thickness), matte finish.
  2. "Tactile" signage, with copy raised minimum 1/32 inch above sign surface using photopolymer bonded process and with Grade II Braille located below copy.
  3. Clear Window Insertion Slots: As indicated on Drawings.
  4. Copy and graphics to be uniformly opaque.
  5. Copy Font: Helvetica Medium, uppercase.
  6. Copy Height: As indicated on Drawings.
  7. Braille Height: As indicated on Drawings.
  8. Symbol Size: As indicated on Drawings.
  9. Total Thickness: As indicated on Drawings, but not less than 0.145 inch.
  10. Corners: Radiused, 1/2 inch.
  11. Edges: Beveled and smooth.
  12. Graphic Style: International type.
  13. Colors:
    - a. Background: As selected by Architect from submitted samples.
    - b. Copy:
      - 1) As selected by Architect from submitted samples.
    - c. Symbols and Graphics:
      - 1) As selected by Architect from submitted samples.
  14. Sign Types:
    - a. Drawings indicate Sign Type Designations, Size, Copy, Symbols and Insert Window requirements.
    - b. Signs required at all door openings and spaces and as indicated on Drawings.
    - c. Refer to Drawings and Signage Schedule therein.
    - d. Include twelve (12) additional identification signs with graphics to be determined during construction. Type to be the type with insert window.
    - e. Back Cover Plate: Where sign must be secured to glass, acquire Architect approval prior to fabrication and installation of a Backing Cover (blank solid sign) on the opposite side of the glass. The backing cover material shall match the size, shape, base color, thickness and finish of the sign. The intent is to hide the unsightly back view of the sign when viewed on the opposite side of the glass. (Back Cover Plate, also reference in INSTALLATION near end of this Section.)

- B. Fire Protections Signs:
1. Size: As indicated on Drawings.
  2. Sign Types: Sign and Copy sizes vary; refer to Drawings.
    - a. Fire Department Connection Sign (2 required.) (Directional arrows as required.)
      - 1) Copy: **FDC**
    - b. Fire Sprinkler Riser Room Sign (2 required)
      - 1) Copy: **FIRE SPRINKLER RISER ROOM**
    - c. Fire Alarm Control Panel Sign (2 required)
      - 1) Copy: **FACP**
    - d. Fire Hose Valve Connection Sign (4 required; locations and final copy to be determined)
      - 1) Copy: **FIRE HOSE VALVE CONNECTION**
  3. Characters: Style and copy as required by NCBC 2012 standards.
  4. Engineering Grade (Type I) Reflective Aluminum: Red reflective lettering on white background, unless indicated otherwise on Drawings.
  5. Comply with requirements of International Fire Code requirements.
- C. Applied Vinyl Graphics: 2 inches high, die-cut characters from vinyl film; 3 mils thick; pressure-sensitive adhesive backing; exterior applications grade adhesive.
1. Provide door signs for each of the following:
    - a. Copy: **VISITORS REPORT TO MAIN OFFICE** (10 signs)
    - b. Copy: **TOBACCO FREE PROPERTY** (10 signs)
    - c. Copy: **DELIVERIES ONLY** (2 signs)
- D. Notification Signs: 1/8 inch thick, white plastic; 2 inch high black letters.
1. Provide one (1) door sign.
    - a. Copy: **DELIVERIES ONLY**
- E. Dimensional Letter Signs: Metal; architectural grade aluminum.
1. Exterior:
    - a. Thickness:
      - 1) 1 inch.
    - b. Height:
      - 1) Refer to Copy and Locations in following paragraphs.
    - c. Copy Style: Helvetica Medium, unless indicated otherwise on Drawings.
    - d. Finish: Brushed.
    - e. Copy and Locations: Characters to be designated by Architect.
      - 1) Building Face - Address Identification (as required by building codes):
        - a) Copy text, height and location on building exterior to be as required and designated by the local Fire Marshal and IBC 501.2 code.
      - 2) Building Face - Building Name (mounted on building wall; height at location as indicated on Drawings):
        - a) 24 upper case characters, **12 inches high.** (24 total characters)
      - 3) Primary Monumental Site Sign (mounted on **front** of sign):
        - a) **5 upper case characters, 8 inches high.**
        - b) **16 upper case characters, 5 inches high.**
  2. Interior:
    - a. Thickness:
      - 1) 1 inch.
    - b. Height:
      - 1) 8 inches, unless indicated otherwise on Drawings.
    - c. Copy Style: Helvetica Medium, unless indicated otherwise on Drawings.
    - d. Finish: Painted. Manufacturer's standard paint system; see drawings.
    - e. Copy:

- 1) Copy: **DINING** (1 signs required)
  - 2) Copy: **SERVING LINE**
  - 3) Copy: **ADMINISTRATION** (1 signs required)
  - 4) Copy: **MEDIA CENTER**
  - 5) Copy: **GYMNASIUM**
  - 6)
  - 7) Copy: **GIRLS** (3 signs required)
  - 8) Copy: **BOYS** (3 signs required)
  - 9) Copy: **ERWIN ELEMENTARY SCHOOL** (1 signs required)
  - 10) Copy: **KINDNESS** (1 signs required)
  - 11) Copy: **RESPECT** (1 signs required)
  - 12) Copy: **ROBOTICS** (1 signs required)
  - 13) Copy: **PROJECT ROOM** (2 signs required)
  - 14) Copy: **ART ROOM** (1 signs required)
  - 15) Copy: **RESPONSIBILITY** (1 signs required)
  - 16) Copy: **COURAGE** (1 signs required)
  - 17) Copy: **PLAYFULNESS** (1 signs required)
  - 18) Copy: **INTEGRITY** (1 signs required)
  - 19) Copy: **PERSEVERANCE** (1 signs required)
- F. Dedication Plaque: Cast bronze.
1. Quantity: One.
  2. Size: 18 x 24 inches.
  3. Border: None.
  4. Finish: Pebble texture, oxidized finish.
  5. Letter Finish: Satin polish.
  6. Mounting: Standard concealed mounting to comply with the manufacturers written instructions for type of wall surface indicated.
  7. Characters: Style and copy to be selected by Architect and Owner from manufacturer's full range of options.
    - a. Plaque to include the following information:
      - 1) Project Name. To be determined by Architect and Owner.
      - 2) Date of Construction.
      - 3) Names and Title of all the Board of Education Members.
      - 4) Name and Title of the School System Superintendent.
      - 5) Architect's Name and Location.
      - 6) General Contractor's Name.
- G. Warning Stencils: Reusable stencils for painting warning on both sides of rated walls, above hung ceiling.
1. Copy: **X-HOUR RATED WALL - PROTECT ALL OPENINGS** (X is to be the actual numeral that represents the wall fire rated time designation).
  2. Letter Color: Red.
  3. Letter Size: 3 inches tall.
  4. Spacing: **Apply at a maximum of 30 feet o.c. and 15' from end of wall or at all rated walls less than 30 feet, above ceilings on both sides of walls. (ADD-1)**
  5. Quantity: Since stencils are reusable, quantity is determined by Contractor.
- H. LED Sign At Entry Drive: Exterior marquee sign, pedestal and concrete foundation.
1. Manufacturers:
    - a. Entech Signs - Alpha LED: Excite 16 mm Message Marguee Version (Basis of Design).
    - b. Substitutions: Section 01 60 00 - Product Requirements.
  2. Design Requirements:

- a. The sign system includes the sign, pedestal, housing, seals, concrete foundation, anchorage and all components of the operational assembly. The sign system is to be designed and sealed by a licensed Professional Engineer experienced in design of work of this type and licensed in the State in which the Project is located. The engineer is to certify that all applicable code requirements have been met. The engineer may be in the employ of the manufacturer of the sign system, provided the Engineer is compliant with the above registration requirement.
  - b. Design sign system to safely withstand Wind Loads as indicated on Drawings for the Structural Design Criteria and in compliance with the State Building Code for the State in which the project is located.
  - c. Comply with the design requirements on the Drawings regarding sign system size and configuration.
  - d. Include engineered sign system design in the Shop Drawings submittals.
3. LED Sign: 16mm full color digital display.
- a. Size; 2 feet - 6.7 inches high by 7 feet - 7.2 inches wide., minimum.
  - b. LED Pixel: LED Pixel 16mm; 0.63 inch pixel pitch; 1 Red/1 Green/1 Blue LED per pixel.
  - c. LED Color: PureColor, 16.7 million colors.
  - d. Digital Display Matrix Size:
    - 1) 240 x 880.
  - e. Case: 10.2 inches deep (including mounting angle) UL50 type 3R, IP24, aluminum enclosure.
  - f. Viewability & Intensity: 160 degrees horizontal/60 degrees vertical; 6500 nits minimum.
  - g. Programming: Operates with Ooh!Media Pro version software.
  - h. Programming Software and Hardware: Provide current version of Ooh!Media Pro software, hardware and all wiring connections required for fully operational sign system.
  - i. Controller: Embedded PC, DVI link to the sign monitor.
  - j. Connectivity to Controller: Wired Ethernet with optional wireless and DSL modem (phone company requirement).
  - k. Service Access: Front-serviceable components. Display drivers (16 x 16) are removable without opening the front access door.
  - l. Mounting: Stainless steel mounting, fastening and anchor devices to sign system superstructure and foundation.
  - m. Miscellaneous Fasteners: Stainless steel.
  - n. Dimming: 10 percent to 100 percent; automatic light sensor.
  - o. Video Frame Rate:
    - 1) Message marquee version; 20fps .
  - p. Special Features:
    - 1) Industry standard 1GB compact flash memory for message storage .
    - 2) External temperature probe.
    - 3) DVI monitor capability.
    - 4) Protector case; ventless enclosure design reflects solar radiation and eliminates external contamination by rain, salt, fog, fumes and dust. No filter changes required.
    - 5) Automatic thermal protection for all electronics.
    - 6) Thermostatically controlled fans for each module/case for internal air mixing.
  - q. Operating Temperature: -22 degrees to 122 degrees F (-30 degrees to 50 degrees C).

- r. Sign System Warranty: Sign system manufacturer's five (5) year limited warranty.
- s. Programming Software and Hardware Warranty: Manufacturer's standard warranty; not less than one (1) duration.
- t. Agency Approvals: UL 48.
- 4. Sign Pedestal: Size and configuration to be as indicated on Drawings.
  - a. Superstructure: Hot dipped galvanized steel members sized and joined per the required engineer's design.
  - b. Sheet Metal: Pre-finished aluminum; ASTM B209 (ASTM B209M), 3003 or 3005 alloy, H12 or H14 temper.
    - 1) Thickness: Base metal thickness unless indicated otherwise on Drawings or required engineer's design.
    - 2) Superior Performance Organic Coating System: AAMA 2605, shop applied multiple coat, 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.
      - b) Color: As selected by Architect from full range of options.
    - 3) Sheet Metal Joinery: Joined and sealed to provide weathertight enclosure. Sealant to match metal finish.
    - 4) Fasteners and anchors to be stainless steel and unexposed except for service access.

### 2.3 ACCESSORIES

- A. Mounting Hardware: Screws; stainless steel; countersunk phillips flat head screws.
- B. Tape Adhesive: Double sided foam tape; permanent adhesive.
- C. Back Cover Plate: Where sign must be secured to glass, acquire Architect approval prior to fabrication and installation of a Backing Cover (blank solid sign) on the opposite side of the glass. The backing cover material shall match the size, shape, base color, thickness and finish of the sign. The intent is to hide the unsightly back view of the sign when viewed on the opposite side of the glass. (Back Cover Plate, also reference in INSTALLATION near end of this Section.)

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate if finished to include finish coating(s).
- C. Verify adequate blocking and supports to structure are installed and ready to receive work.
- D. Verify that electrical and communications wiring requirements are provided.

### 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 at locations indicated on Drawings.
- C. Room Identification Signs: Mount with double sided foam tape and countersunk phillips flat head screws. Finish of screw heads is to match the color and finish of the portion of the sign that the screw is seated into.
  - 1. Position of Room Identification Signs:
    - a. 12 inches from strike side of door to the center of the sign; on wall surface, level, 60 inches from the floor to the top of the sign.
  - 2. Where sign must be secured to glass, acquire Architect approval prior to fabrication and installation of a Backing Cover (blank solid sign) on the opposite side of the glass. The backing cover material shall match the size, shape, base color, thickness and finish of the sign. The intent is to hide the unsightly back view of the sign when viewed on the opposite side of the glass. (Back Cover Plate, also reference in COMPONENTS - Sign Types, in this Section.)
- D. Applied Vinyl Graphics: Mount on exterior of glass doors.
- E. Dimensional Letter Signs: Mount with stainless steel threaded rods into expansion shields. All hardware shall be stainless steel.
- F. Mount fire protection system signage in accordance with International Fire Code requirements.
- G. Dedication Plaque: Mount with stainless steel threaded rods into expansion shields.
- H. LED Sign at Entry Drive: Install sign system, and programming software and hardware in compliance with the engineer's design, manufacturer's recommendations and the Drawings

**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.

**3.6 DEMONSTRATION AND TRAINING**

- A. Section 01 79 00 - Demonstration and Training.
- B. LED Sign System and Programming Software and Hardware: Provide demonstration and training to the Owner regarding operation and maintenance of components of the installed Work.

**END OF SECTION**



**SECTION 10 21 15**  
**PLASTIC TOILET COMPARTMENTS**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes solid plastic toilet compartments and urinal screens.
- B. Related Requirements:
  - 1. Section 10 28 13 - Toilet Accessories.

**1.2 REFERENCES**

- A. ASTM International (ASTM):
  - 1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. 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; 2015.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plans, door swings, elevation views, dimensions, details of wall and floor supports.
- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of finishes and colors available. 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 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: Include special procedures and perimeter conditions requiring special attention.

**1.4 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with placement of support framing and anchors in wall.

**PART 2 PRODUCTS****2.1 SOLID PLASTIC TOILET COMPARTMENTS**

- A. Manufacturers:
  - 1. Accurate Partitions Corp.
  - 2. Columbia Partitions.
  - 3. Legacy Polymers.
  - 4. Metpar Corporation.
  - 5. Rockville Partitions Inc.

6. Scranton Products.
7. Substitutions: Section 01 60 00 - Product Requirements.

## 2.2 COMPONENTS

- A. Toilet Compartments: Solid, molded thermoset, and waterproof; high-density polyethylene (HDPE) plastic panels, doors, and pilasters.
  1. Fire Rating of HDPE Solid Plastic Panels: Class B in accordance with NFPA 286.
  2. Color:
    - a. As selected by Architect from full range of colors and submitted samples.
  3. Panels:
    - a. Thickness: 1 inch.
    - b. Width: As indicated on Drawings.
    - c. Height:
      - 1) As indicated on Drawings.
  4. Doors:
    - a. Thickness: 1 inch.
    - b. Width:
      - 1) Accessible (H/C) Compartment Doors: Out-swinging with opening clearance of 32 inches (with no obstructions). Coordinate with door thickness and hardware to ensure there are no obstructions within the required 32 inches clear opening.
      - 2) Standard Compartment Doors: 28 inches.
    - c. Height:
      - 1) Match compartment panels.
  5. Urinal Screens:
    - a. Thickness: 1 inch.
    - b. Width: Total projection from wall to be 23 inches. Dimension includes pilaster assembly where pilaster is indicated on Drawings.
    - c. Height:
      - 1) As indicated on Drawings.
  6. Pilasters:
    - a. Thickness: 1 inch.
    - b. Widths: As required to fit space and not less than 3 inches.
    - c. Height:
      - 1) As indicated on Drawings.

## 2.3 ACCESSORIES

- A. All finish metal components and accessories to be as follows, unless otherwise indicated:
  1. Satin Finish.
- B. Pilaster Shoe: Formed ASTM A666 Type 304 stainless steel, 3 inches high, concealing floor mounting and adjustment hardware. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. All metal mounting and adjustment hardware to be stainless steel.
- C. Head Rails: Hollow anodized aluminum tube, 1 x 1-5/8 inch size, with anti-grip profiles and cast socket wall brackets. Maximum lengths practical.
- D. Vertical Brackets: Double flange type.
  1. Extruded aluminum; color clear anodized.
    - a. Continuous length.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

1. For attaching panels, screens and pilasters to brackets: Binding Post through-bolts and nuts; tamper proof.
  2. For attaching all hardware: Binding Post through-bolts and nuts; tamper proof.
- F. Hardware: Heavy duty stainless steel:
1. Continuous hinges; self-closing.
  2. Sliding door latch.
  3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
  4. Coat hook with rubber bumper; one for each compartment, mounted on door.
  5. Furnish door pull on each side of door for out-swinging doors.
  6. Furnish metal heat sink at bottom of doors and partitions.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field measurements are as indicated on shop drawings.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location and adequate support of built-in framing, anchorage, and bracing.

### **3.2 INSTALLATION**

- A. Install work level and plumb.
- B. Attach panel brackets securely to support framing and anchor points using anchor devices.
- C. Attach panels and pilasters to brackets.
- D. Locate head rail joints at pilaster center lines.
- E. Adjust pilaster shoe leveling screws to produce level and plumb panel construction on sloped floors.

### **3.3 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/4 inch.
- C. Maximum Variation From Plumb: 1/8 inch.

### **3.4 ADJUSTING**

- A. Section 01 73 00 - Execution: Adjusting.
- B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- C. Adjust hinges to position doors in partial opening position (approximately 3") when unlatched. Return out-swinging doors to closed position.
- D. Adjust adjacent components for consistency of line or plane.

**END OF SECTION**



**SECTION 10 28 00**  
**TOILET ACCESSORIES (ADD-4)**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Toilet room accessories.
  - 2. Utility room accessories.
- B. Related Requirements:
  - 1. Section 04 20 00 - Unit Masonry.
  - 2. Section 06 10 53 - Miscellaneous Rough Carpentry: Blocking in framed walls.
  - 3. Division 09 - Finishes: Sections describing wall materials and finishes.
  - 4. Division 10 - Specialties: Sections describing Toilet Compartments.
  - 5. Division 26 - Electrical: Construction related to electric devices.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 2. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  - 3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 4. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar, 2015.
  - 5. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
  - 6. ASTM C1036 - Standard Specification for Flat Glass.
  - 7. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass, 2012.
  - 8. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror, 2008.

**1.3 DESIGN REQUIREMENTS**

- A. Design grab bars, attachments, anchors and provide blocking to resist minimum 250 lb concentrated load applied at any point in any direction.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.
- C. Manufacturer's Installation Instructions: Submit special procedures, conditions requiring special attention.

**1.5 QUALITY ASSURANCE**

- A. Single Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Architect. (Exception: Electric hand dryers.)

**1.6 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.
- C. Coordinate electrical requirements with electrical service construction.

**PART 2 PRODUCTS****2.1 TOILET AND BATH ACCESSORIES**

- A. Manufacturers:
  - 1. Bobrick Washroom Accessories
  - 2. American Specialties, Inc. (ASI).
  - 3. Bradley Corporation.
  - 4. McKinney/Parker Washroom Accessories Corporation.
  - 5. Electric Hand Dryers:
    - a. Bobrick Washroom Accessories
    - b. Dyson
    - c. Excel Dryer, Inc.
    - d. Pinnacle Dryer Corporation.
  - 6. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. All devices to be compliant with applicable codes and ADA.
- B. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  - 1. Grind welded joints smooth.
  - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- C. Keys: Furnish 2 keys for each accessory to Owner; master key for all accessories.
- D. Stainless Steel Sheet: ASTM A666, Type 304.
- E. Stainless Steel Tubing: ASTM A269, stainless steel.
- F. Galvanized Sheet Steel: ASTM A653/A653M, G60 zinc coating.
- G. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- H. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.
- I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

**2.3 TOILET ROOM ACCESSORIES**

- A. Toilet Tissue Dispenser:
  - 1. Double roll, surface mounted bracket type, satin finished cast aluminum brackets eccentric-shaped plastic spindle for 1/2 revolution delivery designed to prevent theft of tissue roll.
    - a. Controlled Delivery Type: All stalls and toilets except ADA accessible stalls and toilets.

- b. Non-Controlled Delivery Type: All ADA accessible stalls and toilets.
- B. Paper Towel Dispenser:
  - 1. Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
    - a. Capacity: 350 C-fold minimum.
    - b. **Install at all sink locations in classrooms and staff areas that do not receive EHD.**
- C. Soap Dispenser:
  - 1. Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
    - a. Minimum Capacity: 34 ounces.
    - b. **Install at all sink locations.**
- D. Framed Mirrors: Stainless steel framed, 1/4 inch thick Mirror Glass, abrasion-resistant coated mirror.
  - 1. Size, Angle and Configuration: As indicated on Drawings.
  - 2. Frame: 3/4 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
  - 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and non-absorptive filler material.
- E. Grab Bars: Stainless steel, 1-1/2 inches outside diameter, minimum 0.05 inch wall thickness, non-slip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
  - 1. Length and Configuration: As indicated on Drawings.
- F. Sanitary Napkin Disposal Unit: Stainless steel with full-length stainless steel piano-type hinge door and removable receptacle. Other features and mounting type as indicated by Basis of Design in Schedule at end of this Section.
- G. Electric Hand Dryers: As indicated in Schedule at end of this Section. Coordinate with electrical requirements.
- H. **Baby Changing Station: As indicated in Schedule at end of this Section.**
- I. Other Accessories as indicated in Schedule at end of this Section.

## 2.4 SHOWER ACCESSORIES

- A. **Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.05 inch wall thickness, satin-finished, with satin-finished stainless steel flanges, for concealed mounting.**
- B. **Shower Curtain: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.**
- C. **Shower Hooks: Stainless steel Type 304.**
- D. **Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.**
- E. **Wall-Mounted Soap Dish: Heavy duty, seamless stainless steel, surface-mounted with drain holes, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate.**

- F. **Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, rectangular seat.**

- 1. **Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.**

## 2.5 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder: 18 gage, Type 304 stainless steel.
  - 1. Mop Holders: 4 spring-loaded rubber cam holders, holds mops 8 inches from wall.
  - 2. Length: 36 inches.
  - 3. Shelf: 18 gage, 8 inches deep.
  - 4. Rag Hooks: One each, midway between mop holders.

## 2.6 FACTORY FINISHING

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish, unless otherwise noted.
- C. Galvanizing for Items Other than Sheet: ASTM A123/A123M; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify field measurements are as indicated on product data instructed by manufacturer.

### 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. Deliver inserts and rough-in frames to site for timely installation.
- C. Provide templates and rough-in measurements as required.

### 3.3 INSTALLATION

- A. Install plumb and level, securely and rigidly anchored to substrate.
- B. Mounting Heights and Locations: As required by accessibility regulations and as indicated on Drawings.

### 3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust and test installed Work for proper functionality.

### 3.5 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.

**3.6 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed Work from damage.

**3.7 SCHEDULES**

- A. Basis of Design is listed with Model No.:
 

1. Sanitary Napkin Disposal (SND)	Bobrick B-254 (surface mounted)
2. Sanitary Napkin Disposal (SND)	Bobrick B-353 (wall recessed)
3. Sanitary Napkin Disposal (SND)	Bobrick B-354 (thru partition, 2 sides)
4. Grab Bars for Toilets (GB)	Bobrick B-6806.99
5. Framed Mirror (MIR)	Bobrick B-2908 Series (size as on Drawings)
6. Shower Curtain Rod (CR)	Bobrick B-207
7. Shower Curtain (SC)	Bobrick B-204-2
8. Shower Curtain Hooks (SH)	Bobrick B-204-1
9. Coat Hook (CH)	Bobrick B-671
10. Shower Seat (SS)	Bobrick B-5191
11. Mop Holders (MH)	Bobrick B-224 x 36
12. Stainless Steel Mop Sink Backsplash	20” high x width of mop sink x back and sidewall
13. Electric Hand Dryers (EHD)	Dyson Airblade
14. Baby Changing Station (BCS)	Bradley 963 Series

**END OF SECTION**



**SECTION 10 44 00**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Fire extinguishers.
  - 2. Fire extinguisher cabinets.
  - 3. Accessories.
- B. Related Requirements:
  - 1. Section 04 20 00 - Unit Masonry.
  - 2. Section 09 21 16 - Gypsum Board Assemblies.

**1.2 REFERENCE STANDARDS**

- A. Factory Mutual (FM):
  - 1. FM (AG) - FM Approval Guide; current edition.
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 10 - Standard for Portable Fire Extinguishers; 2017.
- C. Underwriters Laboratories Inc. (UL):
  - 1. UL (DIR) - Fire Protection Equipment Directory.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Submit extinguisher operational features; full range of colors and finishes; anchorage details.
  - 2. Submit cabinet product data; operational features; full range of colors and finishes; anchorage details.
- C. Shop Drawings:
  - 1. Indicate mounting measurements for brackets; locations and fire ratings.
  - 2. Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, installation measurements for cabinets; locations and fire ratings.
- D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

**1.5 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

- B. Do not install extinguishers when ambient temperature is capable of freezing extinguisher ingredients.

## **PART 2 PRODUCTS**

### **2.1 FIRE EXTINGUISHERS**

- A. Manufacturers:
  1. General Fire Extinguisher Corp.
  2. Grinnell Corp.
  3. J. L. Industries.
  4. Kidde Fire Extinguishers.
  5. Larsen's Manufacturing Co.
  6. Nystrom Products Co.
  7. Potter Roemer.
  8. Substitutions: Section 01 60 00 - Product Requirements.
- B. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- C. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
  1. Class: A:B:C type.
  2. Size: 10 pounds.
  3. Finish: Baked polyester powder coat, red color.
  4. Temperature range: Minus 40 degrees F to 120 degrees F.
- D. Wet Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
  1. Class: K type.
  2. Size: 1.8 gallons.
  3. Finish: Polished stainless steel.
  4. Temperature range: Minus 20 degrees F to 120 degrees F.

### **2.2 FIRE EXTINGUISHER CABINETS**

- A. Manufacturers:
  1. J. L. Industries - Academy Series. (Basis of Design)
  2. Larsen's Manufacturing Co.
  3. Nystrom Products Co.
  4. Potter Roemer.
  5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Fire Extinguishers Cabinets- General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  1. Provide fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Metal:
  1. Formed aluminum; 0.036 inch thick base metal.
- D. Cabinet Configuration:
  1. Semi-recessed Type:
    - a. Projected Trim: Returned to wall surface, with 1-1/2 inch projection, and 1-1/2 inch wide face.
  2. Size: To be as required to accommodate required extinguisher device and accessories.

- a. Minimum Size: To be used where required extinguisher device and accessories do not require larger size.
  - 1) Tub Nominal Dimensions: 10-1/2 inch wide x 24 inches high x 5-1/2 inches deep.
- E. Door: 5/8 inch thick, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge. Pull to be surfaced mounted handle type with two through-door bolts.
- F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
  - 1. Full door glazed panel.
- G. Door Signage:
  - 1. Vinyl, self adhering, diecut letters; all uppercase helvetica font; vertical descending composition.
    - a. White color and reverse for application on inside face of door glazing panel.
- H. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors; no visible fasteners on exterior of cabinet.
- I. Weld, fill, and grind components smooth.
- J. Finish of Cabinet Exterior Trim and Door:
  - 1. Clear anodized finish.
- K. Finish of Cabinet Interior:
  - 1. Match exterior trim and door.

## 2.3 ACCESSORIES

- A. Extinguisher Brackets:
  - 1. Formed stainless steel.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify locations and mounting heights for each unit.
- C. Verify rough openings for cabinets are correctly sized and located.

### 3.2 INSTALLATION

- A. Install cabinets plumb and level in wall openings and as indicated on Drawings.
- B. Install wall brackets at location indicated on Drawings.
- C. Secure rigidly in place.
- D. Place extinguishers and accessories in cabinets or on wall brackets as indicated on Drawings.

### 3.3 SCHEDULES – As shown on drawings.

- A. Corridors: Cabinets with Type A:B:C fire extinguishers placed inside.
- B. Mechanical Rooms: Type A:B:C fire extinguishers mounted on brackets.
- C. Kitchens: Type K and Type A:B:C fire extinguishers mounted on brackets

- D. Lawn Equipment Sheds: Type A:B:C fire extinguishers mounted on brackets.

**END OF SECTION**

**SECTION 10 51 13**  
**METAL LOCKERS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes factory manufactured metal lockers and accessories.
  - 1. Kitchen Staff Lockers.

**1.2 REFERENCES**

- A. Americans with Disabilities Act (ADA):
  - 1. ADA Accessibility Guidelines; Current Edition.
- B. ASTM International:
  - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate locker plan layout, elevations, filler panels, ADA compliant lockers, numbering plan, and combination lock code.
  - 1. Indicate layout and dimensions for locker benches.
- C. Product Data: Submit data on locker types, sizes and accessories.
- 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 installation template and attachment devices.

**1.4 DELIVERY, STORAGE, AND PROTECTION**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect components and accessories from warping, moisture and other damage.

**PART 2 PRODUCTS**

**2.1 LOCKERS**

- A. Manufacturers:
  - 1. Art Metal Products.
  - 2. ASI Storage Solutions, Inc.
  - 3. List Industries, Inc.
  - 4. Lyon Metal Products, Inc.
  - 5. Penco Products, Inc.

6. Republic Storage Systems Co., Inc.
7. Substitutions: Section 01 60 00 - Product Requirements.

## 2.2 COMPONENTS

- A. Sheet Steel: Cold rolled mild steel, uncoated, stretcher leveled and minimum thicknesses as indicated.

## 2.3 LOCKER TYPES

- A. Kitchen Staff Lockers:
  1. Sides, Bottom, Top, and Shelf: 16 gage.
  2. Back: 18 gage.
  3. Doors Face and Frame: 14 gage.
  4. Hinges: 0.074 inch thick.
  5. Base and Trim: 18 gage.
  6. Accessories:
    - a. Two (2) double prong wall hooks.
    - b. Rubber bumpers.
    - c. Metal plate formed shelf.

## 2.4 FABRICATION

- A. Locker Units:
  1. Width:
    - a. 12 inches.
  2. Depth:
    - a. 15 inches.
  3. Height: The following measurements apply, unless indicated otherwise on Drawings.
    - a. Kitchen Staff: 72 inches; double tier; sloped top.
  4. Base Mounting:
    - a. Concrete Base with face finish to match adjacent wall base in room:
      - 1) Kitchen Staff Lockers.
  5. Base Height: 6 inches, unless indicated otherwise on Drawings.
  6. Locking: Equipped for built-in combination locks; master controlled keyed; with five change capability.
  7. Ventilation Method:
    - a. Door louvers vents at upper and lower portion of door.
      - 1) Kitchen Staff Lockers.
  8. Class: Conventional.
  9. Configuration: Refer to drawing elevations for locker configurations.
- B. Locker Body:
  1. Formed and flanged; with steel stiffener ribs; electric spot welded.
  2. Provide finished heavy gauge steel end panel for exposed end lockers.
- C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
- D. Doors: Hollow channel construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
- E. Hinges: Two for doors under 42 inches high; three for doors over 42 inches high; weld securely to locker body and door.



- F. Door Number Plates: Provide rectangular shaped aluminum plates. Form numbers 3//8 inch high of block font style, in contrasting color. Provide ADA designation for ADA compliant lockers
- G. Form recess for operating handle and locking device.
- H. Finish edges smooth without burrs.
- I. Fabricate metal tops, ends and closure pieces.
- J. Provide finished filler strips and panels.
- K. ADA compliant lockers to include, but are not limited to, the following:
  - 1. Decal with international symbol of accessibility on face of all ADA compliant lockers.
  - 2. Adjustable shelves
  - 3. Recessed handles to meet the operation and reach needs of the operator.
  - 4. Digilock ADA compliant locks.

## **2.5 FACTORY FINISHING**

- A. Clean, degrease, and neutralize metal; prime and finish with one coat of baked enamel.
- B. Paint locker units of one color throughout.
- C. Color: 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 that conditions, finishes, substrates and anchoring construction are adequate and acceptable to receive Work of this Section.

### **3.2 INSTALLATION**

- A. Install lockers plumb and square.
- B. Secure lockers with anchor devices to suit substrate construction.
  - 1. Minimum Pullout Force: 100 lb.
- C. Bolt adjoining locker units together to provide rigid installation.
- D. Install finished accessories, end panels, filler panels, and bases.
- E. Replace components not operating smoothly.

### **3.3 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean locker interiors and exterior surfaces.

**END OF SECTION**



**SECTION 10 56 13****PREFABRICATED WOOD STORAGE SHELVING (ADD-2)****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes prefabricated and prefinished modular wood storage shelving.
- B. Related Requirements:
  - 1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.

**1.2 SYSTEM DESCRIPTION**

- A. Pre-fabricated and prefinished wood uprights and metal edged wood shelving system.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Provide data for all components.
- C. Shop Drawings: Indicate layout of shelving units and components.
- D. Manufacturer's Installation Instructions: Indicate special precautions for installation.

**1.4 QUALIFICATIONS**

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

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept components on site in manufacturer's original packaging. Inspect for damage.
- C. Protect components from moisture damage.

**PART 2 PRODUCTS****2.1 PREFABRICATED WOOD STORAGE SHELVING**

- A. Manufacturers:
  - 1. Palmetto Shelving Systems. (Basis of Design)
  - 2. Excalibur Shelving Systems, Inc.
  - 3. Lunda USA.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. Uprights: Spruce or Douglas Fir species wood; nominal size 1-5/8 x 1-1/4 inches; groove entire length of upright; drill 3/16 inch holes at 2 inch centers for shelf adjustments; factory finished.
- B. Shelves: White Pine species wood; 3/4 inch thick, with painted steel end channels; factory finished.

**2.3 ACCESSORIES**

- A. Shelf Support Pins: Zinc plated steel; 3/16 inch diameter x 1-1/4 inch long, with 5/16 inch diameter head.
- B. Braces: Steel straps, 18 gage minimum, 5/8 inch wide minimum; Rivet brace in center to form 'X' shape.
- C. Softwood, solid construction; 4 inches high; unfinished.

**2.4 FACTORY FINISHING**

- A. Wood: Sealed and lacquered.
- B. Steel: Galvanized.

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify dimensions, tolerances, and methods of attachment with other Work.
- C. Verify spaces are ready to ready to receive Work of this Section.

**3.2 INSTALLATION**

- A. Install components according to manufacturer's written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer.
- B. Install units level, plumb, and firmly anchored.

**3.3 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Replace damaged or defective components.
- C. Remove temporary labels and protective coatings.
- D. Clean exposed surfaces.

**3.4 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect shelving from damage.

**3.5 SCHEDULE (ADD-2)**

10 56 13		WOOD SHELVING		ADD-2
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Room	No.	Qty	wxdxh	shelves
RECORDS	115	9	36x18x84	6
JANITOR	135	4	36x24x84	6
STOR.	123	8	36x24x84	6
		6	36x18x84	6
STOR.	207	8	36x24x84	6
		10	36x18x84	6

**END OF SECTION**



**SECTION 10 56 15**  
**METAL STORAGE SHELVING (ADD-2)**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Metal storage shelving units.
- B. Related Requirements:
  - 1. Section 11 40 00 - Food Service Equipment: Wire shelving for food storage.

**1.2 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for all components.
- C. Shop Drawings: Indicate shelving units and components layout for each location and anchorage.
- 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: Indicate special precautions for installation.

**1.3 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.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept components on site in manufacturer's original packaging. Inspect for damage.

**PART 2 PRODUCTS**

**2.1 METAL STORAGE SHELVING**

- A. Manufacturers:
  - 1. Lyon Workspace Products.
  - 2. Penco Products.
  - 3. Spacesaver.
  - 4. Tennsco Corp.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.

- B. Product Description: Metal Storage Shelving: Factory-formed, field-assembled, freestanding, upright metal storage shelving system; designed for shelves to span between and be supported by corner posts, with shelves adjustable over the entire height of shelving unit.

## 2.2 COMPONENTS

- A. Posts: Tubular L-shaped and T-shaped, cold-rolled steel, 16 gage thick, punched on 1-1/2 inch centers.
- B. Shelves: Box formed edges, 20 gage thick galvanized steel.

## 2.3 ACCESSORIES

- A. Shelf Clips: Hot-rolled steel, 12 gage thick, one piece construction.
- B. Sides and Backs:
  - 1. Solid steel panels; 24 gage thick galvanized steel.

## 2.4 FABRICATION

- A. Fabricate shelves with turned down box edges with return flange spot welded to bottom of shelf.
- B. Fabricate shelves 48 inches long by 24 inches deep, unless indicated otherwise on Drawings.
- C. Overall Unit Height:
  - 1. 84 inches.

## 2.5 FACTORY FINISHING

- A. Manufacturer's standard baked enamel finish.
  - 1. All metal components and accessories.
  - 2. Colors:
    - a. As selected by Architect from submitted samples.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify dimensions, tolerances, and methods of attachment with other Work.
- C. Verify spaces are ready to ready to receive Work of this Section.

### 3.2 INSTALLATION

- A. Install components according to manufacturer's written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer.
- B. Install units level, plumb, and firmly anchored.
- C. Anchor units to back wall to prevent tip-over.

### 3.3 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Replace damaged or defective components.



- C. Remove temporary labels and protective coatings.
- D. Clean exposed surfaces.

**3.4 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect shelving from damage.

**3.5 SCHEDULE (ADD-2)**

10 56 15		METAL SHELVING		ADD-2
Room	No.	Qty	wxdxh	shelves
KILN	137.1	1	36x24x84	6
DRYING	137	3	36x24x84	6
STOR.	136	5	36x24x84	6
		1	32x24x84	6
RECVG	169	1	36x24x84	6

**END OF SECTION**



**SECTION 10 71 13**  
**EXTERIOR SUN CONTROL DEVICES**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  1. Horizontal, fixed, extruded-aluminum sun control assemblies.
- B. Related Requirements:
  1. Division 05 - Metals: Sections related to Structural Steel for supporting structure.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  1. AAMA 611, AA-M12C22A41 - Clear Anodized Aluminum Surfaces.
  2. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum.
  3. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
  4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
  5. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
- B. American Society of Civil Engineers:
  1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM):
  1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
  3. ASTM A666 2015 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
  4. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018.
  5. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
  6. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
  7. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997.
  8. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  9. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2017.
- D. American Welding Society, Inc. (AWS):
  1. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014.
  2. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

- E. The Society for Protective Coatings (SSPC):
  1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Manufacturer's technical and descriptive data on sun control components and assemblies.
- C. Shop Drawings: Include plans; elevations; sections; and details showing profiles, angles, and spacing of blades, frames and supports. Show unit dimensions related to supporting and adjoining structures and construction. Indicate anchorage details and locations.
- D. Structural Calculations: Submit a comprehensive analysis of design loads, including dead loads, live loads, snow loads, snow drift loads, wind loads and thermal movement. Design calculations shall identify the moment and shear forces transferred to the structure or supports through the installation connections.
- E. Structural Calculations shall be stamped and signed by a professional engineer registered in jurisdiction where Project is located.
- F. 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 selection.
- G. Samples for Verification: From the Architect's initial selection, prepare two samples for each selected finish and color; on same product material type indicated for final Work; each 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

### 1.4 QUALITY ASSURANCE

- A. 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 kind indicated. Engineering services are defined as those performed for installations of sun controls that are similar to those indicated for this Project in material, design, and extent.
- B. Welding Standards: As follows:
  1. Comply with AWS D1.2, "Structural Welding Code--Aluminum."
  2. Comply with AWS D1.3, "Structural Welding Code--Sheet Steel."
  3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual supporting and adjoining construction by field measurements before fabrication; and indicate recorded measurements on final Shop Drawings. Verify that supporting construction is as required for support of the Sun Control Devices. Coordinate construction to ensure that sun control assemblies fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the Work.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, coordinate related construction to ensure that Sun Control Devices correspond to established established dimensions and construction.

**1.6 DELIVERY, STORAGE, AND PROTECTION**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Comply with AAMA CW-10.
- C. Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Provide for adequate ventilation through wrappings.

**1.7 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide five (5) year warranty to correct defective Work.
- C. Provide ten (10) year manufacturer warranty against excessive degradation of metal finishes. Include provision for replacement of units with excessive fading, chalking, peeling, blistering or flaking.

**PART 2 PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers:
  - 1. C/S Group - Airfoil. (Basis of Design)
  - 2. Dittmer Architectural Aluminum.
  - 3. The Airolite Company, LLC.
  - 4. All-Lite Architectural Products.
  - 5. AMETCO Manufacturing Corporation.
  - 6. ASCA, Inc.
  - 7. Architectural Grilles & Sunshades, Inc. (AGSINC).
  - 8. Intertec by Doralco.
  - 9. Ruskin Company.
  - 10. Substitutions: Section 01 60 00 - Product Requirements

**2.2 MATERIALS**

- A. Aluminum Extrusions: ASTM B221, alloy 6063-T5 or T-52.
- B. Aluminum Sheet: ASTM B209, alloy 3003 or 5005 with temper as required for forming.
- C. Aluminum Castings: ASTM B26/B26M, alloy 319.
- D. Galvanized Steel Sheet: ASTM A653/A653M, G90 zinc coating, mill phosphatized.
- E. Stainless-Steel Sheet: ASTM A666, Type 302 or 304.
- F. Fasteners: Of same basic metal and alloy as fastened metal or stainless steel conforming to ASTM F593 requirements, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
  - 1. Use types and sizes to suit unit installation conditions.
  - 2. Use hex socket head screws for exposed fasteners, unless otherwise indicated.
- G. Anchors and Inserts: Of type, size, and material required for loading and installation indicated. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as needed for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

- H. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D1187.

### 2.3 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.
  - 2. Comply with Design Loads indicated on Drawings and applicable code requirements based on geographical location.
- B. System Assembly: Accommodate the following without damage to system or components.
  - 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.
- C. 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.
- D. System Internal Drainage: Drain water entering joints, condensation, or migrating moisture occurring within system, to exterior by weep drainage network.
- E. 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.

### 2.4 HORIZONTAL, FIXED, EXTRUDED-ALUMINUM SUN CONTROLS

- A. Sun Screens: Shop fabricated, shop finished, extruded aluminum outriggers, louvers, and fascia, free of defects impairing strength, durability or appearance.
  - 1. Configuration: As indicated on Drawings.
  - 2. Outrigger Shape:
    - a. Aluminum plate.
  - 3. Fascia Shape:
    - a. Rectangular tube shape.
  - 4. Blade Shape:
    - a. Rectangular tube shape.
  - 5. Blade Angle:
    - a. 45 degrees.
  - 6. Sizes:
    - a. As indicated on drawings.
  - 7. Provide a complete system ready for erection at project site.
  - 8. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.

### 2.5 FABRICATION

- A. Assemble sun control assemblies in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

- B. Maintain equal sun control blade spacing, including separation between blades and frames to produce uniform appearance.
- C. Include supports, anchorages, and accessories required for complete assembly.
- D. Join frame members to one another and to fixed sun control blades with fillet welds concealed from view, unless size of sun control assembly makes concealed, bolted connections between frame members necessary.

## 2.6 SHOP FINISHING

- A. Anodized Aluminum Finish:
  - 1. Class I Clear Anodized Finish: AAMA 611, AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Color and Gloss: As selected by Architect from submitted samples.
- C. Touch-Up Materials: As recommended by finish manufacturer for field application.
- D. 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.
- E. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.
- F. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.
- G. 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 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.
- C. Coordinate Setting Drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

### 3.3 INSTALLATION

- A. Locate and place sun control assemblies level, plumb, and at indicated alignment with adjacent work.

- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- E. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

### **3.4 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Level: Plus or minus 1/8 inch in 20 ft.
- C. Maximum Misalignment from Position: Plus or minus 1/8 inch
- D. Maximum Misalignment from Adjoining Members Abutting in Plane: 1/32 inch.

### **3.5 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean exposed surfaces with water and a mild soap or detergent not harmful to finishes, or as otherwise recommended by manufacturer. Thoroughly rinse surfaces and dry.
- C. Clean and touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

### **3.6 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect sun control assemblies from damage during construction.

**END OF SECTION**



**SECTION 10 73 29**  
**CANOPIES AND WALKWAY COVERINGS**

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes factory finished aluminum canopies and walkway covers with extruded aluminum columns, beams, roofing and trim.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast-in-Place Concrete: Concrete for column footings.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
  - 2. AAMA 2605 - Voluntary Specification, Performance Requirements And Test Procedures For Superior Performing Organic Coatings On Aluminum Extrusions And Panels, 2005.
- B. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. American Welding Society, Inc. (AWS)
  - 1. AWS D1.2/D1.2M - Structural Welding Code – Aluminum.

**1.3 DESIGN REQUIREMENTS**

- A. The canopy and walkway covering systems included in this section are to be designed and sealed by a licensed Professional Engineer experienced in design of work of this type and licensed in the State in which the Project is located. The Engineer is to certify that all applicable code requirements have been met. The engineer may be in the employ of the manufacturer of the covering systems, provided the Engineer is compliant with the above registration requirement.
  - 1. Design system and size system components, anchorage and footings to safely withstand Live Loads, Dead Loads, Snow Loads and Wind Loads (to include uplift) as indicated on Drawings for the Structural Design Criteria and in compliance with the State Building Code for the State in which the project is located.

**1.4 PERFORMANCE REQUIREMENTS**

- A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 120 degrees F without causing detrimental effects to system or components.
- B. System to accommodate, without damage to system or components: movement with system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

**1.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Manufacturer's product information, specifications and installation instructions for components and accessories.
- C. Shop Drawings: Indicate system and component profiles, sizes, connection attachments, anchorage, footings, size and type of fasteners; anticipated deflection under load; affected related work; expansion and contraction joint locations and details; drainage details and flow diagrams; field welding; and accessories.
  - 1. Prepare shop drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and option installation details to clearly indicate proper assembly of components. Detailed shop drawings shall be submitted and sealed by the licensed Professional Engineer.
  - 2. Submit substantiating engineering data, test results of previous testing meeting performance criteria, and other supportive data.
- D. Engineering Certification: Submit written certification prepared and signed by the licensed Professional Engineer indicating compliance applicable codes and with Design Requirements indicated in this Section.
- 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.

## 1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings for items.

## 1.7 QUALITY ASSURANCE

- A. Codes and standards: Comply with provisions of the following except as otherwise indicated: Standard building code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.
- B. Manufacturer: Obtain aluminum canopies and walkway covering systems from single source manufacturer specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- C. Installer Qualifications: Firm with not less than five (5) years documented experience in installation of the work type, quantity and installation methods similar to work of this Section. Installer to be approved in writing by manufacturer of system.
- D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work.
- E. Coordination: Coordinate work of other Sections that interface and are related to the work of this Section (sidewalks, curbs, building openings, exterior walls, roofing, soffits, fascia, lighting, etc.).

## 1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide five (5) year manufacturer's warranty for finish.

- C. Provide manufacturer's standard one (1) year warranty that includes, but is not limited to, coverage for structural performance, water tightness and finish.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Peachtree Protective Covers. (Basis of Design)
- B. Dittmer Architectural Aluminum.
- C. Tennessee Valley Metals, Inc., East Coast TVM.
- D. Mitchell Metals.
- E. Mapes Architectural Products.
- F. Perfection Architectural Systems, Inc.
- G. Substitutions: Section 01 60 00 - Product Requirements.

### **2.2 MATERIALS**

- A. Extruded Aluminum: ASTM B221; 6063 alloy, heat treated to T-6 temper.
- B. Sheet Aluminum: ASTM B209; 6061 alloy, heat treated to T6 temper.
- C. Fasteners: Stainless steel.

### **2.3 FACTORY FINISHING**

- A. High performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions
  - 1. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604. Color as selected by Architect from submitted samples.

### **2.4 COMPONENTS**

- A. Columns: Extruded aluminum tubing with radius corners; size and shape as shown on Drawings; fabricated to allow internal drainage to discharge.
  - 1. Drainage and Discharge: Water shall drain internally from deck to beams to columns, for connection and discharge into below-grade level storm drainage system as indicated on Drawings.
  - 2. If no below-grade storm drainage system is indicated for connection and discharge, provide for discharge from column base at grade level in opposite direction of pedestrian walk path. Discharge opening with internal diverter required for drainage discharge. Circular downspout opening in column is not acceptable.
- B. Beams: Open-top tubular extruded aluminum of size and shape shown on drawings, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of all beams.
- C. Deck: Extruded self-flashing aluminum sections interlocking into a composite unit; soffit type, flush bottom.

- D. Fascia: Extruded aluminum, 0.050 inch thick.
  - 1. Shape and size to be as indicated on Drawings.
- E. Flashing: Formed aluminum, 0.040 inch thick, same finish as for system components; secured with concealed fastening method.

## 2.5 ACCESSORIES

- A. Fittings: Elbows, T-shapes, wall brackets; cast aluminum.
- B. Splice Connectors: Concealed spigot; cast aluminum.
- C. Struts: Manufacturer's standard rod type and material.
- D. Wall Brackets: Manufacturer's standard decorative type for mounting in wall construction.
- E. Exposed Fasteners: Flush countersunk stainless steel screws, bolts and rivets; finish to be same as factory finish indicated for canopy and walkway covering components; consistent with design of system.

## 2.6 FABRICATION

- A. Fabricate assemblies to comply with design as indicated on Drawings.
- B. Fit and shop assemble components in largest practical sizes, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide allowance for expansion and contraction of entire system.
- D. Develop drainage pathway without leaks and to point of drainage discharge.
- E. For canopies suspended from building (and without columns for drainage), provide for drainage openings with water diverters along bottom of canopy outer edge member. Drainage openings to be as indicated on Drawings. If drainage openings are not indicated on Drawings, locate drainage openings away from building face and not in direct line of door openings.
- F. Arrange fasteners, attachments and jointing to ensure concealment from view.
- G. Supply components required for anchorage of framing. Fabricate anchors and related components of same material and finish as framing, except where specifically noted otherwise.
- H. Continuously seal joined pieces by continuous welds.
- I. Welding In accordance with ANSI/AWS D1.2/D1.2M.
- J. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, hairline and waterproof. Ease exposed edges to small uniform radius.
- K. Accurately form components to suit each other and to building structure.
- L. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 18" o.c. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that wall substrates and anchors are acceptable and are ready to receive work.
- C. Verify that adjacent, at-grade and sub-grade construction is ready to receive work of this Section.
- D. Verify dimensions, tolerances, and method of attachment with other work.

### **3.2 INSTALLATION**

- A. Install as indicated on Drawings and in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Apply one coat of bituminous coating to aluminum surfaces in contact with dissimilar materials. Application to be concealed from view.
- D. Install anchors required for connecting framing to structure. Anchor framing to structure and footings.
- E. Rain Water Drainage Through Columns:
  - 1. For downspout columns that are indicated to discharge rain water into a subgrade storm drainage system, install watertight and as indicated on Drawings.
  - 2. For downspout columns that are indicated to discharge rain water onto finish grade, fill downspout columns with grout to discharge diverter level to prevent standing water.
- F. Provide weep holes in non-draining columns at top of concrete to remove condensation.

### **3.3 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- C. Maximum Misalignment from True Position: 1/4 inch.
- D. Maximum Variation from Plane: 1/4 inch every 10 feet, non-cumulative.
- E. Maximum Variation from Alignment of Two Adjoining Members Abutting in Plane: 0.015 inch.

**END OF SECTION**



**SECTION 10 75 00****FLAGPOLES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Flagpoles and accessories.
- B. Related Requirements:
  - 1. Section 03 30 00 – Cast-in-Place Concrete: Concrete: Concrete base and foundation construction.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Flagpole With Flag Flying: Resistant without permanent deformation to 120 mph wind velocity; non-resonant, safety design factor of 2.5.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Signed & Sealed indicating detailed dimensions, attachment details, foundation details, anchor requirements, and imposed loads.
- C. Product Data: Submit data on pole, accessories, and configurations.

**1.5 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit Operation and Maintenance Data.

**1.6 QUALIFICATIONS**

- A. Delegated Designer Requirement: Design flagpole foundation and anchorage under direct supervision of Professional Engineer experienced in design of the Work in this Section and licensed in State in which the project is located.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- C. Protect flagpole and accessories from damage or moisture.

**1.8 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.

- B. Keys to lockable Cleat Box.
- C. Specialty adjustment tools, if any required.

## **PART 2 PRODUCTS**

### **2.1 FLAGPOLES**

- A. Manufacturers:
  - 1. American Flagpole.
  - 2. Pole-Tech Company, Inc.
  - 3. Concord Industries, Inc.
  - 4. Ewing.
  - 5. Morgan-Francis Flag Pole.

### **2.2 COMPONENTS**

- A. Aluminum: ASTM B241/B241M, 6063 alloy, T6 temper.
- B. Flagpole Shape:
  - 1. Nominal Height: 50 feet; measured from base of pole.
  - 2. Outside Butt Diameter: As required to resist wind loads for flagpole with flag flying, but not less than 8 inches OD.
  - 3. Nominal Wall Thickness: As required to resist wind loads for flagpole with flag flying, but not less than 0.188 inch.
  - 4. Flag Size: 8 x 12 feet.
- C. Flagpole Design:
  - 1. Cone tapered.
- D. Flagpole Mount:
  - 1. Vertical ground-mounted type.
- E. Halyard: External type.

### **2.3 ACCESSORIES**

- A. Finial Ball: Aluminum, 5 inch diameter.
- B. Truck Assembly: Cast aluminum; revolving, stainless steel ball bearings, non-fouling.
- C. Flag:
  - 1. United States design, nylon fabric, brass grommets, hemmed edges.
  - 2. Refer to COMPONENTS: Flagpole Shape for flag size.
- D. Cleats: 9 inch size, aluminum with stainless steel fastenings, two for each halyard.
- E. Cleat Box: Aluminum, with built-in hinge and lockable assembly, attached to pole with tamper proof screws inside box.
- F. Halyard: 3/8 inch diameter nylon, braided, with steel or bronze core.
- G. Foundation Tube Sleeve: Corrugated 16 gage steel, galvanized, depth as required.
- H. Pole Base Attachment: Sleeve; aluminum base with base cover.
- I. Lightning Ground Cable: Copper No. 6 AWG, soft drawn.

### **2.4 FACTORY FINISHING**

- A. Aluminum: Anodized to clear color.



- B. Final: Spun finish.
- C. Metal Surfaces in Contact with Concrete: Asphaltic paint.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify area is ready to receive work and dimensions are 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. Coat metal sleeve surfaces below grade, in contact with cementitious surfaces, and in contact with dissimilar metals with asphaltic paint.

#### **3.3 INSTALLATION**

- A. Install work in accordance with Delegated Designer and manufacturer's requirements.
- B. Provide isolation barrier between dissimilar materials.
- C. Electrically ground flagpole installation.

#### **3.4 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1 inch.

#### **3.5 ADJUSTING**

- A. Section 01 73 00 - Execution: Adjusting.
- B. Adjust operating devices so halyard and flag function smoothly.

**END OF SECTION**



**SECTION 11 31 00**  
**RESIDENTIAL APPLIANCES (ADD-2)**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes residential appliances with installation including connections to utilities.
- B. Related Requirements:
  - 1. Division 22 - Plumbing: Coordinate equipment plumbing requirements.
  - 2. Division 23 - Mechanical: Coordinate equipment venting requirements.
  - 3. Division 26 - Electrical: Coordinate equipment electrical requirements.

**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; 2017.
  - 2. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. National Electrical Manufacturers Association (NEMA):
  - 1. NEMA LD 3 - High Pressure Decorative Laminates.
  - 2. NEMA MG 1 - Motors and Generators.
- C. National Fire Protection Association (NFPA):
  - 1. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- D. Sheet Metal and Air Conditioning Contractors (SMACNA):
  - 1. SMACNA - Kitchen Equipment Fabrication Guidelines.
- E. Underwriters Laboratories Inc. (UL):
  - 1. UL - Electrical Appliance and Utilization Equipment Directory.
- F. U.S. Environmental Protection Agency:
  - 1. ENERGY STAR - Energy Star Voluntary Labeling Program.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on appliances; indicate configuration, sizes, materials, finishes, locations, and utility connections and locations.
- C. Shop Drawings:
  - 1. Indicate in large scale detail, fabricated equipment showing construction methods, types and gages of metal, hardware and fittings, plan, front elevation, minimum of one cross-section. Indicate verification that the projects planned provisions for utilities, ventilation and connectivity are compliant with the requirements of the appliance and/or device, to include types, sizes, locations and accessibility.
  - 2. Illustrate complicated parts of typical items in cut-away perspective.
  - 3. For control systems, indicate service connections, characteristics, and wiring diagrams.

- D. Samples: Submit samples illustrating manufacturer's full range of color and finish options for selection by Architect.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
  - 1. Certify residential appliances are Energy Star labeled.
- F. Manufacturer's Installation Instructions: Submit special procedures for built-in items and perimeter conditions requiring special attention.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Submit manufacturer's operating instructions for specified equipment and care and maintenance of finished surfaces.

#### **1.5 QUALITY ASSURANCE**

- A. All residential appliances to have Underwriters Laboratories, Inc. (UL) label.
- B. Do not use HCFC based refrigerants or Halon extinguishing agents.

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

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Store products clear of floor in manner to prevent damage.
- C. Coordinate size of access and route to place of installation.

### **PART 2 PRODUCTS**

#### **2.1 RESIDENTIAL APPLIANCES**

- A. Manufacturers:
  - 1. Basis of Design: Indicated in Schedule at end of this Section.
  - 2. Whirlpool Corporation.
  - 3. General Electric Company.
  - 4. Maytag.
  - 5. LG Electronics.
  - 6. KitchenAid.
  - 7. Substitutions: Section 01 60 00 - Product Requirements.

#### **2.2 COMPONENTS**

- A. Refer to schedule at end of this Section.
- B. Provide rough-in hardware, supports and connections, attachment devices, closure trim, and accessories.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify plumbing, electrical and venting service connection requirements.

- C. Verify supports and anchorage construction is correct and in required locations.

### 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. Insulate to prevent electrolysis between dissimilar metals.
- C. Use anchoring devices appropriate for equipment and expected usage.

### 3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust equipment and apparatus to ensure proper working order and conditions.
- C. Remove and replace equipment creating excessive noise or vibration.

### 3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove masking or protective covering from stainless steel and other finished surfaces.
- C. Wash and clean equipment.
- D. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

### 3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed Work from damage.

### 3.7 SCHEDULES – ALL APPLIANCES ARE PROVIDED BY OWNER AND INSTALLED BY CONTRACTOR.

- A. GE Appliance numbers are listed for reference under each description.
  1. Refrigerator/Freezer:
    - a. GE - Model GIE18ETHWW (18.2 Cu. Ft. Top-Freezer Refrigerator, Energy Star, White).
    - b. 2 REQUIRED – Health 113, Teacher Lounge 110**
  2. Stacked Washer/Dryer Combo (Unitized spacemaker):
    - a. GE - Unitized Spacemaker 3.2 DOE cu. ft. Washer and 5.9 cu. ft. Electric Dryer - Model GUD27ESSJWW. White.
    - b. 1 REQUIRED – Locker 164**

END OF SECTION



**SECTION 11 40 00****FOOD SERVICE EQUIPMENT****PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. The general provisions of the contract including general and supplementary conditions and general requirements apply to the work specified in this section.

**1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Plumbing: Refer to Division 22, including:
1. Rough-in piping for water supply and waste lines.
  2. Piping for supply and waste lines.
  3. Traps, grease traps, line strainers, tail pieces, valves, stops, shut-offs and miscellaneous fittings required for complete installation.
  4. Final connections.
  5. Indirect drains for sink compartments.
- B. Mechanical: Refer to Division 23.
1. Roof mounted fans and connecting ductwork not shown as part of the kitchen equipment.
  2. Final connections, including approved welded duct connections to hoods.
- C. Electrical: Refer to Division 26, including:
1. Rough-in conduit, wiring, line and disconnect switches, safety cut-offs and fittings, control panels, fuses, boxes and fittings required for complete installation.
  2. Final connections, including mounting and wiring of switches furnished as part of the food service equipment (unless otherwise indicated on the drawings).

**1.3 WORK INCLUDED THIS SECTION:**

- A. Furnish and install all food service equipment as specified herein, including that which is reasonably inferred, with all related items necessary to complete work shown on contract drawings and/or required by these specifications.
- B. Electrical Work:
1. Interwiring of food service equipment between components within equipment, such as heating elements, switches, thermostats, motors, etc., complete with junction box as is applicable, ready for final connection.
  2. Voltages shall be as indicated on contract drawings. Any differences in electrical characteristics at job site from those shown on contract documents must be submitted to Architect for consideration prior to ordering equipment.
- C. Plumbing Work:

1. Furnish all equipment with faucets, sink waste assemblies, and trim as specified in this section.
  2. Other than sink compartments, extend all indirect waste lines to nearest floor receptor. All such drain lines to be properly sized. Drain shall terminate with proper air gap above flood rim of floor receptor. Drain lines to be copper with silver paint unless specified otherwise. Drain lines in public areas to be chrome plated where exposed to view.
- D. Mechanical Work:
1. Exhaust hoods by mechanical with connection collars ready for final connection by HVAC Section.
  2. Stainless steel exposed ducts by mechanical to ceiling for dishmachine.

#### 1.4 QUALITY ASSURANCE

- A. It is required that all custom fabricated equipment such as food serving units, tables, sinks, counter tops, etc., be manufactured by a food service equipment fabricator who has the plant, personnel and engineering equipment required. Such manufacturer shall be subject to approval of Architect.  
All work in above category shall be manufactured by one manufacturer, and shall be of uniform design and finish.
- B. Manufacturer of this equipment must be able to show that he is now and for the past five years has been engaged in manufacture or distribution of equipment, as required under this contract, as his principal product.
- C. Manufacturer of equipment herein specified shall be a recognized distributor for items of equipment specified herein which are of other manufacture than his own.
- D. Only manufacturers who can meet the foregoing qualifications will be acceptable.
- E. All work shall be done in an approved workmanlike manner, to the complete satisfaction of the owner.

#### 1.5 SUBMITTALS

- A. Submit shop drawings as required by General Conditions.  
All shop drawings and rough-in drawings shall be CAD drafted. Hand drawings are not acceptable.
- B. Shop drawings and bound brochures covering manufactured or "buy-out" items covering all work and equipment included in this contract shall be submitted to Architect as soon as possible after award of contract. After approval, Food Service Equipment Contractor shall furnish to Architect sets of shop drawings and brochures, corrected as required by virtue of review comments, for distribution to various interested trades on project. All costs of reproduction and submission shall be part of contract.
- C. Provide fully dimensioned rough-in plans at 1/4" scale, consisting of a separate drawing for each discipline. Each drawing shall show equipment shaded down 50%. Rough-in set shall include all required mechanical, electrical, plumbing, services for equipment and dimensioned rough-in location for same. Rough-in locations shown shall make allowances for required traps, switches, etc., thereby not requiring interpretation or



adjustment on the part of other Contractors. Drawings shall indicate dimensions for floor depressions, wall openings, etc., for equipment.

Food Service Equipment Contractor shall visit site to verify all rough-in and sleeve locations prior to installation of finished floors, and shall cooperate with other Contractors involved in proper location of same. Food Service Equipment Contractor shall be responsible for any required relocations of rough-in due to errors or inaccuracies on those rough-in plans which he prepares.

- D. Rough-in plans shall include all required services which relate to equipment but which may not directly connect thereto, such as convenience outlets at walls, hose stations, floor drains, etc.
- E. Rough-in plans shall also include all required outlet services for equipment which is designated on drawing schedule, even though such equipment may not be included in this contract.
- F. Fully dimensioned and detailed shop drawings of custom fabricated equipment items shall be submitted, drawn at 3/4" and 1 - 1/2" scale for plans, elevations and sections respectively.  
Drawings shall show all details of construction, installation, and relation to adjoining and related work where cutting or close fitting is required. Drawings shall show all reinforcements, anchorage, and other work required for complete installation of all fixtures.
- G. Do not begin fabrication of custom manufactured equipment until approvals of shop drawings have been received and until field measurements have been taken by Food Service Equipment Contractor, where such measurements are necessary to assure proper conformance with intent of contract drawings and specifications.
- H. Make field measurements, giving due consideration to any architectural, mechanical, or structural discrepancies which may occur during construction of building. No extra compensation will be allowed for any difference between actual measurements secured at job site and dimensions indicated on contract drawings. Any differences which may be found at job site during field measurements shall be submitted to Architect for consideration before proceeding with fabrication of equipment.
- I. Submit illustrative brochures for manufactured or "buy-out" equipment items, complete with illustrations, specifications, line drawings, rough-in requirements, and list of accessories or other specified additional requirements. Brochures shall be bound and shall include data on all equipment which is to be provided, arranged in numerical sequence which conforms to item numbers of specifications. Omission of data does not reduce obligation to provide items as specified.
- J. Approval of shop schedules and brochures will be in general and shall be understood to mean that Architect has no objection to use of materials or processes shown. Approval does not relieve Food Service Equipment Contractor from responsibility for errors, omissions, or deviations from contract requirements.

## 1.6 SUBSTITUTIONS - STANDARDS

- A. Refer to Instructions to Bidders and Division 01 for requirements.

**1.7 DRAWINGS**

- A. Drawings which constitute part of contract documents indicate general arrangement of piping and location of equipment. Should it be necessary to deviate from arrangement indicated in order to meet structural conditions, make such deviations without expense to Owner.
- B. Specifications and drawings are reasonably exact, but their extreme accuracy is not guaranteed. Drawings and specifications are for assistance and guidance of Contractor, and exact locations, distances and levels shall be governed by the building.

**1.8 MANUFACTURER'S DIRECTIONS**

- A. Follow manufacturer's directions in all cases where manufacturers of articles used in this contract furnish directions or prints covering points not shown on drawings or specifications.

**1.9 INDUSTRY STANDARDS**

- A. Electric operated and/or heated equipment, fabricated or otherwise, shall conform to latest standards of National Electric Manufacturers Association and of Underwriters Laboratories, Inc., and shall bear the U.L. label.
- B. Cooking and hot food holding equipment shall meet minimum construction standards as noted by NSF #4.
- C. Refrigeration equipment shall meet minimum construction standards as noted by NSF #7.
- D. Items of food service equipment furnished shall bear the N.S.F. seal.
- E. Food service equipment shall be installed in accord with N.S.F. standards.
- F. Work and materials shall be in compliance with requirements of applicable codes, ordinances and regulations, including but not limited to those of Occupational Safety and Health Act (OSHA), National Fire Protection Association, State Fire Marshal, State Accident Commission, U.S. Public Health Service, State Board of Health, local health codes, etc.
- G. No extra charge will be paid for furnishing items required by regulations, even though such may not be shown on drawings or called for in these specifications.
- H. Rulings and interpretations of enforcing agencies shall be considered part of regulations.

**PART 2 PRODUCTS****2.1 MANUFACTURED EQUIPMENT**

- A. All like types of equipment such as all refrigerated and heated cabinets, all ovens, and all mixers shall be by the same manufacturer.
- B. Except as may be specified otherwise under individual item specifications in "Equipment

Schedule", all items of standard manufactured equipment shall be complete in accord with manufacturer's standard specification for specific unit or model called for, including finishes, components, attachments, appurtenances, etc., except as follows:

- C. All items of standard equipment shall be that manufacturer's latest model at time of delivery.
- D. Substitutions for manufactured equipment specified will be accorded consideration under terms set forth in "Substitutions - Standards".

## 2.2 FABRICATED EQUIPMENT

- A. Stainless steel shall be U.S. standard gauges as called for, 18-8, Type 302, or 304 type, No. 4 finish.
- B. Galvanized iron shall be Armco or equal. Framework of galvanized iron shall be welded construction, having welds smooth, and where galvanizing has been burned off, touched up with high grade aluminum bronze.
- C. Legs and crossrails shall be continuously welded, unless otherwise noted, and ground smooth.
- D. Bottom of legs at floor shall be fitted with sanitary stainless steel bullet type foot, with not less than 2" adjustment.
- E. Legs shall be fastened to equipment as follows:
  - 1. To sinks by means of closed gussets. Gussets shall be stainless steel, reinforced with bushing, having set screws for securing legs.
  - 2. To tables and drainboards with closed gussets which shall be welded to stainless steel hat sections or channels, 14 gauge or heavier, exposed hat sections having closed ends.  
Bracing shall be welded to underside of tops.
- F. Closed gussets shall be a 3" minimum diameter at top, continuously welded to frame members or to sink bottom.
- G. Sinks, unless otherwise specified, shall be furnished with rotary type waste outlets, without connected overflows: Atlantic Brass Works Model 772-RB; Fisher Brass Foundry Model 250A; T&S; or approved equal. Where exposed, furnish wastes chromium plated.
- H. Rolls shall be 1 1/2" diameter, except as detailed contrary, with corners bullnosed, ground and polished.
- I. Seams and joints shall be shop welded. Welds to be ground smooth and polished to match original finish. Materials 18 gauge or heavier shall be welded.
- J. Metal tops shall be one-piece welded construction, unless specified otherwise, reinforced on underside with stainless steel hat sections or channels welded in place. Crossbracing to be not more than 30" on centers.

- K. Drawers to be 18 gauge stainless steel channel type housing and drawer cradle, both housing and cradle being reinforced and welded at corners, housing being secured to underside of table top, and both housing and cradle being sized for and fitted with 18 gauge 20" x 20" x 5" deep stainless steel drawer insert having coved corners. Drawer insert shall be easily removable from cradle without tools or having to remove entire drawer. Drawers to have stainless steel fronts. Provide with recessed flush type stainless steel pulls.
- L. Support drawer on fabricated 14 gauge stainless steel interlocking channel solid delrin ball bearing wheels. Support slides shall be load rated at 200 lb. per pair. Slides to be Component Hardware S52 Series.
- M. Enclosed cabinet type bases shall be made of formed steel sheets reinforced with formed steel sections to create a rigid structure. Steel shall be 18 gauge or heavier. Base shall be welded construction throughout with front rails, mullions, etc., welded to appear as one-piece construction. All exposed sections of interior and exterior shall be stainless steel, and unexposed sections shall be galvanized steel, unless specified contrary.
- N. Doors shall be double cased, unless otherwise noted. Outer pans shall be 18 gauge with corners welded, ground smooth, and polished. Inner pans shall be 20 gauge, fitted tightly into outer pan with sound-deadening material such as Celotex used as core. Two pans shall be tack-welded together with seam solder filled.
- Door shall finish approximately 3/4" thick and shall be fitted with flush recessed type stainless steel door pulls. Single pan type doors shall be reinforced and stiffened with closed hat sections.
- O. Hinged doors shall be flush type mounted on heavy duty stainless steel piano or concealed hinges.
- P. Hardware shall be solid materials and except where unexposed or specified contrary, of cast brass, chrome plated. Stampings are not acceptable. Identify all hardware with manufacturer's name and number so that broken or worn parts may be ordered and replaced.
- Q. Fabricate sink compartments with fully coved vertical and horizontal corners. Multiple compartment partition to be double thickness, continuously welded where sheets join at top. Front of multiple compartment sinks to be continuous on exterior. Bottoms shall be creased to drain.
- R. Ends of all fixtures, splashbacks, shelves, etc., shall be finished flush to walls or adjoining fixtures.
- S. Dishtables, draintables, splashbacks and turned-up edges shall have radius bends in all horizontal and vertical corners, coved at intersections.
- T. Rounded and coved corners or radius bends shall be 1/2" radius or longer.
- U. Shelves in fixtures with enclosed bases shall be turned up on back and sides and feathered slightly to insure tight fit to enclosure panels. Bottom shelves shall be made for easy removal unless otherwise noted.

V. Undersides of tops to be coated with heavy-bodied resinous material compounded for permanent, non-flaking adhesion to metal, 1/8" thick, applied after reinforcing members have been installed, drying without dirt-catching crevices.

W. Metal components, unless specified or noted otherwise, to be the following gauges:

Counter and table tops	14 ga.	Stainless Steel
Wall shelves	16 ga.	Stainless Steel
Pipe leg undershelves	16 ga.	Stainless Steel
Drawer fronts	16 ga.	Stainless Steel
Enclosed cabinet bases	18 ga.	Stainless Steel
Sinks and drainboards	14 ga.	Stainless Steel
Legs 1 - 5/8" diameter	16 ga.	Stainless Steel

**2.3 HEATING EQUIPMENT**

- A. Wherever electric heating equipment or thermostat control for such equipment is specified, it shall be complete, and of the materials, size and rating specified within equipment item or details. All such equipment shall be designed and installed to be easily cleaned or to be easily removed for cleaning.
- B. Electrical appliances or heating element circuits of 120 volts shall not exceed 1650 watts, unless specifically shown contrary.

**2.4 SWITCHES AND CONTROLS**

- A. Food Service Equipment Contractor shall supply on each motor driven appliance or electrical heating unit suitable control switch of proper type in accord with Underwriter's Code.
- B. All internal wiring for fabricated equipment items included, all electrical devices, wiring, controls, switches, etc., built into or forming an integral part of these items shall be furnished and installed by Food Service Equipment Contractor in his factory or building site with all items complete to junction box for final connection to building lines by Electrical Contractor.
- C. Provide standard 3-prong plugs to fit "U" slot grounding type receptacles, similar to No. 5262, for all equipment items powered by plugging into 110-120 volts, single phase AC. Also, provide suitable length 3-wire cord for equipment.

**2.5 CONNECTION TERMINALS**

- A. All equipment shall be complete with connection terminals as standardized by equipment manufacturers, except where specified otherwise.

**2.6 LOCKS**

- A. Fit all doors for reach-in refrigerated compartments with locking type latches approved in writing by Architect. Provide master keys.

**2.7 LAMINATED PLASTIC**

- A. Wherever laminated plastic materials are specified, they shall be Formica, Wilson-Art,

Micarta, or approved equal. Veneer all materials using urea base cement, waterproof and heatproof. Rubber base adhesives are not acceptable. Apply materials directly over close-grained plywood such as mahogany or birch. Standard fir plywood is not acceptable. Face exposed surfaces and edges with 1/16" material and corresponding back faces with 1/32" reject material. Place top sheet on and over finished edge.

### **PART 3 EXECUTION**

#### **3.1 GENERAL**

- A. Work under this contract and covered under this section of specifications includes but is not limited to:
  - 1. Cutting of holes and/or ferrules on equipment for piping, drains, electrical outlets, conduits, etc. as required to coordinate installation of food service equipment with work of other Contractors on project.
  - 2. Field checking of building and rough-in requirements, and submission of brochures and shop drawings, all as required hereinbefore under "Submittals".
  - 3. Repair of all damage to premises as result of this installation, and removal of all debris left by those engaged in this installation.
  - 4. Having all food service equipment fixtures completely cleaned and ready for operation when building is turned over to Owner.

#### **3.2 INSTALLATION PROCEDURES**

- A. Food Service Equipment Contractor shall make arrangements for receiving his custom fabricated and "buy out" equipment and shall make delivery into building as requisitioned by his installation superintendent. He shall not consign any of his equipment to Owner or to any other Contractor unless he has written acceptance from them and has made satisfactory arrangements for the payment of all freight and handling charges.
- B. Food Service Equipment Contractor shall deliver all of his custom fabricated and "buy out" equipment temporarily in its final location, permitting Trades to make necessary arrangements for connection of service lines; he shall then move equipment sufficiently to permit installation of service lines, after which he shall realign his equipment level and plumb, making final erection as shown on contract drawings.
- C. All portable or counter mounted equipment weighing in excess of 25 pounds shall be mounted on 4" stainless steel adjustable legs.
- D. This Contractor shall coordinate his work and cooperate with other trades working at site toward the orderly progress of the project.
- E. Architect or Owner's Agent shall have access at all times to plant or shop in which custom fabricated equipment is being manufactured, from time contract is let until equipment is shipped, in order that progress of work can be checked, as well as any technical problem which may arise in coordination of equipment with building. Any approval given at this point of manufacture shall be tentative, subject to final inspection and test after complete installation.
- F. Food Service Equipment Contractor shall assist Architect, Owner, and/or Owner's Agent in making any desired tests during or prior to final inspection of equipment; he shall remove immediately any work or equipment rejected by Architect, Owner, and/or

Owner's Agent, replacing same with work conforming with contract requirements, and shall reimburse mechanical and/or other contractors involved for extra work made necessary by such replacement.

- G. This Contractor shall keep premises free from accumulation of his waste material and rubbish, and at completion of his work shall remove his rubbish and implements, leaving areas of his work broom clean.
- H. This Contractor shall provide and maintain coverings or other approved protection for finished surfaces and other parts of his equipment subject to damage during and after erection. After removal of protective coverings, all field joints shall be ground and polished and entire work shall be thoroughly cleaned and polished.

### **3.3 TRIMMING AND SEALING EQUIPMENT**

- A. Seal completely spaces between all units to walls, ceilings, floors, and adjoining (not portable) units with enclosed bodies against entrance of food particles or vermin by means of trim strips, welding, soldering, or commercial joint material best suited to nature of equipment and adjoining surface material.
- B. Close ends of all hollow sections.
- C. Equipment butting against walls, ceilings, floor surfaces and corners to fit tightly against same; backsplashes or risers which fit against wall to be neatly scribed and sealed to wall with DowCorning # 732 RTV or General Electric clear silicone sealant, wiping excess sealant out of joint to fillet radius. Where required to prevent shifting of equipment and breaking wall seal, anchor item to floor or wall.
- D. Treat enclosed spaces (inaccessible after equipment installation) for vermin prevention in accord with industry practice.

### **3.4 TESTING AND DEMONSTRATION OF EQUIPMENT**

- A. After completion of installation, all equipment using water, gas, and electricity shall be performance inspected and tested by factory certified service agent, including wet test of hood fire suppression systems, if so required. Food Service Equipment Contractor shall document that these inspections have been performed prior to scheduling demonstrations and owner acceptance of equipment.
- B. Food Service Equipment Contractor shall arrange to have all manufactured, mechanically operated equipment furnished under this contract demonstrated by authorized representatives of equipment manufacturers, these representatives to instruct Owner's designated personnel in use, care and maintenance of all items of equipment after same are in working order. Demonstration and instruction shall be held on dates designated by Owner.
- C. Food Service Equipment Contractor shall provide a competent service representative to be present when installation is put into operation.

### **3.5 EQUIPMENT HANDLING AND STORAGE**

- A. Deliver equipment to site, properly crated and protected, and store in safe place, protected from damage until time for installation.

**3.6 GUARANTEE**

A. **Special Project Warranty:** Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required, provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. This warranty shall be in addition to, and not limitation of, the rights the Owner may have against the Contractor under the Contract Documents.

B. **Warranty Period:**

1 year from date of Substantial Completion, all new equipment furnished. However, manufacturer's warranty shall prevail when the period is longer than one year.

5 years warranty period on refrigeration compressors.

10 year warranty period on walk-in panels.

**3.7 OPERATING AND MAINTENANCE MANUALS**

A. After completion of installation, Food Service Equipment Contractor shall present to Owner three sets of all operating and maintenance manuals, covering all mechanically operated equipment furnished under this contract, each set being neatly bound in looseleaf binder having durable cover.

B. Include in each binder a list of names, addresses and telephone numbers of local servicing agencies authorized to make necessary repairs and/or adjustments of equipment furnished under this contract.

**PART 4 EQUIPMENT SCHEDULE**

ITEM 01	COLD STORAGE SHELVING UNIT	QUANTITY AS SCHEDULED
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Provide four-tier polymer shelving unit complete with tubular uprights and having the following features:

- A. Arrange using quantity and size as shown on Plan.
- B. Removable open grid polymer shelf mats on an epoxy coated steel frame with quick adjust corner releases.
- C. (4) wedge connectors.
- D. Antimicrobial product protection.
- E. 600 lb. capacity per shelf.
- F. Polymer Trilobal Post:
  - 73 – 3/16"H
  - For use with stem casters
  - Adjusts at 1" increments
  - Corrosion proof all polymer construction with built-in antimicrobial product protection.



- G. Polymer Stem Caster:
- Brake
  - 5" diameter
  - 1-1/4"W face
  - -20° F to 120°F temperature range
  - Polyurethane wheel tread
  - 300 lb. capacity
  - Antimicrobial product protection
  - Donut bumpers

Shelving to be as manufactured by Metro, Model MQ1860G, Eagle Group, or Cambro.

ITEM 02            COLD STORAGE ASSEMBLY            QUANTITY AS SCHEDULED

Provide pre-fabricated cold storage room assembly of size and shape shown on plan and detail drawings. Exact overall size to be field verified prior to fabrication.

A. Insulation:

Panels shall be insulated with 4" thick urethane, foamed or poured in place using HCFC (No CFC) blowing agent. Foam shall be 2.25 lb. density, 97% closed cell. Panels shall meet ASTM E-84 (UL-723) and be listed by Underwriters laboratories. Panels shall have a maximum flame spread of 25, maximum smoke developed of 450, minimum flash ignition of 600 degrees, and minimum self-ignition of 800 degrees F.

B. Coved corners:

Assembly shall be constructed so that all interior wall, floor and ceiling intersections shall have integral coved corners. Add-on coved strips will not be acceptable.

C. Cam lock fasteners:

All panel intersections and wall, floor and ceiling intersections shall be secured by cam lock fasteners.

D. Finishes:

Exterior and interior finishes shall be as scheduled on drawings.

E. Doors:

Door size and finish shall be as scheduled on drawings, and shall be furnished complete with sill wiper gasket, lift type hinges.

Hinges, latches and hardware shall be chrome plated.

Exterior door to be equipped with automatic door closer.

Freezer door to be equipped with perimeter heat.

Exterior door(s) to be equipped with cylinder lock having inside safety release feature.

F. Thermometers:

Each compartment to be provided with exterior flush mounted thermometer mounted at eye level to each door, digital type with contactor for hook-up to remote monitoring system.

G. Lights:

Each compartment to be furnished complete with manufacturer's standard light fixture, having tempered glass cover, mounted and pre-wired to switch with pilot light in door section. Extra lights as needed to provide 30 foot candles 30" above floor.

H. Floor: Load rating nominal 1200 lbs./sq. ft. Recessed floor by Food Service Equipment Contractor.

I. Refrigeration System:

Shall be furnished by manufacturer as part of cold storage room assembly, provide each compartment with complete refrigeration system sized to maintain appropriate temperature.

Condensing units to be semi-hermetic air-cooled, remote. Units to have performance and wiring characteristics as scheduled on drawings.

Condensing units to be provided with painted galvanized steel all-weather housing, controls, and crankcase heaters, all suitable for outdoor conditions, and located as shown on drawings.

Unit coolers to be low-silhouette type, mounted at locations shown on drawings. Performance and wiring characteristics to be as scheduled on drawings. Freezer system to be provided with timed electric defrost.

Evaporator drain lines to be provided by this section and extended to floor receptors outside assembly.

Freezer drain lines to be wrapped with heater cable.

Refrigerant piping to be ACR copper tubing, hard temper, with wrought fittings and silver solder joints. Insulate suction lines with 1/2" premolded foamed plastic insulation.

Refrigeration systems to be provided with all required refrigerant piping, insulation, sight glass, vibration eliminator, solenoid(s), dryer, suction line filter, expansion valve(s), thermostat(s) and defrost timers, etc. as necessary for complete installation. Provide pump down control circuit consisting of thermostat and solenoid valve. All components including piping and insulation to be installed using accepted industry standards, manufacturer instructions and first class workmanship.

J. Miscellaneous:

Temperature monitoring system to be provided for both compartments.

Assembly to be installed in floor depression.

Provide trim strips, closure panels, etc., as necessary to trim assembly to adjacent building surfaces.

Provide removable top closure panels with "C" channel rails. Lift-out panel sections to have turn-down edges for strength and are not to exceed 4'-0" in length.

Provide heated pressure relief port in freezer.

Provide sleeves properly located for utility entrance, drain lines, and refrigeration lines, and after lines are installed, fill sleeves with caulking compound, suitable for use in refrigerated spaces.

Cold storage room shall be erected by factory trained and certified installers or shall be supervised by factory personnel. Refrigeration systems shall be furnished by cold storage room manufacturer and installed by factory authorized personnel.

This specification does not constitute a complete description of cold storage assembly, also see plan and detail drawings.

Cold storage room assembly to be as manufactured by Bally, American Panel, Imperial/Brown, or Thermo-Kool, complying with specifications and drawings.

ITEM 03 NOT USED

ITEM 04A SHELVING UNIT QUANTITY AS SCHEDULED

Provide four-tier polymer shelving unit complete with tubular uprights and having the following features:

- A. Arrange using quantity and size as shown on Plan.
- B. Removable open grid polymer shelf mats on an epoxy coated steel frame with quick adjust corner releases.
- C. (4) wedge connectors.
- D. Antimicrobial product protection.
- E. 800 lb. capacity per shelf.
- F. Polymer Trilobal Post:
  - 73-3/16"H
  - For use with stem casters
  - Adjusts at 1" increments
  - Corrosion proof all polymer construction with built-in antimicrobial product protection.
- G. Polymer Stem Caster:
  - Brake
  - 5" diameter
  - 1-1/4"W face
  - Polyurethane wheel tread
  - 300 lb. capacity
  - Antimicrobial product protection
  - Donut bumpers



- H. (4) polymer swivel casters (2 with brakes).
- I. Built-in antimicrobial product protection.

Dishrack dolly to be as manufactured by Metro, Model PR48VX3, Eagle Group or Cambro.

ITEM 06 PROOFER/ HOLDING CABINET QUANTITY AS SCHEDULED

Provide mobile hot cabinet having the following features:

- A. Full-size, insulated, adjustable wire slides.
- B. 3-1/2" OC.
- C. Adjustable on 1-3/4" increments.
- D. Accommodates (14) 18" x 26" or (28) 12" x 20" or (14) 2/1 GN pans.
- E. (2) hinged solid Dutch doors with magnetic latch, see hinging as shown on Plan.
- F. 90°F to 180°F temperature range.
- G. Electronic differential controls.
- H. Digital display.
- I. Manual water fill.
- J. Stainless steel construction.
- K. H3 3" swivel casters (2) with brakes.
- L. Voltage as scheduled, cord and plug.

Cabinet to be as manufactured by Winston, Model HA4522, F.W.E, or Metro.

ITEM 07 BAKER’S WORKTABLE QUANTITY AS SCHEDULED

Provide stainless steel worktable having the following features:

- A. 60" wide x 30" long.
- B. Stainless steel top.
- C. 4"H splash on sides and rear.
- D. Stainless steel gussets.
- E. Stainless steel crossrails and tubular legs with adjustable stainless steel bullet feet.

Worktable to be as manufactured by Eagle Group, Model MT3060GT-BS, John Boos, or fabricated equal.

ITEM 07.1 INGREDIENT BINS





- F. (2) Drawers:
- 20" x 20" x 5"D
  - Stainless steel with polymer slides
  - Note: table must be field drilled for mounting

Worktable to be as manufactured by Eagle Group, Model T3060SEM-BS, Titan, or fabricated equal.

ITEM 12          ONE (1) COMPARTMENT SINK                                  QUANTITY AS SCHEDULED

Provide one compartment sink with drainboards as follows:

- I.          Approximate overall size: 63-1/2"W x 31"D.
- J.          14/304 stainless steel top.
- C.          Coved corners.
- D.          24" x 24" x 14" deep compartment.
- E.          36" drainboard on right.
- F.          9-1/2"H backsplash with 1" upturn and tile edge.
- G.          8" OC splash mount faucet holes, rolled edges on front & sides.
- H.          3-1/2" basket lever drain.
- I.          Stainless steel crossbracing on all sides, stainless steel legs and adjustable bullet feet.

Sink to be as manufactured by Eagle Group, Model FN2424-1-36R-14/3, Titan, or fabricated equal.

ITEM 12.1      FAUCET

- J.          Mixing faucet.
- K.          12" swing nozzle.
- L.          Wall mounted.
- M.          8" centers on sink faucet with 1/2" IPS eccentric flanged female inlets.
- N.          Lever handles.

Faucet to be a manufactured by T&S Brass, Model B-0231, Chicago Faucet, or Fisher.

ITEM 13          WALL MOUNTED SHELF                                  QUANTITY AS SCHEDULED

Provide wall shelf with the following features:

- A.          Wall mount.
- B.          Arrange using quantity and size as shown on Plan.



- C. 1-1/2"H up-turn on sides and rear.
- D. Stainless steel mounting brackets stud welded to shelf.
- E. 14/304 stainless steel construction.

Wall shelf to be as manufactured by Eagle Group, Model WS1260-14/3, Titan, or fabricated equal.

ITEM 14 HAND SINK N.I.K.C.

This item is to be furnished and installed by Plumber.

ITEM 15 SOILED DISHTABLE QUANTITY AS SCHEDULED

This item to be custom fabricated in accord with General Requirements of specifications and with plan and detail drawings. (20"x20"x8" Pre-Rinse sink, Scrap Block)

ITEM 15.1 PRE-RINSE FAUCET QUANTITY AS SCHEDULED

Provide pre-rinse faucet having the following features:

- A. Wall mount mixing faucet with 8" adjustable centers.
- B. Quarter-turn Eterna cartridges with spring checks.
- C. Lever handles with color-coded indexes.
- D. 18" riser.
- E. 44" flexible stainless-steel hose with heat resistant gray handle and hold down ring.
- F. 1.15 GPM spray valve (B-0107).
- G. Finger hook.
- H. Polished chrome-plated brass faucet body.
- I. 1/2" NPT female inlets.
- J. Installation kit.

Pre-Rinse Faucet Assembly to be as manufactured by T&S Brass, Model B-0133, Chicago Faucet, or Fisher.

ITEM 16 DISHWASHER, CONVEYOR QUANTITY AS SCHEDULED

Provide single-tank rack conveyor type dishmachine, having the following features:

- A. Single tank.
- B. (202) racks/hour.



Provide three compartment sink with drainboards as follows:

- L. Approximate overall size: 138"W x 35"D.
- M. 14/304 stainless steel top, coved corners.
- C. 20" wide x 28" front-to-back x 14" deep compartments.
- D. (2) 36" drainboards, see direction of operation on Plan.
- E. 9-1/2"H backsplash with 1" upturn and tile edge.
- F. (2) sets of 8" OC splash mount faucet holes, rolled edges on front & sides.
- G. 3-1/2" basket drains.
- H. Stainless steel crossbracing on all sides, stainless steel legs and adjustable bullet feet.
- I. (3) Lever Handle Drains, 1-1/2" or 2" IPS connection.

Sink to be as manufactured by Eagle Group, Model FN2860-3-36-14/3, Titan, or fabricated equal.

#### ITEM 18.1 FAUCET

- J. Mixing faucet.
- K. 12" swing nozzle.
- L. Wall mounted.
- M. 8" centers on sink faucet with 1/2" IPS eccentric flanged female inlets.
- N. Lever handles.

Faucet to be a manufactured by T&S Brass, Model B-0231, Chicago Faucet, or Fisher.

#### ITEM 19 OVERSHELF QUANTITY AS SCHEDULED

Provide wall shelf with the following features:

- A. Wall mount at 4'-6" A.F.F.
- B. Arrange using quantity and size as shown on Plan.
- C. Rolled front edge, 1-1/2"H up-turn on sides and rear.
- D. 304 stainless steel pot rack bar.
- E. (11) double-prong stainless steel hooks.
- F. 16/430 stainless steel construction.

Wall shelf to be as manufactured by Eagle Group, Model WSP12132, Titan, or fabricated equal.

ITEM 20            UTILITY DISTRIBUTION SYSTEM            QUANTITY AS SCHEDULED

Provide island utility chase to serve items under exhaust hood, having the following features:

- A.     Stainless steel construction.
- B.     U L label.
- C.     Designed for single point electrical connection with, internal bus bars, main disconnect, shunt trip, branch circuit breakers.
- D.     Water tight electrical receptacles to match equipment.
- E.     1 1/2" gas manifold with tees and shut-off valves.
- F.     3/4" hot water and cold water manifold with tees and shut-off valves.
- G.     Gas and water quick disconnects and appropriate cord and plug sets as required by equipment for installation under Division 22 and 26.
- H.     Manual gas shut-off valve for installation under Division 22.
- I.     Length as shown on drawings, with utilities coming from above.
- J.     Note: Cord and plugs must not interfere with placement of equipment. If angled plugs can't be used, equipment is to be hardwired using elbow at face plate.
- K.     All receptacles shall be GFCI type.

Utility chase to be as manufactured by Captive-Aire, Model UDI, Gaylord, or Avtec.

ITEM 21            EXHAUST HOOD            QUANTITY AS SCHEDULED

Provide double bank island mount type canopy exhaust hood of size, shape and content as shown on detail drawings, having the following features:

- A.     All exposed surfaces of 18 gauge 304 Series, 18-8 stainless steel construction.
- B.     N.F.P.A. 96 construction, including all joints and seams welded externally, continuous and liquid tight.
- C.     5/8" diameter hanger rods to structural ceiling, approximately 96" on center.
- D.     Stainless steel high-efficiency baffle type U.L. classified grease extracting filters, with handles.
- E.     Integral grease gutter sloped to drain to grease receptacle.
- F.     Vapor-proof U.L. listed recessed LED light fixtures.
- G.     Coordinated installation of fire suppression system as specified for Item --.

- H. Integral make-up air plenum along front as shown.
- I Provide spacer frame to allow passage of utility chase between hood sections and stainless steel trim on bottom and ends.
- J. Removable stainless steel perimeter trim and/or closure panels from top of hood to ceiling.
- K. Food Service Equipment Contractor shall provide and install any secondary supporting members required to suspend exhaust hoods. Hood supports shall include seismic bracing, if required, installed in accord with SMACNA guidelines.
- L. Fire suppression cabinet with pre-wire control package and switches with variable speed control fan.

Exhaust hood to be as manufactured by Captive-Aire, Model ND-PSP, Gaylord, or Avtec.

ITEM 22      FIRE SUPPRESSION SYSTEM      QUANTITY AS SCHEDULED

Provide automatic wet chemical fire suppression system as required to protect exhaust hood, Item --, and the cooking equipment located under this hood, and having the following features:

- A. All tanks, control heads, piping, relays, cable, fusible links, nozzles, elbows, etc., as required for complete system.
- B. Brass nozzles and chrome plated or sleeved exposed piping.
- C. Manual strike mechanism in accessible location.
- D. Installation in accord with N.F.P.A. 17A code requirements and coordinate with exhaust hood construction and installation.
- E. Four contacts for use by E.C., one contact for alarm, one for supply fan shut-off, one for shunt trip actuation, and one spare.
- F. Provide mechanical gas solenoid valve loose for installation by plumber.

Fire suppression system to be as manufactured by Ansul, Model R-102, Range Guard, or Pyro-chem.

ITEM 23.1      COMBI OVEN, GAS      QUANTITY AS SCHEDULED

Provide gas combi-oven with the following features:

- N. Gas:
  - Field verify type
  - Quick disconnect
  - ¾" x 48" Gas Connector Kit with (1) Swivel max by Dormont, Model 1675KITS48
- B. Boiler-free, countertop combi oven.
- C. (6) 18" x 26" full size sheet pan or (12) 12" x 20" x 1" hotel pan capacity.

- D. 9” control panel, 20 stages each and 399 cooking recipes storage.
- E. (4) cooking modes: hot air, steam, combi-steam and retherm.
- F. Multi-point core temperature probe.
- G. (3) wire racks.
- H. 5-speed auto reversing fan.
- I. Disappearing door, see hinging as shown on Plan, anti-microbial hygienic door handle.
- J. Pull-out spray hose.
- K. Automatic hands-free cleaning system.
- L. Stainless-steel construction.
- N. Energy efficient.
- O. Voltage as scheduled, direct connection.
- P. Verification of required water testing or RO system.
- Q. Optipure Water Filter System:
  - CTO-Q10 cartridge
  - CTO-QCR cartridge
  - 2.5 gpm0.5 micron sediment and chlorine up to 20,000 gallons
  - 0.5 chloramine up to 6,000 gallons
  - Pressure gauge,
  - Inlet shut-off valve
  - Mounting bracket
  - For use with steam & combi ovens
- R. Stacking Kit on 6" Legs:
  - For 6.20 on 6.20 (6.20 on 10.20) (gas models)
  - 6” leg is recommended. Only use the 6 inch leg in cases where the hood height is too low to accommodate a 12” leg
- S. Back flow preventer.

Combi-Oven to be as manufactured by Convotherm, Model C4ET 6.20 GS, Alto-Shaam, or Rational.

ITEM 23.2 COMBI OVEN, GAS QUANTITY AS SCHEDULED

Provide gas combi-oven with the following features:

- O. Gas:
  - Field verify type
  - Quick disconnect
  - ¾”x 48” Gas Connector Kit with (1) Swivel max by Dormont, Model 1675KITS48

- B. Boiler-free, countertop combi oven.
- C. (10) 18" x 26" full size sheet pan or (20) 12" x 20" x 1" hotel pan capacity.
- D. 9" control panel, 20 stages each & 399 cooking recipes storage.
- E. (4) cooking modes: hot air, steam, combi-steam and retherm.
- F. Multi-point core temperature probe.
- G. 5-speed auto reversing fan.
- H. (5) wire racks.
- I. Disappearing door, see hinging as shown on Plan, anti-microbial hygienic door handle.
- J. Pull-out spray hose.
- K. Automatic hands-free cleaning system.
- L. Stainless-steel construction.
- N. Energy efficient.
- O. Voltage as scheduled, direct connection.
- P. Verification of required water testing or RO system.
- Q. Optipure Water Filter System:
  - CTO-Q10 cartridge
  - CTO-QCR cartridge
  - 2.5 gpm
  - 0.5 micron sediment and chlorine up to 20,000 gallons
  - 0.5 chloramine up to 6,000 gallons
  - Pressure gauge
  - Inlet shut-off valve
  - Mounting bracket
  - For use with steam & combi ovens
- R. Stacking Kit on 6" Legs:
  - For 6.20 on 6.20 (6.20 on 10.20) (gas models)
  - 6" leg is recommended. Only use the 6 inch leg in cases where the hood height is too low to accommodate a 12" leg
- S. Back flow preventer.

Combi-Oven to be as manufactured by Convotherm, Model C4ET 10.20 GS, Alto-Shaam, or Rational.

ITEM 24      CONVECTION OVEN, GAS      QUANTITY AS SCHEDULED

Provide electric convection oven having the following features:

- A. Gas:
  - Field verify type
  - Quick disconnect
  - Restraining devices
  - ¾" x 36" or 48" Gas Connector Kit with (2) Swivel max by Dormont, Model 1675KIT2S48
- B. Double-deck, bakery depth.
- C. Capacity (5) 18" x 26" pans per compartment.
- D. (SSD) solid state digital controls.
- E. 60 minute timer.
- F. 2-speed fan.
- G. Interior light.
- H. Simultaneous operated doors with glass.
- I. Stainless steel front, sides and top.
- J. 6" stainless steel adjustable legs.
- K. Flue connector.
- L. (2) 1/2 HP.
- M. (2) Voltage as scheduled, cord and plug.
- N. Solid State digital with Pulse Plus® and Cook & Hold:
  - Top oven
  - Bottom oven
- O. Draft diverter

Convection oven to be as manufactured by Blodgett, Model DFG200 DBL, Southbend, or Vulcan

ITEM 25      MOBILE ENCLOSED CABINET      QUANTITY AS SCHEDULED

Provide aluminum pan rack having the following features:

- A. Mobile, reach-in.
- B. 21-1/2"W x 63-1/4"H, 28"D.
- C. Capacity (35) 18" x 26" sheet pans.
- D. Riveted aluminum construction.
- E. Lockable door.



F. Casters.

Pan rack to be as manufactured by Metro, Model CD3N, Cres-Cor or SPG.

ITEM 26 STEAMER, CONVECTION, GAS QUANTITY AS SCHEDULED

Provide two-compartment pressureless steamer having the following features:

- P. Gas:
- Field verify type
  - Quick disconnect
  - ANSI-standard restraint chain
  - ¾" x 48" Gas Connector Kit with (1) Swivel max by Dormont, Model 1675KITS48
- B. Boilerless generator, double stacked.
- C. Open leg stand with bullet feet.
- D. (10) 12 x 20 x 2-1/2" pans capacity per compartment.
- E. Door, see hinging as shown on Plan.
- F. Stainless steel interior and exterior.
- G. (2) Voltage as scheduled, direct connections.
- H. K-12 second year check-up.
- I. Water Filtration System:
- 1500 gallons per day
  - Reverse osmosis
  - Mineral addition
  - 50-gallon tank
  - (2) pre-filters
  - (1) post filter
  - (1) RO membrane
  - Air gap kit
  - Booster pump and pressure regulator
- J. Drain Tempering Valve:
- For 140 degree drain temperature requirement
  - Requires 1/2" cold water connection
  - No electrical connection required
- K. Backflow prevention device.

Steamer to be by Groen, Model (2)SSB-10GF, Cleveland, or Vulcan.

ITEM 27 TILT SKILLET QUANTITY AS SCHEDULED

Provide electric tilting skillet braising pan having the following features:

- A. Electric, 30-gallon capacity
- B. Modular enclosed cabinet base
- C. Standard with hydraulic hand tilt with quick lowering feature.
- D. Stainless steel construction
- E. Spring-assisted cover and gallon markings
- F. Food strainer
- G. Stainless steel level adjustable feet
- H. Performance start-up and water quality check.
- I. Double Pantry Faucet:
  - 3/4" swing spout & mounting bracket
  - Mounts on right side of unit (add 4.5" to width)
  - Cleveland DPK14 (Chicago Faucet or Fisher)
- J. Food Strainer.
- K. Voltage as scheduled, direct connection.

Electric tilting skillet braising pan to be as manufactured by Cleveland, Model SEM30TR, Market Forge, or Groen.

ITEM 28      FLOOR TROUGH      QUANTITY AS SCHEDULED

Provide floor trough having the following features:

- A. Anti-Splash Floor Trough, 36"W x 18"D.
- B. Stainless steel subway-style grating.
- C. 6" deep trough pan with built-in pitch toward drain.
- D. Accommodates up to a 4" diameter drain pipe.
- E. Stainless steel removable perforated basket.
- F. All-welded 14/304 stainless steel construction.

Floor trough to be as manufactured by Eagle Group, Model ASFT-1836-SG, IMC Teddy, or fabricated equal.

ITEM 29      TWO (2) COMPARTMENT SINK      QUANTITY AS SCHEDULED

Provide two compartment sink with drainboards as follows:

- Q. Approximate overall size: 100"W x 31"D.

- R. 14/304 stainless steel top, coved corners.
- C. 24" wide x 24" front-to-back x 14" deep compartments.
- D. (2) 24" drainboards, see direction of operation on Plan.
- E. 9-1/2"H backsplash with 1" upturn and tile edge.
- F. (2) sets of 8" OC splash mount faucet holes, rolled edges on front and sides.
- G. (2) 3-1/2" basket lever drains.
- H. Stainless steel crossbracing on all sides, stainless steel legs and adjustable bullet feet.
- I. Lever Handle Drain, 2" NPS connection and overflow.

Sink to be as manufactured by Eagle Group, Model FN2448-2-24-14/3, Titan, or fabricated equal.

ITEM 29.1 WALL MOUNTED SHELF

- J. Wall-mounted at 4'-6" A.F.F.
- K. 96"W x 12"D.
- L. Rolled front edge.
- M. 1-1/2"H up-turn on sides and rear.
- N. Stainless steel mounting brackets stud welded to shelf.
- O. 14/304 stainless steel construction.

Shelf to be as manufactured by Eagle Group, Model WS1296-14/3, Titan, or fabricated equal.

ITEM 29.2 FAUCET

- P. Mixing faucet.
- Q. 12" swing nozzle.
- R. Wall mounted.
- S. 8" centers on sink faucet with 1/2" IPS eccentric flanged female inlets.
- T. Lever handles.

Faucet to be as manufactured by T&S Brass, Model B-0231, Chicago Faucet, or Fisher.

ITEM 30 HOSE REEL QUANTITY AS SCHEDULED

Provide hose reel having the following features:

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- S. 3/8" x 50 ft. hose with 1.15 GPM spray valve.
- B. 8" wall mount mixing faucet.
- C. Adjustable centers.
- D. Quarter-turn Eterna cartridges with spring checks.
- E. Lever handles with color coded indexes.
- F. Easy to install 16" and rigid 40" risers.
- G. 36" flexible water hose connector with stainless steel quick disconnect.
- H. Ratcheting system and adjustable hose bumper.
- I. (2) 2-3/8" wall brackets.
- J. Stainless steel hose reel.
- K. 1/2" NPT.

Hose reel assembly to be as manufactured by T&S, Model B-1444-CV, with above components Chicago Faucet, or Fisher.

ITEM 31      ICE MAKER      QUANTITY AS SCHEDULED

Provide ice maker and bin having the following features:

- T. Cube style.
- U. Air cooled, self-contained condenser, R410A refrigerant.
- C. 30"W x 24"D x 21-1/2"H.
- D. Capacity up to 490 lb./24 hours at 70°/50° (378 lb. AHRI certified at 90°/70°).
- E. Stainless steel finish, corrosion, fingerprint and dirt resistant.
- F. Half-dice size cubes.
- G. Energy efficient.
- H. Voltage as scheduled, direct connection.
- I. Drain.
- J. Pre-Filter Assembly:
  - 5 micron filtration includes head, shroud, hardware, mounting assembly
  - filter cartridge
  - Not stand-alone; should be used in conjunction with primary water filter assembly

Unit to be as manufactured by Manitowoc, Model IYT0450A, Scotsman, or Hoshizaki.

## ITEM 31.1 ICE BIN

- K. 30"W x 34"D x 50"H.
- L. Side-hinged front-opening door.
- M. Side grips.
- N. AHRI certified 532 lb. ice storage capacity (17.9 cu. ft.).
- O. For top mounted ice maker
- P. Stainless steel finish, corrosion, fingerprint and dirt resistant.
- Q. Legs, 6" adjustable stainless steel.
- R. Backflow prevention device.

Bin to be as manufactured by Manitowoc, Model D570, Scotsman, or Hoshizaki.

## ITEM 32 PASS-THRU REFRIGERATOR QUANTITY AS SCHEDULED

Provide two-section pass-thru refrigerator with top mounted air-cooled condensing unit, exterior digital thermometer, cylinder door locks and top mounted condensate evaporator, having the following features:

- A. Self-contained refrigeration.
- B. 48.0 cu. ft. capacity.
- C. (8) half-height solid doors, Santoprene door gaskets, hinged as shown on drawings for Control/ Kitchen side and Rear/ Server side.
- D. (6) silver freeze (chrome-style) shelves.
- E. Stainless steel exterior, aluminum interior.
- F. Standard depth cabinet.
- G. Electronic temperature touch control/indicator.
- H. LED lighting.
- I. Expansion valve technology.
- J. Stainless steel breakers.
- K. 1/3 HP.
- L. Voltage as scheduled, cord and plug.
- M. Legs, set of 4, 6" high adjustable stainless steel.

N. Stainless steel trim on all sides from equipment to wall.

Refrigerator to be as manufactured by Victory, Model RSA-2D-S1-PT-HD, Traulsen, or Delfield.

ITEM 33          PASS-THRU HEATED CABINET                      QUANTITY AS SCHEDULED

Provide one-section pass-thru hot cabinet, having the following features:

- A. 21.5 cu. ft. capacity.
- B. (4) half-height solid doors, hinged as shown on drawings for Control/ Kitchen side and Rear/ Server side.
- C. (3) silver freeze (chrome-style) shelves.
- D. Standard depth cabinet.
- E. Exterior digital touch control system.
- F. Cylinder locks.
- G. Stainless steel exterior, aluminum interior.
- H. Legs, set of 4, 6" high adjustable stainless steel.
- I. Voltage as scheduled, cord and plug.
- J. Stainless steel trim on all sides from equipment to wall.

Cabinet to be as manufactured by Victory, Model HSA-1D-1-PT-HD, Delfield, or Traulsen.

ITEM 34          MILK COOLER    QUANTITY AS SCHEDULED

Provide mobile carton milk cabinet having the following features:

- A. Normal temperature.
- B. 49"W x 30-5/8"D x 41-1/8"H.
- C. 20.32 cu. ft.
- D. Single access.
- E. Flat top carton capacities.
- F. (12) 13" x 13" x 11" or (8) 19" x 13" x 11" case capacity.
- G. Self-latching doors/lids with safety bumpers.
- H. Cylinder lock.
- I. Wire floor racks.

- J. Floor drain.
- K. Electronic control.
- L. Auto defrost.
- M. Stainless steel interior and exterior.
- N. Self-contained refrigeration, R290 Hydrocarbon refrigerant.
- O. 4" heavy duty casters, (2) with brakes.
- P. 1/3 H.
- Q. Voltage as scheduled, cord and plug.

Dispenser to be as manufactured by Beverage-Air, Model SM49HC-S, True, or Norlake.

ITEM 35      HOT FOOD SERVING COUNTER      QUANTITY AS SCHEDULED

Provide modular serving counter having the following features:

- A. Hot food unit, electric.
- B. 74-3/8"W x 30"D x 36"H.
- C. (5) 12" x 20" hot wells.
- D. Wet and dry operation.
- E. Individual digital controls.
- F. Stainless steel top.
- G. Fully enclosed molded fiberglass base, color as selected by Architect/Owner.
- H. (4) 5" locking swivel casters.
- I. Voltage as scheduled, cord and plug set.
- J. (Z) Hot food drains.
- K. Install in banked line-up as shown on drawings.
- L. (AA) line up lock.
- M. (A) Solid tray slide with (3) inverted "V" ridges on surface, stainless steel.
- N. Single service buffet sneeze guard, hinged.
- O. (RR) LED lights.
- P. Tray slide to be 30"H.

Q. Work board on staff side.

Hot food counter to be by Colorpoint, Model EF5-CPA-EB, Delfield, or Duke.

ITEM 36 COLD FOOD SERVING COUNTER QUANTITY AS SCHEDULED

Provide cold food counter module having the following features:

- V. Cold food unit, electric.
- B. 72-3/8"W x 30"D x 36"H.
- C. (1) 51"W x 20"D x 9" deep stainless steel cold well.
- D. Accommodates (4) full size 6" deep food pans.
- E. Forced air refrigeration with (2) fans.
- F. Fully enclosed molded fiberglass base, color as selected by Architect/Owner.
- G. 5" casters all with brakes.
- H. (AA) Line up lock.
- I. (A) Solid tray slide with (3) inverted "V" ridges on surface, stainless steel.
- J. Single service buffet sneeze guard, hinged.
- K. 12" Extention
- L. Install in banked line-up as shown on drawings.
- M. Tray slide to be 30"H.
- N. (RR) LED lights.
- O. Voltage as scheduled, cord and plug.
- P. Work board on staff side.

Counter to be by Colorpoint, Model 66-CFMA-EB-MOD, Delfield, or Duke.

ITEM 37 SERVING COUNTER, UTILITY QUANTITY AS SCHEDULED

Provide modular serving counter of size and content as shown on Plan drawings, having the following features:

- A. Solid Utility Food Table.
- B. Flat stainless steel top.
- C. 60-3/8"W x 30"D x 36"H.





- C. 1" upturn on all sides of all shelves.
- D. 12-1/2" shelf clearance.
- E. (1) push handle.
- F. Angle legs include bumpers.
- G. 300 lbs. capacity.
- H. 430 stainless steel all welded construction.
- I. 4" swivel plate casters.

Utility cart to be as manufactured by Eagle Group, Model UUC-322, Cambro, or Lakeside.

ITEM 41

NOT USED

END OF SECTION 11 40 00

**SECTION 11 52 13**  
**PROJECTION SCREENS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Electrically operated projection screens.
  - 2. Related accessories.
- B. Related Sections:
  - 1. Section 04 20 00 - Unit Masonry: Substrate for screens mounted at unit masonry construction.
  - 2. Section 09 21 16 - Gypsum Board Assemblies: Substrate for screens mounted at gypsum board assembly construction.
  - 3. Section 09 51 13 - Acoustical Panel Ceilings: Substrate for screens mounted at acoustical panel ceiling construction.
  - 4. Division 26: Electrical characteristics and wiring connections, and electrical service to main disconnect and control unit.

**1.2 REFERENCES**

- A. National Fire Protection Association:
  - 1. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
- B. Underwriters Laboratories Inc.:
  - 1. UL - Electrical Appliance and Utilization Equipment Directory.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's product data on materials, finishes, operation of unit, and electrical requirements.
  - 1. Include electrical requirements if electric requirements are indicated.
- C. Shop Drawings: Submit drawings indicating details for mounting, anchoring and mounting substrate construction requirements for screen types indicated.
  - 1. Include manufacturer's wiring diagram for electrically operated controls if electric operation is indicated.
  - 2. Indicate verified electrical service requirements for motor adequate for screen size and operation.
- D. Samples: Submit samples illustrating manufacturer's full range of colors and finishes available. Submit for Architects selection.
- E. Manufacturer's Installation Instructions: Submit detailed installation instructions including rough-in measurements.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures: Requirements for submittals.
- B. Operation and Maintenance Data:

1. Submit parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Submit technical information for servicing operating equipment.

### **1.5 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 three (3) 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. Deliver projection screens after building is enclosed, other work within spaces where screens are to be installed is substantially complete, and installation of screens is ready to take place.
- C. Protect projection screens from damage before, during and after installation.

### **1.7 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

### **1.8 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Prior to fabrication, coordinate screen system electrical requirements with available electrical service indicated on Drawings at screen location.
- C. Coordinate with installation of ceilings, walls, operation switch controls and screen location.

## **PART 2 PRODUCTS**

### **2.1 PROJECTION SCREEN - ELECTRIC MOTOR OPERATED**

- A. Manufacturers:
  1. Da-Lite Screen Co., Inc. - Tensioned Advantage Electrol. (Basis of Design)
  2. Draper Shade and Screen Co.
  3. Stewart Filmscreen Corp.
  4. Substitutions: Section 01 60 00 - Product Requirements.

### **2.2 CHARACTERISTICS - GENERAL**

- A. Refer to SCHEDULE article at end of this Section for other requirements by screen locations.
- B. Flame Resistant: Screen material passes when tested in accordance with NFPA 701, Test 1 or Test 2.
- C. Mildew resistant; black backed; washable with mild soap and water solution; with top edge mounted on, and securely anchored to, rigid metal roller supported by self-aligning bearings in brackets.
- D. For electric motor operated screens, bottom edge of screen material to be inserted into a custom aluminum slat bar with added weight to provide vertical tension on the screen surface.

**2.3 ELECTRICAL CHARACTERISTICS AND COMPONENTS**

- A. Electrical Characteristics: Comply with Division 26 – Electrical provisions.
- B. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.
- D. Motor: 120 volts, single phase, 60 Hz; pre-wired; sufficient for smooth and quiet operation.
  - 1. Instant reversing, gear drive motor of size and capacity recommended by screen manufacturer, with permanently lubricated ball bearing, automatic thermal overload protection, preset limit switches to automatically stop screen in UP and DOWN position, and positive stop action to prevent coasting; remotely controlled as indicated on Drawings.
  - 2. Motor housed within rigid metal roller.
- E. Disconnect Switch: Factory mount disconnect switch on equipment.
- F. Screen Control Station(s): Electric; 3-position, keyed; UL listed control switch for each screen with metal device box and cover plate for flush wall mounting and for connection to electric power supply.
- G. Remote Control: Hand-held, battery operated device

**2.4 ACCESSORIES**

- A. Provide all installation hardware required for anchor and support to building structure.
- B. For electric motor operated screens, provide all electrical components required for fully operational installation.

**PART 3 EXECUTION****3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify rough-in opening and conditions are acceptable.
- C. Verify electrical power service is available and of correct characteristics.

**3.2 INSTALLATION**

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install projection screens at location indicated on Drawings.
- C. Coordinate with electrical connection.
- D. Securely anchor and support installation to building structure.
- E. Install to produce smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when lowered.
- F. Test electrically-operated units to verify screen controls, limit switches, closure and other operating components are in optimum functioning conditions.

**3.3 ADJUSTING**

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.

- B. Adjust installed unit for smooth and balanced operation.

### 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. Remove protective coverings from finished surfaces. Clean surfaces and components ready for inspection.

### 3.5 PROTECTION OF FINISHED WORK

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect work for damage and do not permit use of projection screens after installation.

### 3.6 DEMONSTRATION AND TRAINING

- A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of component of the installed Work.

### 3.7 SCHEDULE

- A. Platform Location:
  - 1. Operation:
    - a. Electric motor operated.
  - 2. Mounting Configuration: Installation to be supported to building structure.
    - a. As indicated on drawings.
    - b. Concealed Type (recessed); bottom to be flush to finished ceiling with finish trim; components above ceiling to be plenum rated.
      - 1) Factory manufactured and finished trim for flush installation to surrounding ceiling construction type. Finish of trim and exposed bottom of case and doors to be of color selected by Architect from full range of manufacturer's colors.
  - 3. Screen Case: Factory constructed for maximum noise free operation offered by manufacturer and as appropriate for mounting configuration.
    - a. Bottom Panel:
      - 1) Slotted opening for screen deployment; removable for service.
  - 4. Color of screen case, hardware and all installation components to be as selected by Architect.
  - 5. Screen Material: Seamless surface.
    - a. Viewing Area Finish:
      - 1) Rear projection; Optical Performance to be not less than a gain of 1.1 with a minimum half-gain viewing angle of 85 degrees. Basis of Design is Da-Lite Screen Co. – Tensioned Large Advantage Deluxe, HD Progressive 1.1.
  - 6. Integral tensioning cable system on each side. Tab guide cable tensioning system to maintain even, lateral tension and hold viewing surface flat.
  - 7. Screen Size:
    - a. Length (Height):
      - 1) Viewing area height to be full length of screen.
      - 2) Screen length to be as required to deploy screen to within 3 feet of finished floor. Refer to Drawings. Adjust fully open stop position accordingly.
    - b. Width:
      - 1) Viewing area width to be determined by height for a 16:9 HDTV Format.

8. Screen Masking Border:
  - a. Black at bottom and 2 sides only. No intermediate or top border. Viewing area finish surface to be full length of screen, except as may be required for secure mounting to roller.
9. Control Stations:
  - a. One for each screen; as indicated on Drawings.

**END OF SECTION**





**SECTION 11 61 15**  
**ACOUSTICAL CLOUDS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Acoustical cloud system.
- B. Related Sections:
  - 1. Division 05 - Metals: Sections indicating Structural Steel and Steel Joist for structural supports for acoustical clouds system.

**1.2 REFERENCES**

- A. American National Standards Institute (ANSI):
  - 1. ANSI A135.4 - Basic Hardboard Standard.
- B. American Society of Civil Engineers (ASCE):
  - 1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures.
- C. Architectural Woodwork Institute (AWI): Quality Manual, 8th Edition.
- D. ASTM International (ASTM):
  - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 2. ASTM C423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 4. ASTM E413 – Classification for Determination of Sound Transmission Class.
- E. National Electrical Manufacturers Association (NEMA):
  - 1. ANSI/NEMA LD 3 – High-Pressure Decorative Laminates.
- F. Underwriters Laboratories, Inc. (UL):
  - 1. UL 723 - Test For Surface Burning Characteristics of Building Materials.

**1.3 DESIGN REQUIREMENTS**

- A. Design acoustical clouds and suspension system, including supplemental framing, under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State in which the Project is constructed.
- B. Design acoustical clouds and hanging accessories to the following:
  - 1. Transfer loads to building structural frame to prevent overloading and damage to building.
  - 2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with ASCE 7.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics per ASTM E84 or UL 723.
  - 1. Flame Spread Index: 25 or less.
  - 2. Smoke Developed Index: 450 or less.

- B. Seismic Performance: Comply with ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads" based upon seismic design criteria indicated.
- C. Acoustical Panel Sound Transmission: Provide acoustical cloud comprised of acoustical cloud panels having the following sound transmission requirements:
  1. Sound Transmission Class (STC): Minimum 50 per ASTM E413.

### 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Manufacturer's data sheets for acoustical cloud.
  1. Provide test results by certified independent testing laboratory indicating compliance with requirements of Performance Requirements article.
  2. Include installation instructions for acoustical clouds.
- C. Shop Drawings: Prepared by manufacturer. Include dimensioned plans and sections, and elevations showing acoustical cloud component sizes, arrangements, and details of each condition of installation. Show fabrication and installation details.
  1. Indicate special fabrication details required to accommodate other work components that penetrate or adjoin acoustical clouds such as lights.
  2. Indicate coordination with related overhead components, including structural elements, rigging, catwalks, lighting, ductwork, piping, and sprinklers.
- D. Samples for Initial Selection: For products with factory-applied finishes, submit two manufacturer's color charts illustrating the full range of finishes, colors and sheens available. For products receiving field-applied finishes, submit color charts illustrating a full range of finishes, colors and sheens. Submit to Architect for initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare two samples for each selected finish and color; on same product material type indicated for final Work; each 8 x 10 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

### 1.6 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 and with minimum five (5) years documented experience.
- C. Source Limitations: Obtain acoustical cloud system and components through one source from a single approved manufacturer.
- D. Field Measurements: Verify layout and the dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings.

### 1.7 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.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver, store, and handle acoustical cloud components in accordance with component manufacturers' recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept units and recommended temperature and humidity levels will be maintained during the remainder of construction.

**1.9 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordination Conference: Prior to fabrication of acoustical clouds, conduct conference at project site to verify coordination requirements with work of related trades. Review acoustical cloud shop drawings in reference to rigging and to adjacent or integral fire protection, plumbing, HVAC, electrical power, lighting, communication, and structural and architectural features.
  - 1. Coordinate requirements for structural supports or pipe battens furnished under other sections and used to support acoustical cloud.

**1.10 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Special Warranty: Manufacturer's written warranty indicating manufacturer's intent to repair or replace acoustical cloud components that fail in materials or workmanship within five (5) years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:
  - 1. Fracturing or breaking of unit components which results from normal wear and tear and normal use other than vandalism.
  - 2. Delamination or other failures of glue bond of components.
  - 3. Warping of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
  - 4. Failure of unit to perform acoustically in accordance with manufacturer's published data.

**PART 2 PRODUCTS****2.1 ACOUSTICAL CLOUDS**

- A. Manufacturers:
  - 1. Wenger Corporation - Diva Acoustical Cloud System. (Basis of Design)
  - 2. Architectural Components Group, Inc.
  - 3. AVL Systems, Inc.
  - 4. Kinetics.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Overhead sound reflecting acoustical cloud consisting of fixed acoustical cloud panels suspended directly from building structure support overhead.
  - 1. Cloud Panel Radius: As indicated.
  - 2. Cloud Panel Size and Configuration: As indicated.
  - 3. Cloud Panel Face Finish: No exposed fasteners.

- a. Painted Hardboard: Opaque, 100 percent acrylic latex, three (3) coats, eggshell finish; color as selected by Architect from full range of options.
- 4. Cloud Edge Framing: Panel edges to be reinforced with extruded aluminum edge frame; color as selected by Architect from full range of options.
- C. Cloud Assembly Suspension: Chain and shackle from each of four corners to overhead supports.
  - 1. Shackles: Rated screw pin shackles.
  - 2. Chain: 3/16 inch (4 mm) Grade 30 proof coil black oxide steel chain.
- D. Miscellaneous Supports: Battens, channels, and other miscellaneous supports are part of the work of Division 05 Section "Metal Fabrications."

## 2.2 MATERIALS

- A. Aluminum Extruded Bars, Profiles, and Tubes: ASTM B221 (ASTM B221M), 6063T alloy.
- B. Hardboard: ANSI A135.4, Class 1 Tempered, Urea Formaldehyde free.
- C. Supplemental Framing: Steel, schedule 40 pipe.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that field measurements are as required.
- C. Verify that surfaces, overhead clearances, building structural support elements and other conditions are ready to accept the work of this Section.
- D. Examine products to be installed for damage and other conditions detrimental to completion of the Work.
- E. 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 acoustical cloud units plumb, level, and true, in accordance with manufacturer's recommendations and approved submittals. Suspend from overhead building structure using specified installation accessories.

### 3.4 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 exposed surfaces of acoustical clouds. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

- C. Repair or replace defective work as directed by Architect upon inspection.

**3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.

**3.6 SCHEDULE**

- A. Auditorium.

**END OF SECTION**



**SECTION 11 61 43**  
**STAGE CURTAINS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes fire retardant stage curtains and rigging.
  - 1. The term “curtains” refers to all hanging fabric items indicated in this Section and includes, but is not limited to, curtains, travelers, valances, masking borders, masking legs, cyclorama hangings, etc.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - 2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate plans, elevations, and detail sections of typical rigging elements. Show anchors, hardware, operating equipment, and other components not included in manufacturer's standard product data.
- C. Product Data: Submit including manufacturer's specifications, assembly and installation instructions, and maintenance recommendations.
- D. Samples: Submit two 12 x 12 inches in size illustrating color and texture of each curtain fabric in color indicated.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Project Record Documents: Record actual locations of installed items.
- C. Operation and Maintenance Data: Submit data for stage curtains and rigging to include in maintenance manuals.

**1.5 QUALITY ASSURANCE**

- A. All equipment in this section and section 11 61 61 THEATRICAL LIGHTING SYSTEMS shall be furnished and/or installed by the theatrical systems integrator. The stage rigging, lighting and drapery systems shall be furnished and installed through an experienced theatrical systems integrator with a minimum of 10 years experience in projects of this scope. The theatrical systems integrator will supervise and act as a source of information to the installing contractor throughout the installation period. The theatrical systems integrator must have been in the business of designing and integrating systems for a period of no less than 10 years, and must provide, as part of their bid package, a listing of three rigging jobs

in similar scope in North and/or South Carolina within the last two years. Bidders who do not provide project lists shall be considered nonresponsive.

- B. Theatrical Lighting System Contractor/Integrator Qualifications: The Theatrical Lighting Contractor must:
1. Be qualified with at least 10 years experience in the installation of systems of similar scope.
  2. Have suitable financial status to meet the obligations of the work.
  3. Have adequate staff trained in the installation of this type of equipment and regularly provide maintenance on this type of equipment.
  4. Provide one person who will be in charge of the project throughout the installation.
  5. Approved System Integrators are listed below. All other interested systems integrators must submit and receive prior approval 7 days before the advertised bid date:

Barbizon Charlotte  
1016 Lelland Ct.  
Charlotte, NC 28206  
Contact: Jeff Montgomerie  
(704) 372-2122

Bandit Lites  
Charlotte, NC  
Contact: Andrew Fisher  
(704) 266-2113

Productions Unlimited  
870 Anderson Ridge Road  
Greer, SC 29651  
Contact: Brian Phillips  
(864) 675-6146

- C. Flame Resistance Requirements: Provide stage curtains which are certified to be flame resistant in accordance with requirements of NFPA 701. Permanently attach label to each curtain indicating whether curtain is permanently and inherently flame resistant, or whether it will require retreatment after dry cleaning.

## 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 five (5) years documented experience approved by manufacturer.

## 1.7 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Special Warranty:
1. Warrant systems and equipment to be free of defective components, faulty workmanship or improper adjustment for a period of two years from the date of Owner's acceptance. Replace items showing evidence of defective materials or workmanship (including installation workmanship) within thirty (30) days after notification. Make replacements without cost to the Owner. Rectify conditions that might present a hazard to human life, well-being and or property within 48 hours of notification.



2. Designate warranties on manufactured equipment to the Owner on the date of system acceptance.

## **PART 2 PRODUCTS**

### **2.1 STAGE CURTAINS**

- A. Manufacturers:
  1. KM Fabrics, Inc. - Memorable. (Basis of Design)
  2. Frankel Associates, Inc.
  3. JB Martin Ltd.
  4. Valley Forge Fabrics, Inc.
  5. Substitutions: Section 01 60 00 - Product Requirements.

### **2.2 COMPONENTS**

- A. Curtain Fabric: Woven Cotton Velour with napped fabric of 100 percent cotton; 54-inch minimum width; not less than 40 backing ends per inch, 40 pile ends per inch, and 32 picks per inch; 640 pile tufts per square inch; 60 percent fullness, and other characteristics as follows:
  1. Heavy Weight: Fabric weighing not less than 25 oz. per linear yard before flameproofing, with pile height of approximately 135 mils.
    - a. Exception: Fabric weighing less than 25 oz. per linear yard is acceptable only for specific items as indicated in this Section.
  2. Color: As indicated in Curtain Schedule at end of this Section.
- B. Lining: Yarn-dyed denim cloth of 100 percent cotton, woven in warp-faced twill; 54-inch minimum width.

### **2.3 CURTAIN TRACKS & PIPE BATTENS**

- A. Main Curtain Track shall be H&H Specialties 400 Series or equivalent.
- B. Rear Velour Curtain Track shall be H&H Specialties 200 Series or equivalent.
- C. All Pipe Battens shall be 1-1/2 inch, Schedule 40, Plain-End Tested Pipe. Internal Bolt-Thru Pipe splices shall be used as needed; threaded couplers shall not be accepted. Pipe battens shall be supported at not less than 10 feet OC and dead hung from structure above.
- D. Hanging hardware: JR Clancy #698 Beam Clamp with two 3/8 x 1 inch, Grade 5 hex bolts, with lock nuts, and a 1/4 inch round pin anchor shackle or as required.
- E. Chains and Trim Chains: Grade 30 Proof coil chain for dead hanging; zinc plated; manufactured to Federal Specification RRC-271-E, 1/4 inch Proof Coil Chain.

### **2.4 ACCESSORIES**

- A. Jack Chain: No. 8 weighing not less than 9 oz per yard for the bottom hems of draperies.
- B. Tie Lines: Solid braided black "venetian blind" or mason cord No .4-1/2 (9/64 inch diameter).

### **2.5 FABRICATION**

- A. Sewing and Fabrication:
  1. Table drapery, as removed from bolts, across an inspection window for detecting weaving flaws and imperfections. Remove and do not incorporate detected flaws.

- Sew all black draperies nap up; color velour nap down. Construct fabrics and draperies as specified herein, unless otherwise noted.
2. Unless specified otherwise herein, sew fabrics with a locked filament polyester core thread in a running interlock stitch and not more than nine stitches per inch. Monofilament thread is not acceptable.
  3. Fabricate the fabric panels to run the height of the various sections without horizontal seams. Box pleat at the top in the fullness listed, exclusive of turn-back facing. Sew pleats on the face side of the drapery and reinforce across the top with jute webbing. Sew the webbing to the top of the drapery with two runs of stitching using a double needle machine with 2.75 inch needle spacing and heavy industrial thread. Locate brass grommets in the center of the webbing width so no horizontal stitching is cut or severed. Locate grommets on each pleat at 12 inches OC for flat sewn and pleated panels. Employ matching thread throughout.
  4. Provide full length drapery items operating from traveler tracks with nickel plated oblong spring harness or carabineer type clips fastened in place by means of heavy nylon or polyester strap double stitched to webbing. Provide and install in grommets other drapery with tie lines for attachment to rigging. Employ black cotton solid braided "venetian blind" or mason cord No. 4-1/2 (9/64 inch diameter), 36 inch long, double knotted and tied as tie lines.
  5. Sew bottom hems 6 inches deep with full length items containing No. 8 jack chain in a separate pocket inside the bottom hem with chain being held 2 inches above extreme bottom of curtain (except where pipe batten weights are called out).
  6. Fabricate so that the bottom edge of the face fabric and lining is within 0.25 inch parallel with the top edge of the drapery, for true hanging across full width.
  7. Sew lining in the same fullness as the face fabric with side hems 1 inch wide. Fabricate so the lining is sewn inside the bottom hem of the face fabric to prevent catching air when the curtain descends. Lace the sides of the lining to the inside of the side hems of the face fabric with 1 inch wide webbing. 1 inch webbing loops are sewn to both the face fabric and lining at 9 inches OC and the lacing webbing runs through the loops loosely connecting the face fabric to the lining. Provide two 6 inch tucks in lining no more than 36 inches from the bottom of the curtain to allow for a total adjustment of 12 inches in the lining height due to shrinkage. For curtain less than 10 feet high, provide one shrinkage tuck.
- B. Construction: Refer to materials specified in this Section and include materials indicated in Curtain Schedule at end of this Section.
1. Main Curtain Travelers (Grand Drape) and Main Valance:
    - a. Fabricate in two lined panels to provide for bi-parting action. Finish each panel to the dimensions and fullness indicated in Curtain Schedules.
    - b. Provide lining (if indicated in Curtain Schedule) as indicated in "Sewing and Fabrication" paragraphs above.
    - c. Face back the center edges of each panel with a 1/2 width of fabric. Stop the lining (if indicated in Curtain Schedule) at the edge of this turnback as indicated in "Sewing and Fabrication" paragraphs above.
    - d. Face back the offstage edges of each panel with at least 2 inches of fabric.
    - e. Fabricate the top of each panel with face material pleats 12 inches OC. Reinforce tops with jute webbing with brass grommets 12 inches OC.
    - f. Fabricate the bottom of each panel with a 6 inch double-turned hem with No. 8 jack chain inserted in a separate pocket 2 inches above the finish floor and placed inside the hem.
  2. Rear Curtain Travelers:
    - a. Fabricate in two panels to provide for bi-parting action. Finish each panel to the dimensions and fullness indicated in Curtain Schedules.

- b. Provide no lining.
  - c. Face back the center edges of each panel with a 1/2 width of fabric.
  - d. Face back the offstage edges of each panel with at least 2 inches of fabric.
  - e. Fabricate the top of each panel with face material pleats 12 inches OC. Reinforce tops with jute webbing with brass grommets 12 inches OC.
  - f. Fabricate the bottom of each panel by sewing a No. 8 jack chain inside the bottom pocket. Line batten pocket with No. 8 canvas duck. Provide hook and loop fastener closures for pocket ends.
3. Rear Curtain Border:
- a. Fabricate each panel finished to the dimensions and fullness indicated in the Curtain Schedule.
  - b. For curtains with fullness indicated, sew a No. 8 jack chain inside the bottom hem.
  - c. Reinforce tops with jute webbing with brass grommets 12 inches OC and double grommets at both ends. Secure to batten with 36 inch, #4 black cotton tie lines.
- C. Signage:
- 1. Signage to be legible both in construction and grammar utilizing the English Language.
  - 2. Mark the centerline of the jute webbing with indelible marker. Use a white tie line on the centerline grommet.
  - 3. Sew a white fabric label on the upper right and left corners of the jute webbing of the drape with the following information:
    - a. Item Name.
    - b. Item Number.
    - c. Dimensions.
    - d. Fullness.
    - e. Date of Manufacture.
    - f. Manufacturer.
- D. Steel Tracks, General: Fabricate of not less than 0.075-inch (14-gage) nominal thickness galvanized roll-formed steel, with continuous bottom slot, and with each half of track in one continuous piece.
- 1. Provide curtain carriers for track spaced at 12 inches oc.
- E. Heavy-Duty Track: Equip track with heavy-duty live-end double pulley and heavy-duty dead-end single pulley, with 5-inch cast-iron or nylon wheels on ball bearings, enclosed in steel housings. Provide curtain carriers of molded nylon with a pair of neoprene- or nylon-tired ball-bearing wheels riveted parallel to body. Equip carriers with neoprene or rubber bumper, heavy-duty swivel eye, and trim chain for attaching curtain snap or S hook. Provide end stops for track and adjustable floor block designed to maintain proper tension on 3/8-inch stretch-resistant operating line of braided polypropylene or fiber-glass center cord.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that inserts, clips, blocking, and other supports are installed and 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. Furnish layouts for inserts, clips, or other supports required to be installed by other trades to support tracks and battens.

### **3.3 INSTALLATION**

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. All curtains and accessories require dead-hung installation. Provide hanging schedule for approval by Architect prior to installation.
- C. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by special lap clamps.
- D. Secure curtains to track carriers with track manufacturer's special heavy-duty S-hooks or snap hooks.

### **3.4 ADJUSTING**

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust track and carriers to provide smooth operation of curtains.

### **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 DEMONSTRATION AND TRAINING**

- A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of component of the installed Work.

### **3.8 CURTAIN SCHEDULE**

- A. Main Curtain Travelers (Grand Drape):
  - 1. Color: FULL RANGE OF COLORS
    - a. KM Fabrics - As selected by Architect.
  - 2. 100 % cotton velour.
  - 3. 25 oz. per lineal yard.
  - 4. Flame retardant treated.
  - 5. 60% fullness.
  - 6. Lining: None
  - 7. Quantity and Size:
    - a. Two (2) each; 21 feet wide x 18 feet high; field verify all dimensions.
- B. Main Valance:
  - 1. Color: FULL RANGE OF COLORS
    - a. KM Fabrics - As selected by Architect.
  - 2. 100 % cotton velour.
  - 3. 25 oz. per lineal yard.
  - 4. Flame retardant treated.

5. 60% fullness.
  6. Lining: None
  7. Quantity and Size:
    - a. One (1) each; 40 feet wide x 6 feet high; field verify all dimensions.
- C. Rear Curtain Travelers:
1. Color: BLACK
    - a. KM Fabrics - Black.
  2. 100 % cotton velour.
  3. 22 oz. per lineal yard.
  4. Flame retardant treated.
  5. 60% fullness.
  6. Quantity and Size:
    - a. Two (2) each; 18 feet wide x 18 feet high; field verify all dimensions.
- D. Rear Curtain Boarder:
1. Color: BLACK
    - a. KM Fabrics - Black.
  2. 100 % cotton velour.
  3. 22 oz. per lineal yard.
  4. Flame retardant treated.
  5. 60% fullness.
  6. Quantity and Size:
    - a. One (1) each; 40 feet wide x 5 feet high; field verify all dimensions.
- E. Battens
1. Provide battens for all stage curtains in Curtain Schedule above.
  2. Additionally, provide battens for the following:
    - a. One (1) each; battens for front of house (FOH) lighting/electrical (one electric)
    - b. Three (3) each; battens for on-platform lighting/electrical (two each electric)
    - c. Six (6) each; additional dead hung open battens
- F. Refer to Drawing A-404 for auditorium and platform section.
1. Provide shop drawing of hanging final hanging schedule.

**END OF SECTION**



**SECTION 11 61 61****THEATRICAL LIGHTING SYSTEMS****PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. Related Documents are the Terms and Conditions of the General Contract, the Theatrical Lighting Drawings, the AV Drawings, the Architectural Drawings, the Electrical Drawings, and Sections of the General Contract relating to finishes.
- B. All parts of the installation shall conform to all local building code requirements.
- C. Work of this section shall be coordinated with work of the general building contract. It is the intent of this section to provide Theatrical Lighting Systems that are complete in every respect in accordance with commonly accepted industry standards, as set forth in this section, and as coordinated with related work in other sections.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Provision of Theatrical Lighting Systems equipment for installation by the Theatrical Lighting System Contractor.
  - 2. Low voltage control cable related to the Theatrical Lighting System.
  - 3. Provision of a Motorized Front-of-House Lighting Hoist.
  - 4. Proper handling and on site storage of equipment prior to installation.
  - 5. Demonstration of the System as described to the Owner and Architect, fully installed and tested.
  - 6. Verification of dimensions and conditions at job site prior to equipment installation. Coordinate with all associated trades.
- B. Any additional materials, equipment, or services needed in order to meet the general requirements stated above, even if not specifically mentioned in these specifications or on the related drawings, shall be provided by the Theatrical Lighting System Contractor without claim for additional payment.

**1.3 SYSTEM DESCRIPTION**

- A. Provide all items, articles, materials, and operations listed, mentioned, scheduled, or reasonably inferred from the Contract Documents, including tools, scaffolding, labor, supervision, and incidentals necessary and required for the satisfactory completion of the work.
- B. Verify all field conditions and dimensions in the Drawings before commencing the work. Verify all measurements at the building site that may be required for correct installation. Bring any and all supposed discrepancies and/or questions to the attention of the Architect before commencing any work. Discrepancies and/or omissions in the Contract Documents shall in no way be construed as authority to deviate from the intent of this section.
- C. The work includes all drilling, fitting, and operations of similar character required for securing and setting the materials in place, and all cutting and fitting required in connection with the securing of the rigging materials and equipment to the adjoining work.
- D. The system shall be designed for the control of architectural and theatrical lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, power supplies, breakers, terminals and/or control electronics.

- E. The dimming equipment provider shall provide supervision and assistance to the Division 26 installing Electrical Contractor.
- F. System shall work in conjunction with the specified low-voltage control stations.
- G. Deficiencies in the work shall be rectified upon order from the Architect. Equipment found not meeting the contract requirements shall be immediately removed from the job site and equipment meeting the requirements shall be immediately substituted at no additional cost.

#### 1.4 WORK EXCLUDED FROM THIS SECTION

- A. All building wire, conduit, switchgear and high voltage (>70V) termination related to the Theatrical Lighting System to be provided and installed by the Division 26 Electrical Contractor.
- B. All low voltage (<70V) lighting control wire to be furnished by Theatrical Lighting System Contractor and installed by the Division 26 Electrical Contractor.
- C. Provision of any additional structural elements required for mounting the Motorized Front-of-House Hoist.

#### 1.5 SUBMITTALS

- A. Provide 4 copies of the complete submittal package.
- B. Product Data: Include types, styles, materials, operating instruction, and maintenance recommendations.
- C. Shop Drawings: Submit for action. Show fabrication and installation of the Work. Include the following.
  - 1. Submittal shall consist of shop drawings, cut sheets, and maintenance manuals for the supplied equipment.
  - 2. Layout of stage electrics and front-of-house hoist system and support to structure.
  - 3. Extent of required operating clearances.
  - 4. Provide all drawings in printed form on sheets no smaller than 11" x 17" and on a CD in .pdf format.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of at least 10 completed projects with project names and addresses, names and addresses of architects and owners, and any other specified information.
- E. Closeout Submittals: Submit the following to the Owner.
  - 1. Provide the architect with 4 sets of operation and maintenance manuals bound in 3 ring binders.

#### 1.6 QUALITY ASSURANCE

- A. All equipment in this section and section 11 61 43 STAGE CURTAINS shall be furnished and/or installed by the theatrical systems integrator. The stage rigging, lighting and drapery systems shall be furnished and installed through an experienced theatrical systems integrator with a minimum of 10 years experience in projects of this scope. The theatrical systems integrator will supervise and act as a source of information to the installing contractor throughout the installation period. The theatrical systems integrator must have been in the business of designing and integrating systems for a period of no less than 10 years, and must provide, as part of their bid package, a listing of three rigging jobs in similar scope in North and/or South Carolina within the last two years. Bidders who do not provide project lists shall be considered nonresponsive.



- B. Theatrical Lighting System Contractor/Integrator Qualifications: The Theatrical Lighting Contractor must:
1. Be qualified with at least 10 years experience in the installation of systems of similar scope.
  2. Have suitable financial status to meet the obligations of the work.
  3. Have adequate staff trained in the installation of this type of equipment and regularly provide maintenance on this type of equipment.
  4. Provide one person who will be in charge of the project throughout the installation.
  5. Approved System Integrators are listed below. All other interested systems integrators must submit and receive prior approval 7 days before the advertised bid date:
    - Barbizon Charlotte  
1016 Lelland Ct.  
Charlotte, NC 28206  
Contact: Jeff Montgomerie  
(704) 372-2122
    - Bandit Lites  
Charlotte, NC  
Contact: Andrew Fisher  
(704) 266-2113
    - Productions Unlimited  
870 Anderson Ridge Road  
Greer, SC 29651  
Contact: Brian Phillips  
(864) 675-6146
- C. Regulatory Requirements: Comply with all applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.
- D. The dimming equipment provider shall provide supervision and assistance to the Division 26 installing Electrical Contractor.
- E. The dimming equipment manufacturer shall be one who has been continuously engaged in the manufacture of lighting control equipment for a minimum of ten years. All dimmer and cabinet fabrication must take place in a U.S. manufacturing plant.
- F. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theatre Technology. Approved equipment shall be so labeled on delivery to the job site.
- G. The dimming and control system shall be manufactured by Electronic Theatre Controls, Inc., 3030 Laura Lane, Middleton, Wisconsin. (No Substitutions Allowed)
- H. The theatrical lighting cables and accessories shall be manufactured by Electronic Theatre Controls, Inc., by SSRC, Duncan, South Carolina and by Lex Products, Sun Valley, CA (No Substitutions Allowed).
- I. The theatrical distribution equipment shall be manufactured by Electronic Theatre Controls, Inc. and by SSRC, Duncan, South Carolina. (No Substitutions Allowed)
- J. Single Source Responsibility: Obtain materials from a single manufacturer for each different product required.

- K. Alternative manufacturers must submit a full pre-approval package 10 days prior to the bid date. Acceptance or refusal of alternate manufacturers is the responsibility of the architect and his consultant.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver materials in manufacturer's original packaging with label indicating pertinent information identifying the item. Store materials in accordance with manufacturer's instructions in a protected dry location off ground. Do not open packaging nor remove labels until time of installation.

## 1.8 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Existing Conditions: Field measure at location of the Work prior to preparation of the shop drawings. Include measurements of adjacent construction to which the Work must fit. Coordinate construction to ensure that actual opening dimensions correspond to fabricated dimensions of the Work. Allow for trimming and fitting.
  - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

## PART 2 PRODUCTS

### 2.1 RACK ENCLOSURES

- A. The control enclosure shall be the Unison DRd Series Rack Enclosure as manufactured by Electronic Theatre Controls, Inc.
- B. The Rack Enclosure shall be a surface mounted, deadfront switchboard, constructed of 18-gauge formed steel panels with a hinged, lockable full-height door containing an integral electrostatic air filter. Control Enclosures shall be sized to accept one Control Processor, options and accessories.
- C. All rack components shall be properly treated and finished.
  - 1. Exterior surfaces shall be finished in fine textured, scratch-resistant, epoxy paint.
- D. The fully digital rack enclosure shall be available with six or twelve dimmer module spaces, one processor and a single station power supply.
- E. A single low-noise fan shall be located at the top of each rack. The fan shall draw all intake air through the integral electrostatic air filter, over the surfaces of the module housing and out the top of the rack.
- F. Control Enclosures shall be available in 100, 120, 230, 240, and 277 volt configurations.
- G. Rack enclosures shall be completely pre-wired by the manufacturer. The contractor shall provide input feed, load, and control wiring.
- H. All control wire connections shall be terminated via factory provided connectors.
- I. External Processing enclosures shall be designed to support the wire terminations for AC (single phase), Echelon link power, 24Vdc, configurable DMX512A (In or Out), DMX512A Output, RS232 Serial In/Out, Unshielded Twisted Pair (UTP) Category 5/5e, 4x Contact Closure In, and 4x Contact Closure Out.

## 2.2 CONTROL PROCESSOR MODULE

- A. The Architectural Control Processor shall be the Unison Paradigm P-ACP Series Control Processor as manufactured by Electronic Theatre Controls, Inc., or equal.
- B. The Architectural Control Processor (ACP) assembly shall be designed for use in DRd Series Dimming Enclosures and ERn Series Control Enclosures.
- C. The processor shall utilize microprocessor based, solid state technology to provide multi-scene lighting and building control.
  - 1. ACP shall support functions such as station programming, macro sequencing, electronic lockout, room combine and astronomical time clock events. ACP station processor shall allow configuration of the control system via the menus. See software section for additional system details.
  - 2. When used in a dimming enclosure, the ACP shall allow access to dimming control menus including the status screen, dimming configuration screen, backup menu, test menu and configuration menu.
- D. One ACP shall be rated to drive 1024 channels of control, 1024 zones, 64 rooms, 512 presets, 62 button or button/fader stations and 6 Touchscreen Stations
- E. ACP module electronics shall be convection cooled.
- F. The ACP shall provide front-panel RJ45 jack, Secure Digital (SD) card slot, and Universal Serial Bus (USB) Port for configuration and data exchange.
- G. Architectural Lighting System configuration and program information shall be stored in flash memory, which does not require battery backup.
- H. The ACP shall be contained in a plug-in assembly and require no discrete wiring connections; all wiring shall be terminated into Dimming or Control Enclosure.
  - 1. The ACP shall support the following communications:
    - a. Echelon LinkPower
    - b. 10/100BaseTX, auto MDI/MDIX, 802.3af compliant Ethernet networking with TCP/IP, ESTA BSR E1.17 Advanced Control Networks (ACN) and ESTA BSR E1.31 (sACN) Protocols
    - c. EIA-232 serial protocol
    - d. ESTA DMX512A, configurable as input or output ports
    - e. Dry contact closure inputs
    - f. Dry contact closure outputs, rated at 1A@30VDC

## 2.3 LIGHTING CONSOLE AND ACCESSORIES

- A. General
  - 1. The lighting control console shall be a microprocessor-based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems. The console shall be the ColorSource 40 as manufactured by Electronic Theatre Controls, Inc., or equal.
  - 2. The system shall provide control of 512 DMX512A addresses on a maximum of forty (40) or eighty (80) control channels. Any or all of the DMX512A outputs may be controlled by a channel.
  - 3. A maximum of 999 cues may be contained in non-volatile electronic memory.
  - 4. Twenty (20) or forty (40) faders shall provide access to individual intensity channels, intensity for devices as well as playbacks.
  - 5. Four (4) configurable faders shall provide functionality for output of bump buttons, cue list control or crossfade control.

6. The console shall have one (1) built-in 7" color multi-touch touchscreen. The touchscreen shall provide the primary interface for system configuration, programming show data and multi-parameter control.
7. Six (6) softkey buttons shall be provided, five of which may be configured by the user.
8. Console shall be equipped with an on-board help system, with on-board tutorial videos.
9. Console shall not require the use of an external monitor for normal use.
10. Console software upgrades shall be made by the user via USB drive. Changing internal components shall not be required.
11. The console shall provide a USB port allowing show data to be saved for archival or transfer to other consoles or a personal computer.
12. Systems that do not provide the above capabilities shall not be acceptable.
13. Controls and Playback
  - a. Patching
    - 1) The console shall provide patching facilities for dimmers and multi-parameter devices via a built in library of fixture definitions. The fixture library shall be updated via software based updates. It shall be possible to create custom fixture definitions using an offline application.
    - 2) The console shall support patching, address setting, and mode changes using Remote Device Management (RDM) on the local DMX/RDM port.
  - b. Channel or Playback Faders
    - 1) Twenty (20) or forty (40) proportional, fully overlapping faders shall be provided with 45mm potentiometers and bump buttons.
    - 2) The faders shall provide direct manual control of intensity for all channels. Channel levels can be changed at any time by using the individual channel faders or through the use of the touch screen interface
      - a) Faders shall also control up to ten (10) pages of twenty (20) (or forty (40)) recordable memories or sequences. Memories shall record user-selected channel levels. Sequences shall record user-selected memories or channel levels.
        - (1) With color mixing systems, output of color from fixtures shall appear to be a combination of the active memories in a color space.
  - c. Programming Tools
    - 1) The console shall provide a 7" color multi-touch touchscreen with six (6) softkeys, as well as touch-based controls. The LCD shall provide system configuration, programming show data and multi-parameter control.
    - 2) Touch-based tools shall include:
      - a) Forty (40) programmable color chips and color picker.
      - b) Touch-based parameter controls.
      - c) Virtual Level/Rate wheel.
      - d) Virtual keypad for level entry.
      - e) Customizable channel display using Stage Map. It shall be possible to rearrange the graphical representations for control channels to closely mimic the positions of fixtures in the venue.
      - f) Effects (intensity, color, shape, and parameter)
        - (1) It shall be possible to assign multiple effects to the same channel and parameters. The playback of those effects shall play levels back relative to the combination of the two effects
    - 3) Fixture selection shall be made via:
      - a) Auto fixture selection on fader moves.

- b) Pressing the selection button under channel faders.
  - c) Touching the channel icon in the stage map display on the touch screen.
  - d) Fixture Tags for Quick Selects
    - (1) Selection of multiple fixture shall be possible through a special controls dock that groups channels together based on the channel tile positions within a pre-defined area in the topographical view for channels.
    - (2) Selection shall be possible through the use of informational tags. Selecting a predefined tag selects all fixtures sharing that same tag. At least two tags may be assigned to any one channel.
    - (3) There shall be at least 27 Quick Select groupings.
  - 4) Two independent channels shall be provided with on/off functionality. Independents shall be patched in a location separate from patch.
  - d. Playback Controls
    - 1) A cue list of up to 999 cues shall be provided. Cues may be made up of channel levels and parameter settings or contain a reference to a recorded memory. Cues shall be editable and shall be able to be individually deleted and inserted.
    - 2) Playback Toy for filtered and timed execution of playbacks.
    - 3) Multiple bump modes (Flash, Solo, SoloChange, Move/GO)
    - 4) Full history rubberbanding for playbacks
- B. Interface Options
- 1. The console shall provide connectors for the following:
    - a. 12V AC or DC input for external power supply
    - b. DMX512-A/RDM output (one (1) 5-pin XLR connector)
    - c. USB connection (one (1) type A connector)
- C. Physical
- 1. All operator controls and console electronics shall be housed in a single desktop console
  - 2. Size and weight:
    - a. Twenty (20) fader console shall be equal to or less than 18.31" (465mm) wide 11" (279mm) deep 2.36" (60mm) high (including controls), and 6.9 lbs. (3.13 kg.)
    - b. Forty (40) fader console shall be equal to or less than 26.31" (668mm) wide 11" (279mm) deep 2.36" (60mm) high (including controls) and 9.55 lbs. (4.33kg).
  - 3. Twenty (20) fader console shall be able to be mounted into a 19" equipment rack with the use of additional mounting hardware
  - 4. Console power shall be 12V AC or DC via an external power unit. The power unit shall operate with 90-265VAC line voltage, 50 or 60Hz. Console is provided with a universal power supply

## 2.4 DATA PLUG-IN STATIONS

- A. General
- 1. The Plug-in Stations shall consist of the appropriate connectors required for the functional intent of the system. Custom combinations and control connectors shall be available.
  - 2. The following standard connectors shall be available:
    - a. 5-Pin male XLR connectors for DMX input
    - b. RJ45 connectors for ETCNet connections - Twisted Pair

3. Station faceplates shall be .80" aluminum, finished in fine texture, scratch-resistant black powder coat. Silk-screened graphics shall be white. The station panel shall mount into an industry standard back box, depending on size and quantity of connectors. A terminal block shall be supplied for contractor terminations.

## 2.5 ARCHITECTURAL CONTROL BUTTON, BUTTON/FADER STATIONS

- A. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.
- B. Mechanical
  1. Unison Heritage Button and Button/Fader Stations shall operate using up to sixteen programmable faders and twelve programmable buttons.
  2. All button/fader stations shall be available with white, cream, ivory, gray or black faceplates, fader knobs, and buttons.
    - a. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
  3. Stations shall have indicator lights at each button or fader.
    - a. Indicators shall be comprised of red, green and blue LED's
    - b. Indicator color and state (steady On, Blink, Off) shall be configured in software, and shall operate relative to the button or fader it is associated with.
  4. All faceplates shall be designed for flush or surface mounting.
  5. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
  6. Station faceplates shall be indelibly marked for each button or fader function.
  7. The manufacturer shall supply back boxes for flush mounted half gang stations and for all surface mounted stations.
- C. Functional
  1. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
  2. Station Button, Button/Fader, and Interface) control components shall be designed to operate standard default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the Windows-based configuration program.
  3. Stations (Button and Button/Fader) shall allow programming of station and component electronic lockout levels via LightDesigner.
- D. Electrical
  1. Unison control station wiring shall be an Echelon® Link power network.
    - a. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).
    - b. Touchscreen and Interface stations shall also require (2) #16 AWG stranded wires for 24Vdc operating power. 24Vdc wiring shall be topology free.
    - c. Network wiring may be bus, loop, home run, star or any combination of these.
    - d. Network insulation displacement connectors shall be provided with all stations.

## 2.6 POWER DISTRIBUTION EQUIPMENT

- A. Outlet and Pigtail Boxes
  1. Connectors shall be available as 20A, 50A and 100A grounded stage pin, 20A twist lock and 20A "U" ground (dual rated "T-slot"); other connectors shall be available as specified.

2. Outlet and pigtail boxes shall be supplied with appropriate brackets and hardware for mounting as shown on the drawings.
3. A low voltage distribution system shall be available to incorporate DMX, Ethernet or other protocols as specified in the power distribution box.
4. Internal wiring shall be sized to circuit ampacity.
5. Circuits shall be labeled with 1.25" lettering.

## 2.7 THEATRICAL FIXTURES

- A. A. Ellipsoidal: Color mixing Light Emitting Diode Profile Fixture:
  1. General:
    - a. The fixture shall be a color-mixing high-intensity LED illuminator with DMX control of intensity and color. The fixture shall be a ColorSource Spot or ColorSource Spot Deep Blue as manufactured by Electronic Theatre Controls, Inc. or approved equal.
    - b. All LED fixtures shall be provided by a single manufacturer to ensure compatibility.
    - c. The fixture shall be UL 1573 listed for stage and studio use
    - d. The fixture shall comply with the USITT DMX-512A standard.
  2. Physical:
    - a. The unit shall be constructed of rugged, die cast aluminum, free of burrs and pits, finished in black.
    - b. The following shall be provided:
      - 1) Lens secured with silicone shock mounts.
      - 2) Shutter assembly shall allow for +/-25° rotation.
      - 3) 20 gauge stainless steel shutters.
      - 4) Interchangeable lens tubes for different field angles with Teflon guides for smooth tube movement.
      - 5) Sturdy integral die cast gel frame holders with two accessory slots, and a top-mounted, quick release gel frame retainer.
      - 6) Rugged steel yoke with two mounting positions allowing 300°+ rotation of the fixture within the yoke.
      - 7) Positive locking, hand operated yoke clutch.
      - 8) Slot with sliding cover for motorized pattern devices or optional iris.
    - c. The housing shall have a rugged black powder coat finish.
    - d. Power supply, cooling and electronics shall be integral to each unit.
    - e. The unit shall ship with:
      - 1) Theatrical-style hanging yoke as standard.
      - 2) 5' Neutrik PowerCon™ to Edison power cable as standard.
      - 3) Gate diffuser.
      - 4) A-size pattern holder.
    - f. Available options shall include but not be limited to:
      - 1) Bare-end, Stage-Pin or Twist-lock type-equipped power leads.
      - 2) PowerCon to PowerCon cables for fixture power linking.
      - 3) Smooth Wash Diffuser for overlapping beams of light from multiple fixtures.
  3. Optical:
    - a. The light beam should have a 2-to-1 center-to-edge drop-off ratio.
    - b. The unit shall provide, but not be limited to:
      - 1) Low gate and beam temperature.
      - 2) Sharp imaging through a three-plane shutter design.
    - c. The unit shall provide, but not be limited to:
      - 1) High-quality pattern imaging

- 2) Sharp shutter cuts without halation
- 3) Shutter warping and burnout in normal use shall be unacceptable
- 4) Adjustable hard and soft beam edges
- d. 19, 26, 36, and 50 degree units shall have optional lens tubes available for precision, high-contrast imaging.
- e. Shall work with S4 LED CYC and Fresnel adapters
4. Environmental and Agency Compliance:
  - a. The fixture shall be ETL and cETL LISTED and/or CE rated, and shall be so labeled when delivered to the job site.
  - b. The fixture shall be UL LISTED to the UL1573 standard for stage and studio use.
  - c. The fixture shall be rated for IP-20 dry location use.
5. Thermal
  - a. Fixture shall be equipped with a cooling fan.
  - b. The fixture shall utilize advanced thermal management systems to maintain LED life to an average of 70% intensity after 50,000 hours of use.
    - 1) Thermal management shall include multiple temperature sensors within the housing to include:
      - a) LED array circuit board temperatures
      - b) Fixture ambient internal temperature
  - c. The fixture shall operate in an ambient temperature range of -20°C (-4°F) minimum, to 40° C (104°F) maximum ambient temperature.
6. Electrical:
  - a. The fixture shall be equipped with a 100V to 240V 50/60Hz internal power supply.
  - b. The fixture shall support power in and thru operation.
    - 1) Power in shall be via Neutrik® PowerCon™ input connector.
    - 2) Power thru shall be via Neutrik ® PowerCon™ output connector.
    - 3) Fixture power wiring and accessory power cables shall be rated to support linking of multiple fixtures up to the capacity of a 15A breaker.
  - c. The fixture requires power from a non-dim source.
  - d. Fixtures shall have droop compensation to prevent thermal shift of color or intensity
  - e. Power supply outputs shall have self-resetting current-limiting protection.
  - f. Power supply shall have power factor correction.
7. LED Emitters:
  - a. The fixture shall contain a minimum of four different LED colors to provide color characteristics as described in the Color Section below.
  - b. All LEDs used in the fixture shall be high brightness and proven quality from established and reputable LED manufacturers.
  - c. Fixture shall utilize Luxeon® Rebel™ LED emitters.
  - d. Manufacturer of LED emitters shall utilize an advanced production LED binning process to maintain color consistency.
  - e. LED emitters should be rated for nominal 20,000-hour LED life to 70% intensity.
  - f. All LED fixtures (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing.
  - g. LED system shall comply with all relevant patents.
8. Calibration:
  - a. Fixture shall be calibrated at factory for achieve consistent color and intensity output between fixtures built at different times and/or from different LED lots or bins.



- 1) Calibration data shall be stored on the control card as a permanent part of on-board operating system.
  - 2) All arrays, including replacement arrays shall be calibrated to the same standard to insure consistency.
  - 3) Fixtures not offering LED calibration shall not be acceptable.
  - b. The fixture shall utilize a minimum of 60 LED emitters
    - 1) These emitters shall be made up of Red, Green, Indigo and Lime for ColorSource Deep Blue
9. Dimming:
- a. The LED system shall use 15-bit nonlinear scaling techniques for high resolution dimming.
  - b. The fixture shall utilize an Incandescent dimming curve.
  - c. Dimming curve shall be optimized for smooth dimming over longer timed fades.
  - d. The LED system shall be digitally driven using high-speed pulse width modulation (PWM).
  - e. LED control shall be compatible with broadcast equipment in the following ways:
    - 1) PWM control of LED levels shall be imperceptible to video cameras and related equipment.
    - 2) PWM rates shall be adjustable by the user at the fixture if necessary to avoid any visible interference to video cameras and related equipment.
10. Control and User Interface:
- a. The fixture shall be USITT DMX 512A-compatible via In and Thru 5-pin XLR connectors.
  - b. The fixture shall be compatible with the ANSI RDM E1.20 standard.
    - 1) All fixture functions shall accessible via RDM protocol for modification from suitably equipped control console.
    - 2) Temperature sensors within the luminaire shall be viewable in real time via RDM.
    - 3) Fixtures not offering RDM compatibility, feature set access or temperature monitoring via RDM shall not be compatible.
  - c. The fixture shall be equipped with a 7-segment display.
  - d. The fixture shall be equipped with a three-button user-interface.
  - e. The fixture shall be controlled via RGB data input
    - 1) 5-channel footprint (IRGBS).
    - 2) A variable-rate strobe channel shall be provided.
  - f. The fixture shall offer stand-alone functionality eliminating the need for a console.
    - 1) Fixture shall ship with 12 preset colors accessible as a stand-alone feature.
    - 2) Fixture shall ship with 5 sequences accessible as a stand-alone feature.
    - 3) Each color and sequence can be modified by the end user via RDM
    - 4) Fixtures can be linked together with standard DMX cables and controlled from designated master fixture
    - 5) Fixtures in a stand-alone state shall restore to the settings present prior to power cycling, eliminating the need for reprogramming
    - 6) Fixtures that do not provide regulated and protected operation modes are not acceptable.
- B. Color mixing Light Emitting Diode Wash fixture:
1. General:
    - a. The fixture shall be a color-mixing LED fixture with DMX control of intensity as well as color changing. The fixture shall be a ColorSource Par or

- Coloursource Par Deep Blue as manufactured by Electronic Theatre Controls, Inc. or approved equal.
- b. All LED fixtures shall be provided by a single manufacturer to ensure compatibility.
  - c. The fixture shall be UL 1573 listed for stage and studio use
  - d. The fixture shall comply with USITT DMX-512 A.
2. Physical:
- a. The unit shall be black in color and contained in a rugged all-metal extruded and formed-metal housing, free of burrs and pits.
  - b. Power supply, cooling and electronics shall be integral to each unit.
  - c. Fixture housing shall provide two easy-access slots for secondary lenses and other accessories:
    - 1) Slots shall be equipped with locking retaining clip.
  - d. The unit shall ship with:
    - 1) Theatrical-style hanging yoke as standard.
    - 2) 5' power lead with Edison connector as standard.
  - e. Available options shall include but not be limited to:
    - 1) Floor stand conversion Kit.
    - 2) Bare-end, Stage-Pin or Twist-lock type-equipped power leads
    - 3) PowerCon to PowerCon cables for fixture power linking
    - 4) Multiple secondary lens options to include multiple angles.
  - f. Light output shall be via a round aperture:
    - 1) Aperture and accessory slots shall accommodate standard 7.5" accessories such as used in other similar-sized fixtures.
    - 2) Accessories available as options.
3. Environmental and Agency Compliance:
- a. The fixture shall operate in an ambient temperature range of 1°C minimum, to 40° C (104°F) maximum ambient temperature. The fixture shall be rated for IP-20 dry location use.
  - b. The fixture shall utilize advanced thermal management systems for long LED life.
  - c. The fixture shall be ETL and cETL LISTED, and shall be so labeled when delivered to the job site. The fixture shall be ETL LISTED to UL1573.
4. ELECTRICAL:
- a. The fixture shall be equipped with 100V to 240V 50/60 Hz internal power supply.
  - b. The fixture shall receive power via Neutrik® PowerCon™ input connector.
  - c. The fixture requires power from non-dim source.
  - d. Power/data supply outputs shall have current limiting protection.
  - e. Power/data supply shall come with a housing that meets a minimum IP20 rating for dry location installation.
5. LED Emitters:
- a. The fixture shall contain 4 different LED colors to provide color characteristics as described in Section H below.
  - b. All LEDs used in the fixture shall be high brightness and proven quality from established and reputable LED manufacturers.
    - 1) Fixture shall utilize Luxeon® Z™ LED emitters
  - c. Manufacturer of LED systems shall utilize an advanced production LED binning process to maintain color consistency.
  - d. LED emitters should be rated for nominal 20,000 hour LED life.
  - e. All LED fixtures (100% of each lot) shall undergo a minimum eight-hour burnin test during manufacturing.

- f. LED system shall comply with all relevant patents.
- 6. CALIBRATION:
  - a. Fixture shall be calibrated at factory for achieve consistent color between fixtures built at different times and/or from different LED lots or bins.
    - 1) Calibration data shall be stored in the fixture as a permanent part of on-board operating system
    - 2) All arrays, including replacement arrays shall be calibrated to the same standard to insure consistency
    - 3) Fixtures not offering LED calibration shall not be acceptable
- 7. COLOR:
  - a. The fixture shall utilize an minimum of 40 LED emitters
    - 1) These emitters shall be made up of Red, Green, Blue and Lime for ColorSource
    - 2) These emitters shall be made up of Red, Green, Indigo and Lime for ColorSource Deep Blue
- 8. DIMMING:
  - a. The LED system shall use 15-bit nonlinear scaling techniques for high-resolution dimming.
  - b. The dimming curve shall be optimized for smooth dimming over longer timed fades.
  - c. The LED system shall be digitally driven using high-speed pulse width modulation (PWM).
  - d. LED control shall be compatible to broadcast equipment.
    - 1) PWM control of LED levels shall be imperceptible to video cameras and related equipment
  - e. The LED system shall be digitally driven using high-speed pulse width modulation (PWM)
- 9. CONTROL AND USER INTERFACE:
  - a. The fixture shall be USITT DMX 512A-compatible via **In** and **Thru** 5-pin XLR connectors
  - b. The fixture shall be compatible with the ANSI RDM E1.20 standard
    - 1) All fixture functions shall accessible via RDM protocol for modification from suitably equipped control console
    - 2) Temperature sensors within the luminaire shall be viewable in real time via RDM
    - 3) Fixtures not offering RDM compatibility, feature set access or temperature monitoring via RDM shall not be compatible
  - c. The fixture shall be equipped with a 7-segment display for easy-to-read status and control
  - d. The fixture shall be equipped with a three-button user-interface
  - e. The fixture shall offer RGB control
  - f. The fixture shall operate in Regulated mode for droop compensation
  - g. The fixture shall offer stand-alone functionality eliminating the need for a console.
    - 1) Fixture shall ship with 12 preset colors accessible as a stand-alone feature.
    - 2) Fixture shall ship with 5 sequences accessible as a stand-alone feature.
    - 3) Each color and sequence can be modified by the end user via RDM
    - 4) Fixtures can be linked together with standard DMX cables and controlled from designated master fixture
    - 5) Fixtures in a stand-alone state shall restore to the settings present prior to power cycling, eliminating the need for reprogramming

- 6) Fixtures that do not provide regulated and protected operation modes are not acceptable.
- C. Color mixing Light Emitting Diode Linear fixture
1. General
    - a. The fixture shall be a color-mixing high-intensity LED illuminator with DMX control of intensity and color. The fixture shall be a ColorSource Linear 1, 2 or 4 as manufactured by Electronic Theatre Controls, Inc. or approved equal.
    - b. All LED fixtures shall be provided by a single manufacturer to ensure compatibility
    - c. The fixture shall be UL 1573 listed for stage and studio use
    - d. The fixture shall comply with the USITT DMX-512 A standard
  2. Physical
    - a. The fixture shall be contained in a rugged all-metal die-cast and/or sheet metal housing, free of burrs and pits.
    - b. The housing shall have a rugged black powdercoat finish
      - 1) White or silver/gray powdercoat finishes shall be available as color options
      - 2) Other powdercoat color options shall be available on request
    - c. Power supply, cooling and electronics shall be integral to each unit.
    - d. The ColorSource Linear shall be available in 3 lengths
      - a) Linear 1 shall be .5 meters
      - 2) Linear 2 shall be 1 meter
      - 3) Linear 3 shall be 2 meters
    - e. Fixture housing shall provide two easy-access slots for secondary lenses and other accessories
      - 1) Slots shall be equipped with locking cover on both ends of the fixture
    - f. Each LED optic shall be spaced for optimal photometric performance
      - 1) The units shall allow for being placed end to end while maintaining optical spacing to prevent scalloping between fixtures
    - g. The unit shall ship with:
      - 1) 2 x Floor stand trunnions that can accommodate c-clamps for hanging.
      - 2) 5' power lead with Edison connector as standard
    - h. Available options shall include but not be limited to:
      - 1) Bare-end, Stage-Pin or Twist-lock type-equipped power leads
      - 2) Original or Deep Blue LED array
    - i. Accessories available as options shall include but not be limited to:
      - 1) Hanging yoke for the Linear 1
      - 2) Double hanging yoke for the Linear 1
      - 3) PowerCon to PowerCon cables for fixture power linking
      - 4) Multiple secondary lens options to include multiple angles in the following patterns:
        - a) Horizontal
        - b) Vertical
        - c) Round
      - 5) Barn doors
      - 6) Egg crate louvers
  3. ENVIRONMENTAL AND AGENCY COMPLIANCE
    - a. The fixture shall be UL and cUL LISTED and/or CE rated, and shall be so labeled when delivered to the job site.
    - b. The fixture shall be UL LISTED to the UL1573 standard for stage and studio use
    - c. The fixture shall be rated for IP-20 dry location use.

4. THERMAL
  - a. The fixture shall be cooled with a variable speed fan.
  - b. The fixture shall utilize advanced thermal management systems to maintain LED life to an average of 70% intensity after 20,000 hours of use
    - 1) Thermal management shall include multiple temperature sensors within the housing to include:
      - a) The LED array
      - b) The control board
  - c. The fixture shall operate in an ambient temperature range of 0°C (32°F) minimum, to 40° C (104°F) maximum ambient temperature.
5. ELECTRICAL
  - a. The fixture shall be equipped with 100V to 240V 50/60 Hz internal power supply
  - b. The fixture shall support power in and thru operation
    - 1) Power in shall be via Neutrik® PowerCon™ input connector
    - 2) Power thru shall be via Neutrik® PowerCon™ output connector
    - 3) Fixture power wiring and accessory power cables shall be rated to support linking of multiple fixtures up to the capacity of a 15A breaker
  - c. The fixture requires power from non-dim source
  - d. Power supply outputs shall have self-resetting current limiting protection
  - e. Power supply shall have power factor correction
6. LED Emitters
  - a. The fixture shall contain 4 different LED colors to provide color characteristics as described in Section H below.
  - b. All LEDs used in the fixture shall be high brightness and proven quality from established and reputable LED manufacturers.
    - 1) Fixture shall utilize Luxeon® Z™ LED emitters
  - c. Manufacturer of LED emitters shall utilize an advanced production LED binning process to maintain color consistency.
  - d. LED emitters should be rated for nominal 20,000 hour LED life to 70% intensity
  - e. LED system shall comply with all relevant patents
7. CALIBRATION
  - a. Fixture shall be calibrated at factory for achieve consistent color between fixtures built at different times and/or from different LED lots or bins
    - 1) Calibration data shall be stored in the fixture as a permanent part of on-board operating system
    - 2) All arrays, including replacement arrays shall be calibrated to the same standard to insure consistency
    - 3) Fixtures not offering LED calibration shall not be acceptable
8. COLOR
  - a. The fixture shall utilize an minimum of 40 LED emitters
    - 1) These emitters shall be made up of Red, Green, Blue and Lime
      - a) Deep Blue arrays use Indigo in place of Blue
9. DIMMING
  - a. The LED system shall use 15-bit nonlinear scaling techniques for high-resolution dimming.
  - b. The dimming curve shall be optimized for smooth dimming over longer timed fades while responding quickly to bumps.
  - c. The LED system shall be digitally driven using high-speed pulse width modulation (PWM)
  - d. LED control shall be compatible with broadcast equipment in the following ways:

- 1) PWM control of LED levels shall be imperceptible to video cameras and related equipment
  - 2) PWM rates shall be adjustable by the user via RDM to avoid any visible interference to video cameras and related equipment
10. CONTROL AND USER INTERFACE
- a. The fixture shall be USITT DMX 512A-compatible via **In** and **Thru** 5-pin XLR connectors
  - b. Each half meter of length shall be individually addressable and controllable
  - c. The fixture shall be compatible with the ANSI E1.20 RDM standard
    - 1) All fixture functions shall accessible via RDM protocol for modification from suitably equipped control console
    - 2) Temperature sensors within the luminaire shall be viewable in real time via RDM
    - 3) Fixtures not offering RDM compatibility, feature set access or temperature monitoring via RDM shall not be compatible
  - d. The fixture shall be equipped with a 7-segment display for easy-to-read status and control
  - e. The fixture shall be equipped with a three-button user-interface
    - 1) 4 buttons on the Liner 2 and 4 to allow for Cell/Group control selection
  - f. The fixture shall offer RGB, IRGBS, Direct and Single Channel control
  - g. The fixture shall operate in Regulated mode for droop compensation
  - h. The fixture shall offer stand-alone functionality eliminating the need for a console
    - 1) Fixture shall ship with 12 preset colors accessible as a stand-alone feature
      - a) Built in UI shall allow for setting level of these presets
    - 2) Fixture shall ship with 5 Sequences accessible as a stand-alone feature
    - 3) Each color and sequence can be modified by the end user
    - 4) Fixtures can be linked together with standard DMX cables and controlled from designated master fixture
      - a) Up to 32 fixtures may be linked
    - 5) Fixtures in a stand-alone state shall restore to the settings present prior to power cycling, eliminating the need for reprogramming
    - 6) Fixtures without stand-alone operation features described in a, b, c, d, and e shall not be acceptable.

**2.8 LIGHTING ACCESSORIES**

- A. Lenses – Provide lenses for DB PAR fixtures. Provide 4 Spare of each.
- B. Safety Cables – Provide one safety cable for each fixture plus 4 spare.
- C. DMX Extension Cables and Terminators.
  1. Provide (28) 5-Pin DMX Extension Cables – 10 ft. length.
  2. Provide (4) 5-Pin DMX Extension Cables – 25 ft. length.
  3. Provide (4) 5-Pin DMX Terminators.

**2.9 EQUIPMENT LIST**

- A. The System Contractor is to furnish the following list:

Qty	Item	Description
1	DRd-24	Installed Rack with 12 Modules / 24 Circuits
1	FLO	Fluorescent Option Board

B.	1	P-ACP	Paradigm Architectural Control Processor
	1	P-SPM	Paradigm Station Power Module
	8	R20	2.4kw Dual 20A Relay Module
	3	AFM	Air Flow Module
	1		Wall Mount Opto Splitter
	1	CS20	Color Source 20 Lighting Console
	1		25' Console Cable
	2	ECPB DMXIn	1-Gang Input Plate w/ (1) DMX In
	1	ECPB DMXOut	1-Gang Output Plate w/ (1) DMX Out
	3	UH10007	7-Button Station
	1	UH40707	Paradigm 4 Fader 7 Button Station
	1	Lot	Outlet Boxes as noted on drawings
	1	Lot	Control Cable

Theatrical Lighting Fixtures and Accessories:

1. The System Contractor is to furnish the following list:

Qty	Item	Description
10	CSSPOTSDB	ColorSource Spot Deep Blue LED Profile Fixture
10	LT	EDLT Lens Tube as required by site conditions
10	CSPARDB	ColorSource PAR Deep Blue
10	Lens Sets	ETC Lenses (Provide Lenses as noted on plans)
9	CSLINEARDB	ColorSource LINEAR Deep Blue
9	Lens Sets	ETC Lenses (Provide Lenses as noted on plans)
30		Safety Cables
28	DMX-5P-10	5-Pin DMX Extension – 10'
4	DMX-5P-25	5-Pin DMX Extension – 25'
4	DMX5P-TERM	5-Pin DMX Terminator
1	Lot	PowerCon Jumper Cables as required

**PART 3 EXECUTION**

**3.1 PROTECTION**

- A. After installation, protect any installed components from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

**3.2 PREPARATION**

- A. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.3 INSTALLATION**

**A. GENERAL**

1. Install all systems according to manufacturer's written instructions.

**3.4 ENERGIZATION**

- A. A qualified Engineering Representative employed full time by the manufacturer shall visit the job site after the installation is complete and prior to the energization of the system to

inspect, test and adjust the system. Instruction shall be provided for the Owners' representatives in the operation and maintenance of the system. These services shall not exceed one (1) day and shall be provided with a minimum of fourteen (14) days written notice by the contractor.

**3.5 TRAINING**

- A. Upon completion of the Theatrical Lighting Systems and owner approval of the installation, two – four hour training sessions shall be provided for up to four representatives of the owner. Any training beyond this eight-hour period is understood to be additional to this contract and may be billed accordingly.

**3.6 MANUFACTURER SERVICES**

- A. Service shall be provided directly by the manufacturer and service visits shall be made within twenty-four (24) hours.

**3.7 WARRANTY**

- A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.
- B. Warranty shall cover repair or replacement of such parts determined defective upon inspection.
- C. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.
- D. Warranty shall not cover any labor expended or materials used to repair any equipment without manufacturer's prior written authorization.

**END OF SECTION**



**SECTION 11 66 24**  
**BASKETBALL BACKSTOPS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes:
  - 1. Indoor basketball backstops.
    - a. Masts.
    - b. Backboards.
    - c. Goals and nets.
    - d. Electric motorized winches for retractable backstop systems.
  - 2. Outdoor basketball backstops.
    - a. Masts.
    - b. Backboards.
    - c. Goals and nets.
- B. Related Requirements:
  - 1. Section - 05 12 00 - Structural Steel.
  - 2. Section - 05 21 00 - Steel Joists.
  - 3. Section - 05 50 00 - Metal Fabrications: Supplementary framing.
  - 4. Division 26: Electrical: Electrical service for winch operations and Work requirement for electrical work.

**1.2 REFERENCES**

- A. American Society of Civil Engineers:
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- B. ASTM International:
  - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. American Welding Society:
  - 1. AWS D1.1 - Structural Welding Code - Steel.
- D. National Electrical Manufacturers Association:
  - 1. NEMA MG 1 - Motors and Generators.
- E. National Federation of State High School Associations:
  - 1. NFHS - Basketball Rules Book.

**1.3 DESIGN REQUIREMENTS**

- A. Design backstops including masts, backboards, and goals to meet requirements of NFHS and the following:
  - 1. Withstand loads without damage to backstop.
  - 2. Transfer loads to building structural frame to prevent overloading and damage to building.
  - 3. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with ASCE 7.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data:
  - 1. Submit data indicating materials of construction, thicknesses, and colors available.
- C. Shop Drawings: Signed and sealed by licensed Professional Engineer.
  - 1. Indicate size and location of backstops, mounting details, accessory anchoring members. Show operable backstops in fully extended and retracted positions.
  - 2. Indicate operator locations and mounting details. Include wiring diagrams for electric operators and controls.
  - 3. Indicate magnitude and location of loads imposed on building framing.
- D. Design Data: Signed and sealed by licensed Professional Engineer.
  - 1. Submit calculations for foundation design.
  - 2. Submit calculations for supplementary framing required to attach backstops to building framing.
  - 3. Indicate location and magnitude of loads imposed on building framing.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Include the following.
  - 1. Description of method of operation and motor control system.
  - 2. Parts catalog with complete list of replacement parts.
  - 3. Schematic wiring diagrams of installed electrical equipment.

### 1.6 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by UL or another testing firm acceptable to authority having jurisdiction.
- B. Perform welding in accordance with AWS D1.1.

### 1.7 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 three (3) years documented experience and approved by manufacturer.
- C. Welders and Welding Procedures: AWS qualified within previous twelve (12) months.
- D. Design backstops and support framing under direct supervision of licensed Professional Engineer experienced in design of this Work and licensed in the State in which the project is located.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept backstops on site in manufacturer's original packaging. Inspect for damage.
- C. Store backstops indoors, protected from weather and contamination until installed.

### 1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

**1.10 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate backstops with structural system building framing as indicated in Specifications and Drawings to distribute loads to building framing without overloading building framing.
- C. Coordinate layout of backstops and support framing with the following to avoid interferences:
  - 1. HVAC equipment, ductwork, outlets, and inlets.
  - 2. Fire suppression system piping and sprinkler heads.
  - 3. Lighting.

**1.11 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Indoor Backstops: Furnish lifetime manufacturer's warranty for masts and backboards.
- C. Outdoor Backstops: Furnish manufacturer's standard warranty.

**1.12 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Furnish six (6) of each type net.
- C. Furnish four manual crank tools for adjusting height of backboard for play.

**PART 2 PRODUCTS****2.1 INDOOR BACKSTOPS**

- A. Manufacturers:
  - 1. Porter Athletic Equipment Company. (Basis of Design)
    - a. Indoor Basketball Backstop Systems – Style 909xxxxx Series.
      - 1) Include Porter Center-Strut Height Adjuster.
  - 2. American Athletic, Inc.
  - 3. Draper, Inc.
  - 4. Performance Sports Systems.
  - 5. Progressive Sports Construction Group.
  - 6. Substitutions: Section 01 60 00 - Product Requirements.
- B. Locations: As indicated on Drawings.
  - 1. Main Court: Two (2) backstop systems.
    - a. Suspended; stationary.
    - b. Adjustable Vertical Movement Mounting feature for backboards.
- C. Masts:
  - 1. Center Post Masts: Single post at center of backboard with side sway bracing to eliminate sway and vibration during play.
  - 2. Tubular steel, welded construction.
  - 3. Overhead Mounting: Mast assembly extending vertically from overhead building structural frame to support backboard at position and height indicated on Drawings.
    - a. Design and provide supplemental steel framing as needed to span between and anchor to building structural frame and support mast at position indicated on Drawings.

- D. Backboards:
  - 1. Glass Backboards: 1/2 inch thick clear tempered glass, resiliently mounted in painted steel frame; target markings fired onto glass.
  - 2. Rectangular shape; 72 x 42 inches with manufacturer's standard mounting to suit mast; drilled for goal mounting.
  - 3. Safety padding installed along lower edge and corners.
  - 4. Adjustable Vertical Movement Mounting: Variable height with rim height ranging from 8 to 10 feet above finished floor; adjustable by manual crank tool operated from floor beneath backboard.
- E. Goals and Nets:
  - 1. Goals: Steel, removable type; fabricated from 5/8 Inches rod; 18 Inches inside clear diameter; with no-tie style net hooks; painted finish; mounted directly to main mast.
    - a. Breakaway type; single rim, breakaway type; rigid play up to 230 lbs, flexible for forces greater than to 230 lbs.
  - 2. Net: Woven chord, size and style to fit goal; 15 to 18 inches long.
    - a. Competition Net: Anti-whip nylon.
- F. Shop Finishing:
  - 1. All metal components, parts, fasteners and accessories to be powder coat finished.
  - 2. Color: As selected by Architect from manufacturer's full range.

## 2.2 ACCESSORIES

- A. Mounting Hardware: As designed and recommended by manufacturer.

## 2.3 FABRICATION

- A. Fabricate components in largest practical sizes for delivery.
- B. Grind exposed welded joints flush and smooth with adjacent finish surface.
- C. Provide fittings and hardware to accommodate site assembly and installation.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify building structural frame is ready to receive backstops.
- C. Verify electrical power is available with correct characteristics.
- D. Verify finishing operations, including painting, are complete before installing backstops.

### 3.2 INSTALLATION

- A. Install backstops in accordance with NFHS requirements.
- B. Assemble components furnished loose for field assembly.
- C. Install masts plumb and rigid at location indicated on Drawings.
- D. Install backboards plumb, level, and parallel to basketball court end line.
- E. Install goals level and adjust rim height to 10 feet above finish floor.

- F. Install safety padding on backboards.
- G. Touch up damaged finishes to match shop finish.

**3.3 ADJUSTING**

- A. Section 01 73 00 - Execution: Requirements for starting and adjusting.
- B. Adjust folding backstops, winches, motors, and controls for smooth and proper operation over full range of movement.
- C. Adjust limit switches to prevent damage to equipment.

**3.4 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Requirements for protecting finished Work.
- B. Fully retract backstops and disable operators until Substantial Completion.

**3.5 DEMONSTRATION**

- A. Section 01 79 00 - Demonstration and Training: Requirements for demonstration and training.
- B. Demonstrate to Owner representatives, operation and maintenance of winches and backboard height adjustment.

**END OF SECTION**



**SECTION 11 66 25****WALL PADDING****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes wall padding and mounting accessories.
- B. Related Sections:
  - 1. Section 04 20 00 - Unit Masonry: Substrate.

**1.2 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Provide physical characteristics of wall pads and mounting accessories.
- C. Shop Drawings: Indicate dimensioned elevations layout (include cutouts at wall devices), unit sizes and thickness, describe finish method around cutouts at wall devices, mounting details and hardware.
- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of finishes and colors available. 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 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

**1.3 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures.
- B. Submit Operation and Maintenance Data.

**PART 2 PRODUCTS****2.1 WALL PADDING**

- A. Manufacturers:
  - 1. American Athletic, Inc.
  - 2. Draper, Inc.
  - 3. Porter Athletic Equipment Company.
  - 4. Performance Sports Systems.
  - 5. Progressive Sports Construction Group.
  - 6. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. Wall Pads: Urethane foam, 3.7 lb. density, 2 inches thick; over 3/8 inch OSB; flame retardant vinyl coated polyester covering.

**2.3 ACCESSORIES**

- A. Wall Attachment Clip: Extruded aluminum.
- B. Z-Clip Channel: Extruded aluminum.

- C. Floor Mounting Channel: Extruded aluminum (if Drawings indicate wall pads layout to extend to the floor).

## **2.4 FABRICATION**

- A. Wall Pads: Cement foam to backing board. Staple covering to rear of backing board. Provide a one inch nailing margin at top and bottom of backing board. Fabricate in 2 feet wide by 6 feet tall panels.
- B. Accessories: Provide 13/64 inch diameter holes on 9 inch centers for attaching accessories to wall or backing board.

## **2.5 FINISHES**

- A. Vinyl Coated Polyester Covering: Color as selected by Architect from submitted samples.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify adequacy of support framing and blocking.

### **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. Install wall pads in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Z-clips attached to wall pad backer board must be adhered to backer board in addition to screwed attachment.
- C. Set wall pads plumb, square, aligned at top and bottom with adjacent pads, and securely anchored to building structure.
- D. Provide anchorage to prevent wall pads from sliding laterally on z-clip mounting
- E. Provide cutouts for wall devices such as outlets and switches. Provide reinforced edge support at cutouts.

### **3.4 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean wall pad covering and exposed mounting accessories.

### **3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.

## **END OF SECTION**



**SECTION 12 21 13**  
**HORIZONTAL LOUVER BLINDS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes horizontal metal slat louver blinds and operating hardware.

**1.2 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Product Data: Submit data indicating physical and dimensional characteristics, and operating features.
- C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- D. Samples for Initial Selection: For each finish product specified, submit two sets of samples representing manufacturer's full range of available finishes, colors and patterns for all exposed components of product.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selection. Samples to be presented on actual product sections no less than 12 inches long.
- F. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

**1.3 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in installing products specified in this section with minimum five (5) years documented experience.

**1.4 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**1.5 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with window installation and placement of concealed blocking to support blinds.

**1.6 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Extra Blind Assemblies: Two of each size.
- C. Extra Slats: 20 of each type and size.
- D. Extra Lift Cords, Control Cords, and Wands: One of each type.

**PART 2 PRODUCTS****2.1 HORIZONTAL LOUVER BLINDS**

- A. Manufacturers:
  - 1. Bali Window Treatments.
  - 2. Caco, Inc.
  - 3. Hunter Douglas Window Fashions.
  - 4. Levolor Contract.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.

**2.2 COMPONENTS**

- A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; between the window jambs; manual control of raising and lowering by cord with full range locking; variable blade angle adjustable by control wand.
- B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
  - 1. Width: 1 inch.
  - 2. Thickness: 0.008 inch.
  - 3. Color: As selected by Architect from submitted samples.
- C. Slat Support: Woven polypropylene cord, ladder configuration.
- D. Headrail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats; height 1-7/8 inches.
  - 1. Color: Same as slats.
- E. Bottom Rail: Pre-finished, formed aluminum with top side shaped to match slat curvature; with end caps.
  - 1. Color: Same as slats.
- F. Lift Cord: Braided polypropylene; continuous loop.
  - 1. Free end weighted.
  - 2. Color: As selected by Architect from submitted samples.
- G. Control Wand: Extruded hollow plastic; round shape.
  - 1. Non-removable type.
  - 2. Length of window opening height less 3 inches.
  - 3. Color: Clear.
- H. Headrail Attachment: Wall brackets, or as otherwise indicated on Drawings.
- I. Accessory Hardware: Type recommended by blind manufacturer.

**2.3 FABRICATION**

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.
- B. At openings requiring multiple blind units, fabricate separate blind assemblies with space of 1/2 inch between assemblies, occurring at window mullion centers.

**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 work.

- C. Verify structural blocking and supports are correctly placed.

### **3.2 INSTALLATION**

- A. Install blinds.
- B. Secure in place with flush countersunk concealed fasteners.
- C. Place intermediate head supports at 24 inch o.c., or closer for adequate support of imposed operating loads.

### **3.3 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Gap at Window Opening Perimeter: 1/8 inch.
- C. Maximum Offset From Level: 1/8 inch.

### **3.4 ADJUSTING**

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust blinds for smooth operation.

### **3.5 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean blind surfaces just prior to occupancy.

### **3.6 SCHEDULE – As shown on drawings.**

- A. Classrooms: All exterior windows.
- B. Administration and Teacher Workrooms: All exterior windows.
- C. Media Center: All exterior windows, but not at high clerestory windows.

**END OF SECTION**



**SECTION 12 32 16****MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK (ADD-4)****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
  1. Manufactured plastic-laminate-clad casework.
  2. Countertops.
  3. Casework hardware.
- B. Related Requirements:
  1. Section 09 65 00 - Resilient Flooring: Rubber base.
  2. Division 22 - Plumbing Fixtures: Sinks set in countertops.

**1.2 DEFINITIONS**

- A. Identification of Casework Parts by Surface Visibility:
  1. Unit Body Open Interiors: Any storage unit surface without solid door or drawer fronts and units with glass sliding or glass framed doors.
  2. Unit Body Closed Interiors: Any storage unit surface behind solid door or drawer fronts.
  3. Unit Body Exposed Side: Any storage unit exterior side surface that is visible.
  4. Concealed Surfaces: Any surface not normally visible after installation.

**1.3 REFERENCES**

- A. ASTM International (ASTM):
  1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Architectural Woodwork Manufacturers Association of Canada (AWMAC) and the Woodwork Institute (WI):
  1. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, 2017.
  2. WI (GIS) - Guarantee and Inspection Service.
  3. WI (CCP) - Certified Compliance Program.
  4. WI (CSIP) - Certified Seismic Installation Program.
  5. WI (MCP) - Monitored Compliance Program.
- C. California Department of Health Services:
  1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. American National Standards Institute (ANSI):
  1. ANSI A135.4 - Basic Hardboard Standard; 2012.
  2. ANSI A208.1 - Particleboard; 2016.
- E. Forest Stewardship Council (FSC):
  1. FSC Guidelines - Forest Stewardship Council Guidelines.
- F. National Electrical Manufacturers Association (NEMA):
  1. NEMA LD 3 - High Pressure Decorative Laminates.
- G. South Coast Air Quality Management District (SCAQMD):
  1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

**1.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data describing casework finishes and construction.
- C. Shop Drawings:
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
  - 2. Provide the information required by AWMAC/WI (NAAWS) and to include the following:
    - a. Indicate component dimensions, configurations, elevations, cross-sections, construction details, joint details, service run spaces and location of services. Include layout of units with relation to surrounding walls, doors, windows and other building components.
- 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.
- 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 hinge and pull. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
- B. Installer: Company specializing in the installation of casework with minimum five (5) years documented experience and approved by the manufacturer.
- C. Work is to comply with AWMAC/WI (NAAWS) standards.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Store completed casework and countertops in a ventilated space with relative humidity range of 20 to 50 percent.

**1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install casework in unconditioned spaces, or in spaces where relative humidity is not within acceptable limits.

**1.9 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**PART 2 PRODUCTS****2.1 QUALITY STANDARD**

- A. Custom Grade, in accordance with AWMAC/WI (NAAWS), unless noted otherwise.

**2.2 MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK**

- A. Manufacturers:
  1. TMI Systems Design Corporation.
  2. Stevens Industries Inc.
  3. Pridgen Cabinetworks.
  4. Case Systems.
  5. Cleora Sterling Corporation.
  6. Cabinets by Design, Inc., Duluth GA.
  7. Blair-Dumond, Inc.
  8. Substitutions: Section 01 60 00 - Product Requirements.
  9. Interior Wood Specialties, Inc.
  10. Biggs Casework, Inc.

**2.3 COMPONENTS**

- A. Particleboard: ANSI A208.1; 45 pound density, fir or pine.
  1. Interior Composite Wood Products: Conform to California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
  2. For Plastic Laminate finished countertops in wet areas, provide Moisture Resistant Particleboard.
- B. Hardboard: ANSI A135.4; prefinished; 1/4 inch thick.
- C. Melamine: Thermally Fused Melamine; color to be selected by Architect for submitted samples.
- D. PVC Edging: Color to be selected by Architect from submitted samples.
- E. Plastic Laminate: NEMA LD-3; general purpose.
- F. Plastic Laminate Backing: High pressure paper base laminate, 0.020 inch thick, smooth surface finish.
- G. Solid Surface (Synthetic Surface):
  1. Provide finished products having flame spread index of 35 and smoke developed index of 15, when tested in accordance with ASTM E84 in thickness of 3/4 inch.
  2. Resin: Polyester type, with integral coloring, stain resistant to domestic chemicals and cleaners.
  3. Polishing Cream: Compatible polishing cream to achieve specified finish sheen.
  4. Adhesive: Type recommended by solid surface manufacturer and coordinated for bonding to substrate type.
- H. Cabinet Hardware:
  1. Pulls: 4 inch centers.
    - a. Finish:
      - 1) Powder coated wire; color as selected by Architect from submitted samples.
  2. Hinges: Heavy duty, exposed 5 knuckle, fixed pin, hospital-tip style; color and finish to match Pulls.

- a. Finish:
  - 1) Powder coated steel.
- 3. Coat Hooks: Double prong; stainless steel; color and finish to match Pull.
- 4. Magnetic Catches: Aluminum case with zinc plated steel strike, 6 lb. pull minimum.
- 5. Door & Drawer Locks: Cam type, disc tumbler capable of being master keyed; stainless steel, satin finish. Each room, keyed alike and separate from other rooms and all locks master keyed.
  - a. Drawers:
    - 1) Provide locks at locations indicated on Drawings.
  - b. Doors:
    - 1) Provide locks at locations indicated on Drawings.
    - 2) Pair Door - Interior release/latch on one leaf; lock on other leaf.
- 6. Hardware Fasteners: Exposed fasteners to match material and finish of installed device.
- 7. Where door opens against adjacent construction (i.e. wall), provide chain or other restraint device to prevent door and door hardware from contacting adjacent construction.
- 8. Drawer Slides:
  - a. Standard Drawers: Nylon ball bearing, self closing; 75 pound capacity.
  - b. File Drawers: Full extension, ball bearing, self closing; 100 pound capacity.
- 9. Adjustable Shelf Supports:
  - a. Heavy duty, polycarbonate; clear; pin type; shelf locking clip.
- 10. Casters: Double ball bearing mounting to heavy gage zinc plated fork; 5 inch soft rubber wheels. Provide two brake units per mobile unit.

#### 2.4 FABRICATION ( ADD-4)

- A. Fabricate laminate clad casework to dimensions, profiles and details shown.
- B. Cabinet Joinery: Industrial grade hardwood dowels, glued and clamped tight.
- C. Construct cabinet bodies with 3/4 inch particleboard for sides, fixed intermediates, subtops, and bottoms. Stretchers, where allowed, to be minimum 4 inch wide.
  - 1. Subtops to be solid particleboard; no stretchers allowed for subtops.
- D. Construct shelving up to 30 inches wide with 3/4 inch particleboard. Construct shelving over 30 inches wide with 1 inch particleboard.
- E. Construct cabinet backs with 1/4 inch particleboard.
- F. Construct drawers with 1/2 inch particleboard for sides, back, and subfront. Construct drawer bottoms with 1/2 inch prefinished hardboard.
- G. Construct doors, and drawer fronts with 3/4 inch particleboard.
- H. **Construct countertops with**
  - 1. **Provide 1 inch thick particleboard substrate at Solid Surface countertops. See drawings for location.**
  - 2. **Provide 1.125 inch thick particleboard substrate for Plastic Laminate finished countertops, in wet areas, provide Moisture Resistant Particleboard.**
- I. All components to be of balanced construction. Plastic laminate faced particleboard to be balanced with high pressure cabinet liner on opposite side unless otherwise noted. Melamine faced particleboard to be balanced with melamine.
- J. Wall Hung Units:
  - 1. Top surfaces of wall hung units to be finished with same material as visible vertical end panels.



2. Bottom surfaces of wall hung units to be finished with **melamine on surfaces and color matching PVC panel edge.**

## 2.5 FINISHES

- A. Door and Drawer Fronts: Plastic laminate VCS28 with 3mm PVC edges.
- B. Unit Body Closed and Open Interiors: Melamine with 1mm PVC edges. Exposed sides to be plastic laminate VGS28 with 0.5 mm PVC edges. Shelves have melamine on both sides with 1mm PVC on front edge. Exposed shelf edges for Open Interior units to be 3 mm PVC.
- C. Drawers: Melamine with 1mm PVC edges.
- D. Countertops:
  1. Plastic Laminate Clad Type: **HGS/HGP48** with 3mm PVC edges. Refer to Drawings.
  2. Solid Surface Type: Solid Surface (Synthetic Surface). Refer to Drawings.
- E. Colors:
  1. As selected by Architect from submitted samples.

## 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 location and sizes of utility rough-in associated with 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. Install work in accordance with AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure casework in place; rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- E. Carefully scribe casework abutting other components and construction, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
- G. Seal joints at abutment to other construction with appropriate sealant matching casework finish.
- H. Sequence installation and erection to ensure mechanical and electrical connections are achieved in an orderly and expeditious manner.

### 3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust moving or operating parts to function smoothly, without binding and correctly.

- C. Repair or remove and replace defective work to new condition.

**3.5 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**3.6 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect Work from damage, including damage from detrimental air temperature and humidity levels.

**END OF SECTION**

**SECTION 12 61 00****FIXED AUDIENCE SEATING****PART 1 GENERAL****1.1 SUMMARY**

- A. The Work required under this Section consists of furnishing and installing auditorium seating, their accessories, and necessary mounting and installation hardware as indicated on Drawings and specified herein.

**1.2 SUBMITTALS**

- A. Submit in accordance with Section 01 33 00.
- B. Shop Drawings shall be comprehensive layout drawings(s) showing all equipment to be furnished with details of accessories to be supplied including necessary electrical service to be provided by others.
- C. Shop Drawings must include International Building Code compliance calculations for seating rows, back to back spacing, and aisle widths for complete layout installation.
- D. Shop Drawings must be sealed and signed by Engineer licensed to practice in North Carolina.
- E. Samples of material and color finish as requested by Architect.
  - 1. Include submission of full range of Grade G Upholstery Fabric colors and patterns available.
- F. Installation, operation, and maintenance instructions
- G. Written warranty to the Owner upon completion.

**1.3 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in spectator seating with a minimum of ten (10) years experience in manufacturing spectator seating equipment.
- B. Engineer Qualifications: Manufacturer to employ a registered licensed professional engineer to certify that the equipment to be supplied meets or exceeds the design criteria of this specification.
- C. Product Improvements: Equipment provided shall incorporate manufacturer's design improvements and materials current at time of shipment, provided that such improvements and materials are consistent with the intent of these specifications.
- D. Welding Processes: To be performed by certified professional welding operators in accordance with AWS D1.1 "Structural Welding Code-Steel".
- E. Installation: Shall be handled directly by the manufacturer or by a factory certified installation subcontractor.

**1.4 WARRANTY**

- A. The Contractor shall warranty all work performed under these specifications to be free of defects for a period of one year from the Date of Substantial Completion.
  - 1. Any materials found to be defective within this period will be replaced at no cost to the Owner.
- B. Provide manufacturer's warranty for the following components:
  - 1. Structural: Lifetime
  - 2. Operating Mechanisms: Five years.
  - 3. Plastic, Wood, and Paint Components: Five years.

**PART 2 PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers:
  - 1. Hussey Manufacturing, Inc.: Quattro
  - 2. Other acceptable manufacturers offering equivalent products:
    - a. Irwin Seating Company
    - b. Lancaster Auditorium Seating
    - c. Seating Concepts.
    - d. American Seating
    - e. **Davis Furniture Company. (ADD-1)**
    - f. Substitutions: Section 01 60 00 - Product Requirements.
- B. The chair seating system shall be comprised of a multiplicity of chair modules and supportive members.
- C. The dimensional and physical characteristics of the seating, and the seating plan, shall be in accord with all applicable codes, the following specifications and approved Drawings.
- D. The seating layout shall be radial to match the curve of the slab and based on a 3 foot back to back row spacing and an average 22" chair width

**2.2 DESIGN CRITERIA**

- A. Seats
  - 1. Shall be semi-cantilevered, self-centering, automatic three-quarter lift with over center retract feature.
  - 2. Shall be tested and professionally certified through an independent testing laboratory to support and withstand an evenly distributed 600 lb. load without failure or irregularities that would impair usefulness.
  - 3. Shall be tested and professionally certified through an independent testing laboratory to withstand 350,000 operating cycles without added lubrications, failure to gravity-lift return to upright position, adjustment, or measurable bearing wear.

4. Shall be tested and professionally certified to withstand, without failure, 5,000 impacts of a 40 lb. sandbag dropped on center of seat from a distance of 12" at 35 c.p.m.
- B. Backs
1. Shall withstand an evenly distributed front or rear load of 450 lbs.
  2. Shall be tested and professionally certified to withstand, without failure, 40,000 alternating swinging impact cycles by each of two opposing 40 lb. sandbags. Sandbags shall be moved horizontally and equally through various distances (6", 8", 10", and 12") at 35 c.p.m.
- C. Materials (Flammability) shall satisfy applicable test, codes, standards, or requirements as follows:
1. Polyethylene shall meet the Federal Motor Vehicle Safety Standard No. 302 which specifies a burning rate of less than 4" per minute.
  2. Upholstery materials meet Class 1 requirements of U.S. Department of Commerce, CS 191-52 as required by the State of California Home Furnishings Act.
  3. Cushioning and padding that exceeds 1/2" thickness shall be self-extinguishing and shall not exhibit flaming drippings the extent that these drippings ignite a duplicate specimen to foam placed directly underneath the test sample when tested as defined in ASTM 1692-68.

### 2.3 FABRICATION

- A. Arch Spring/Foam Cushion Upholstered Seats
1. Seat pan shall be polymer molded with platform cushioned seating OR deep drawn, die formed, 20 gauge one-piece metal compound curved construction with the perimeter edge rolled inward for added strength and appearance. The pan shall be free of buckles, ripples, dimples, and die marks.
  2. Inserted into the steel seat pan shall be a steel seat frame. Steel frames shall be die formed 16 gauge steel channel with integral steel clips welded to the perimeter sides of the seat frame to resist spring tension. The seat frame shall be secured in the seat pan under tension and shall require no additional mechanical fasteners.
  3. Seats shall be of the arch type serpentine spring construction. Not less than five (5) serpentine springs shall be attached laterally by means of integral spring clips to the internal steel frame to assure free and quite movement without fatigue or breakage.
  4. Seat cushions shall be contour molded, high density, inherently fire-retardant virgin urethane foam with integral 3-ply bonded continuous filament polyester fabric buffer to prevent seat springs from cutting, chafing, or otherwise damaging cushion.
  5. Contoured foam cushion shall be 3" thick at the front, 2 1/2" thick at the rear, with an average overall thickness of 1 1/2" over the center.
  6. Seat "Cover" shall be panel side construction without welts stretched and fastened securely to the seat frame by means of upholstery clips.

7. Tailoring shall evidence a superior level of design workmanship and fit. Seams shall be straight, continuous and neat, without unsightly puckering.
- B. Padded Upholstered Back
1. Rear shield shall be one piece injection molded high impact polyethylene plastic. The shield shall be channeled to form lightly textured, easily cleaned decorative closure returning on the front face to enclose the upholstered inner panel for protection.
  2. The upholstered inner panel shall be constructed of the following components:
    - a. The contoured formed inner panel shall be 5/8" thick, one piece injection molded high density polyethylene.
    - b. The back padding shall be 2" thick, single density polyurethane glued to the inner panel.
    - c. The upholstery shall be on one piece waterfall construction and securely stapled to the rear face of the inner panel.
  3. The upholstered inner panel is inserted into the injection molded rear shield and secured with hidden mechanical fasteners. The finished back shall be attached to the standard with steel wings of cold rolled steel. The design of the wings shall allow for the proper pitch of the back.
  4. The entire back shall be not less than 27" long to provide complete protection of the seat from the rear and back height not less than 32 3/8" from the floor.
- C. Steel Standards
1. Standards shall be continuously welded, closed seam 1" X 3" steel tube, floor mounted.
  2. Attachment of the armrest to standard shall be vandal resistant. Armrests shall be solid wood.
  3. Floor mount standards shall have a 14 gauge formed steel foot with four detentes to allow for floor variations during installation. The formed foot shall be full perimeter welded to the upright tubular member. The floor mount standards shall be manufactured to various floor pitches.
  4. Standards shall be designed to be fitted with decorative end panels in accordance with seating plan.
- D. Seat Hinges
1. Dual seat hinges shall be fully contained within the seat pan and fitted with a pair of independent, permanently lubricated bearings.
  2. Each of the independent seat hinges shall be fitted with neoprene cushioned up and down stops as well as double acting, self-centering, gravity-lift seat return with silencer.
  3. Seat hinge and installation shall be designed not to require periodic adjustment or lubrication.
  4. Seat hinge type shall be gravity-lift seat return type, requiring no spring to return to upright position when not occupied. Spring-lift hinges are not acceptable.
- E. Finish

1. Steel: Shall be chemically cleaned and dipped in an iron phosphate bath and electrostatically spray enameled. Enamel shall be baked 15 minutes in a 300 degree oven.
2. Blow-molded polyethylene: Shall be pigmented with textured surface.
3. Fabric: Upholstery material shall be Grade G, 100% Marquesa Lana continuous filament Olefin yarn with 13 fill picks per inch, 13 warp ends per inch, weighing 14.4 oz. per linear yard. (Exclusive of backing)
4. Color: Shall be per manufacturer's standards. Seating contractor shall submit full range of color samples for Architect's approval prior to manufacture. Manufacturer to offer 22 colors minimum, of plastic and paint for color selection.

## 2.4 FASTENINGS

### A. Chair Assembly

1. All welds shall be made at the factory by welders that are certified on the equipment and process used.
2. All structural connections shall be made with S.A.E. Stress rated finish grade plated steel bolts, lock washers, and nuts.

### B. Concrete Floor Attachment

1. Chair stanchions shall each be attached by means of two 1/4" expansion bolts set in holes drilled to a depth of not less than 1 1/4" in the concrete.
2. Expansion bolts shall be of approved type lead drive anchor comprised of the following:
  - a. Bolt - 1/4" X 2" (or longer to compensate for superficial covering) special flat countersunk head with two fins under head and with hexagon nut.
  - b. Sleeve - 1/2" x 1" lead with one end recessed to fit cone.
  - c. Cone - formed steel.
  - d. Flat washer to be slipped on bolt over the standard and the nut to be permanently secured by means of a lock washer.

## 2.5 ACCESSORIES

- A. Armrests to be secured to standard with a minimum of two (2) unobtrusive screws. Armrests shall be solid Northern Hard Maple or Birch without defects. All edges shall be rounded. Armrests shall be immersed in stain, dried, receive a single coat of sealer and sanded, and receive two final coats of lacquer, sanding between.
- B. Chair Numbers - Black numbers etched on 5/8" X 1 5/8" anodized aluminum plates. Plates fitted in vandal resistant seat nosing recess secured with two rivets.
- C. Row Letters - Black letters etched on 5/8" X 1 5/8" anodized aluminum plates. Plates fitted flush and secured on wood armrests with brass band.

**PART 3 EXECUTION**

**3.1 INSPECTION**

- A. Verify that areas to receive products are free of impediments interfering with installation.
- B. Do not begin work until conditions are satisfactory.

**3.2 PREPARATION**

- A. Seating contractor shall be responsible for field checking site conditions and dimensions.

**3.3 INSTALLATION**

- A. Install products in accordance with manufacturer's written instructions and reviewed submittal Drawings.
- B. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.
- C. Install seating with chair end standards aligned from first to last row and with backs and seats varied in width to optimize sightlines.
- D. Install chairs in curved rows at a smooth radius.
- E. Install seating so moving components operate smoothly and quietly.

**3.4 ADJUSTMENT AND CLEANING**

- A. All equipment to be adjusted for smooth and proper operation.
- B. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.
- C. Clean work area and remove debris from site.

**3.5 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Do not permit seating to be used or damaged.

**END OF SECTION**



## SECTION 12 93 13

## BICYCLE RACKS AND ACCESSORIES

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Bicycle racks and accessories of the following types:
  - 1. Bicycle wave racks.

## 1.2 RELATED SECTIONS

- A. Section NONE.

## 1.3 REFERENCES

- A. ASTM International (ASTM):
  - 1. ASTM A 513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
  - 2. American Society for Testing and Materials for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

## 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
- C. Shop Drawings: Manufacturing details for each bicycle rack.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. A firm experienced in manufacturing bicycle racks similar to those required for this project and with a record of successful in-service performance.
- B. Installer Qualifications:
  - 1. An experienced installer who has completed installation of bicycle racks 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.
- C. Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single

source with resources to provide components of consistent quality in appearance and physical properties.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Saris Cycling Group, American Bike Security Company, DERO Bike Rack Company, or approved equal.

#### 2.2 BICYCLE WAVE RACKS

- A. Bicycle Wave Racks:
  - 1. Construction: 1-5/8 inches (41 mm) O.D. 12 gauge (0.109 inches) (2.65 mm) steel tube.
  - 2. Capacity: 5 bikes.
  - 3. Capacity: 7 bikes.
  - 4. Capacity: 9 bikes.
  - 5. Mount: Flange.
  - 6. Mount: Below grade.
  - 7. Finish: Polyester powder coat.
  - 8. Colors:
    - a. Black.
    - b. Brown.
    - c. Essex Green.
    - d. Or Owner Approved Color

### PART 3 EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.3 PROTECTION

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

END OF SECTION



**SECTION 14 24 23**  
**HYDRAULIC PASSENGER ELEVATORS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Hydraulic passenger elevators.
  - 2. Holeless type.
- B. Products Furnished but Installed Under Other Sections:
  - 1. Section 03 30 00 - Cast-in-Place Concrete: Execution requirements for placement of elevator machine and pump anchors in concrete.
  - 2. Section 04 20 00 - Unit Masonry Assemblies: Execution requirements for placement of special guide rail brackets and inserts for installation.
- C. Related Requirements:
  - 1. Section 03 30 00 - Cast-in-Place Concrete: Concrete for elevator motor and pump foundation.
  - 2. Section 04 20 00 - Unit Masonry Assemblies: Building-in hoistway door frames; masonry hoistway enclosure.
  - 3. Section 05 50 00 - Metal Fabrications: Pit ladder, sill supports, divider beams, and overhead hoist beams.
  - 4. Section 07 13 00 - Sheet Waterproofing: Waterproofing of elevator pit walls and floor.
  - 5. Section 09 21 16 - Gypsum Board Assemblies: Gypsum shaft walls.
  - 6. Section 09 65 00- Resilient Flooring: Floor finish in cab.
  - 7. Division 23 - Mechanical (HVAC): Fans and ventilation and temperature control of elevator equipment room.
  - 8. Division 26 - Electrical: Equipment wiring systems.
    - a. Electrical characteristics and wiring connections.
    - b. Electrical service to main disconnect in elevator machine room including electrical power for elevator installation and testing.
    - c. Electrical service for machine room and machine room convenience outlets.
    - d. Lighting in elevator pit.
    - e. Empty conduit for telephone service to machine room.
  - 9. Division 28 - Electronic Safety and Security:
    - a. Fire and smoke detectors and interconnecting devices.
    - b. Fire alarm signal lines to elevator controller cabinet.
  - 10. Division 33 - Utilities: Storm drainage piping for pit drainage.

**1.2 REFERENCES**

- A. American Institute of Steel Construction:
  - 1. AISC S335 - Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
- B. American Society of Mechanical Engineers:
  - 1. ASME A17.1 - Safety Code for Elevators and Escalators.
  - 2. ASME A17.2.2 - Inspector's Manual for Hydraulic Elevators.
- C. ASTM International:
  - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

2. ASTM A139/139M - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over), 2016.
  3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  4. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  5. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  6. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.
- E. Copper Development Association Inc.:
1. CDA 113/5 - Standards Handbook 2. Alloy Data.
- F. Forest Stewardship Council:
1. FSC Guidelines - Forest Stewardship Council Guidelines.
- G. National Electrical Manufacturers Association:
1. NEMA LD 3 - High Pressure Decorative Laminates.
  2. NEMA MG 1 - Motors and Generators.
- H. National Fire Protection Association:
1. NFPA 72 - National Fire Alarm and Signaling Code, 2016.
  2. NFPA 80 - Standard for Fire Doors, Fire Windows.
  3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- I. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
- J. Underwriters Laboratories Inc.:
1. UL 10B - Fire Tests of Door Assemblies.
- K. California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda

### 1.3 SYSTEM DESCRIPTION

- A. Hydraulic Elevator Systems:
1. Holeless hydraulic type; dual jack with motor and pump; cylinder mounted within hoistway.
  2. Elevator machine room equipment.
- B. Characteristics of elevator are as follows:
1. Rated Net Capacity: 3500 lbs.
  2. Rated Speed:
    - a. Not less than 110 ft/min.
  3. Nominal Platform Size: Dimensions shall be as required to accommodate the clear inside cab dimensions. Coordinate dimensions with Drawings and hoistway clearances.
  4. Clear Inside Cab Dimensions: Dimensions to be sized to accommodate applicable codes and a medical stretcher per US Architectural & Transportation Barriers

- Compliance Board ADAAG Section 4.10 (American's with Disabilities Act Accessibility Guidelines). Also, the dimensions shall be not less than 80 inches wide x 65-1/2 inches deep.
5. Ceiling Height: minimum 8 feet
  6. Hoistway and Cab Entrance Frame Opening Sizes: Dimensions to be sized to accommodate applicable codes and a medical stretcher per US Architectural & Transportation Barriers Compliance Board ADAAG Section 4.10 (American's with Disabilities Act Accessibility Guidelines). Also, the dimensions shall be not less than 24 x 84 inches.
  7. Door Type: Single panel.
  8. Door Operation: Single-Speed Side Opening (SSSO).
  9. Number of Stops: As indicated on Drawings.
  10. Number of Openings: As indicated on Drawings.
  11. Emergency Call Button: Key operated.
- C. Door Control Features:
1. Program door control to open doors automatically when car arrives at floor.
  2. Render "Door Close" button inoperative when car is standing at dispatching terminal with doors open.
  3. If doors are prevented from closing for approximately twenty seconds because of an obstruction, automatically disconnect door reopening devices, close doors more slowly until obstruction is cleared. Sound buzzer.
  4. Door Reversal System: Multi-beam infrared light curtain.
- D. Interconnect elevator control system with building fire alarm system.
- E. Seismic Design: In accordance with seismic risk zone code.
- F. All work shall be performed in accordance with current local Building Codes, the latest revised edition of the American Society of Mechanical Engineers ASME/ANSI A17.1 Safety Code for Elevators and Escalators, the National Electrical Code, and other applicable codes required for operation and certification by jurisdictions having authority.

#### 1.4 DESIGN REQUIREMENTS

- A. Two-Stop Automatic Operation:
1. Set system operation so that momentary pressure of hall button at other landing dispatches car to that landing.
  2. Allow call registered by momentary pressure of hall button at any time to remain registered until car stops in response to that call at that landing.
  3. If hoistway door is not opened within a short interval after car has stopped at terminal allow car to respond to any call from the other landing.
- B. Firefighter's Emergency Operation:
1. Provide "Firefighter's Operation" in accordance with ASME A17.1.
  2. Designated Landing: Main floor.
  3. Alternate Landings: Second floor.
- C. Independent Service:
1. Provide key operated "Independent Service" on car operating panel. Key activation will remove that car from normal operation and cancel all pre-registered car calls.
  2. Car will respond to selected floor. Car will not respond to any calls from hall call buttons. Car will only respond to calls placed on the car operating panel. Doors will remain open at last landing requested. Doors will close with a constant pressure on "DOOR CLOSE" button.
  3. Key activation to normal operation will return car to normal operation.

- D. Shunt Trip: Provide means installed in accordance with NFPA 72 to automatically disconnect power supply to elevator prior to activating automatic sprinkler within elevator hoistway or machine room.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for manufacture and installation of elevator system.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.
- C. Interactive Monitor Display at Machine Room:
  1. The system shall be provided with a monitoring, interactive keyboard command and diagnostic computer. A printer to provide written data shall be included.
  2. Individual car functions and group functions shall be monitored, displayed on a color monitor, and stored in memory. The system shall have the capability to recall time segments of the recorded data and display it for viewing on the monitor and printouts.
  3. Individual car functions that are to be monitored shall consist of car direction, car position, car movement, door position, door movement, car calls, car status and car load.
  4. Group functions that are to be monitored shall consists of registered hall calls length of registered hall calls, group status, cars in group, hall call assignments.
  5. Faults or deviations from normal shall be recorded for diagnostic purposes.
  6. The monitored data shall be summarized and be capable of being recalled to be displayed in graph and chart form on any connected monitor. The system shall be capable of interfacing with building management systems. Print out capabilities for permanent copies shall be available at any of the monitoring locations. The system shall be capable of remote monitoring by modem.

## 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit data on the following items:
  1. Signal and operating fixtures, operating panels, indicators.
  2. Cab design, dimensions, layout, and components.
  3. Cab and hoistway door and frame details.
  4. Electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate the following information:
  1. Section view, floor heights, location of pit equipment, location and means for disconnect.
  2. Motor and hydraulic pump, valves, piping, controller, selector, and other component locations.
  3. Car, guide rails, buffers, and other components in hoistway.
  4. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
  5. Individual weight of principal components; load reaction at points of support.
  6. Loads on hoisting beams.
  7. Clearances and over travel of car.
  8. Locations in hoistway and machine room of connections for car light and telephone.
  9. Location and sizes of access doors, doors, and frames.
  10. Expected heat dissipation of elevator equipment in machine room.
  11. Applicable seismic design data; certified by a registered professional engineer.
  12. Interface with building security system.
  13. Electrical characteristics and connection requirements.



- 14. Show arrangement of equipment in machine room so moving elements and other equipment can be removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.
- 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.
- 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. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

### **1.7 CLOSEOUT SUBMITTALS**

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data:
  - 1. Include a parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
  - 2. Provide technical information for servicing operating equipment.
  - 3. Include legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment and changes made in the Work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.
  - 4. Provide one copy of master electric and hydraulic schematic and one copy of lubrication chart.

### **1.8 QUALITY ASSURANCE**

- A. Perform Work in accordance with ASME A17.1, AWS D1.1, AISC S335, and as supplemented in this section.
- B. Fabricate and install door and frame assemblies in accordance with NFPA 252, NFPA 80 and UL 10B.
- C. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- D. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.

### **1.9 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Installer: Employees and supervisor on payroll of elevator equipment manufacturer.

### **1.10 PRE-INSTALLATION MEETING**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing Work of this section.
- C. Require attendance of persons directly involved with the Work of this section.
- D. Review schedule of installation, installation procedures and conditions, and coordination with related Work.
- E. Review temporary use of elevator for construction purposes, hours of use, scheduling of its use, cleanliness of cab, employment of operator, and maintenance of system.

**1.11 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**1.12 WARRANTY**

- A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.
- B. Provide five (5) years elevator manufacturer's written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care, after acceptance thereof by beneficial use.

**1.13 MAINTENANCE SERVICE**

- A. Section 01 77 00 - Closeout Procedures: Maintenance service agreements.
- B. Provide service and maintenance of elevator system and components for one (1) year from Date of Substantial Completion.
- C. Examine system components monthly. Clean, adjust, and lubricate equipment.
- D. Include systematic examination, adjustment, and lubrication of elevator equipment; maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment.
- E. Perform work without removing cars during peak traffic periods.
- F. Provide emergency call back service at all hours for this maintenance period.
- G. Maintain locally, near the Place of the Work, an adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure the fulfillment of this maintenance service, without unreasonable loss of time.
- H. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer or original installer.
- I. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

**1.14 EXTRA MATERIALS**

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Supply two extra keys.

**PART 2 PRODUCTS****2.1 HYDRAULIC PASSENGER ELEVATORS**

- A. Manufacturers:
  1. Kone, Inc.
  2. Otis Elevator Company.
  3. Schindler Elevator Corp. - Model 330A Holeless Hydraulic Elevator. (Basis of Design)
  4. ThyssenKrupp Elevator - TwinPost Above Ground Model.

**2.2 COMPONENTS**

- A. Materials:

1. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.
  2. Sheet Steel: ASTM A653/A653M, zinc coated to G90.
  3. Stainless Steel: ASTM A666 Type 304.
  4. Aluminum: ASTM B221, extruded.
  5. Plywood: APA/EWA Structural I, Grade C-D, sanded.
  6. Plastic Laminate: NEMA LD-3, general purpose type, 0.050 inch thick; color/pattern and surface finish as selected.
    - a. Laminate Color Selection: Select from Wilsonart®, Nevamar®, and Formica® color chainsets.
  7. Shop Primer and Touch-Up Primer: SSPC 15, Type 1, red oxide.
  8. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic zinc rich.
  9. Primer for Wood Surfaces: Alkyd primer sealer.
  10. Finish Paint (for Metal Surfaces): Alkyd enamel, semi-gloss, color as selected.
- B. Equipment:
1. Motor, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring and Devices, Indicators.
  2. Guide Rails, Cables, Spring Buffers, Attachment Brackets and Anchors: Purpose designed, sized according to code with safety factors.
- C. Lubrication:
1. Grease Fittings: For lubricating bearings requiring periodic lubrication.
  2. Lubrication Points: Visible and easily accessible.
- D. Car Fabrication:
1. Frame: Rigid and braced, rolled or formed steel sections, mounted on resilient isolators.
  2. Platform: Steel frame, with fire retardant treated plywood subflooring assembly, ready to receive floor finish.
- E. Cab Fabrication:
1. Flooring: As indicated on Drawing. If not indicated on Drawings, 12 x 12 inches, VCT, of type specified in Section 09 65 00.
  2. Walls: Plastic laminate on plywood, vertical panel configuration.
  3. Front Return Panel: Stainless steel, brushed.
  4. Base: Baked enamel on steel, recessed.
  5. Ceiling: Suspended, illuminated. Accommodate emergency access.
  6. Light Fixtures: Strip fluorescent.
  7. Ventilation: Two speed fan, grille above ceiling.
  8. Control Panel and Face Plate: Stainless steel, brushed with illuminating call buttons.
  9. Position Indicator: Above control panel with illuminating position indicators.
  10. Hand Rail: Stainless steel, cylindrical, spaced from wall 1-1/2 inches; placed at rear wall and side walls.
  11. Pad Hooks: Stainless steel type, mounted at 92 inches high, in all cabs.
  12. Protective Pads: One set, canvas cover, padded with cotton wadding fill material, sewn with piping edges; brass grommets spaced to match pad hook spacing in cab, covering side and rear walls and front return, except cut-out for control panel.
  13. Certificate Frame and Glazing: Metal frame, clear plastic attached with tamper proof screws.
- F. Cab Entrances:
1. Cab Doors: Stainless steel; 0.058 inch thick metal, of hollow sandwich panel construction, flush design, rolled profiles, rigid construction. Fabricate front return panels same as doors.

2. Cab Door Frames: Stainless steel; 0.058 inch thick metal, welded corner design with smooth invisible joints.
  3. Thresholds: Extruded aluminum type.
- G. Hoistway Entrances:
1. Hoistway Doors: Baked enamel on steel; 0.058 inch thick metal, of hollow sandwich panel construction, flush design, rolled profiles, rigid construction.
  2. Hoistway Door Frames: Baked enamel on steel; 0.0625 inch thick metal, of rolled profiles, welded corner with smooth invisible joints.
  3. Door and Frame Construction: 1-1/2 hour fire rating; insulated sandwich panel door construction 1-1/4 inch thick, minimum.
  4. Sills: Extruded aluminum.
- H. Car Operating Panel:
1. Provide one flush mounted operating panel per car with applied face plate; with front return panels containing key operator corresponding to floors served, in car alarm button, and DOOR OPEN, DOOR CLOSE buttons.
  2. Include matching service cabinet integral with front return panel, with hinged door and lock in each car containing:
    - a. Independent service switch
    - b. Inspection switch
    - c. Fan or blower switch
    - d. Light switch test switch
    - e. Emergency light
    - f. Additional operating switches for the special features specified.
  3. Locate a 110 V, 15 A convenience receptacle in service cabinet.
  4. Car Position Indicators: Illuminated.
  5. Telephone Cabinet: Provide telephone.
- I. Landing Controls:
1. Landing Controls:
    - a. Illuminating button type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; all buttons marked with arrows.
  2. Landing Position Indicators: Illuminating white
  3. Car Direction Indicators: Illuminating white

### 2.3 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Division 26 - Electrical: Requirements for motors.
1. 30 hp.
  2. Voltage: Confirm with electrical provisions on Drawings prior to submission of Submittals; 460 volts, three phase, 60 Hz.
  3. Starter: Reduced voltage, Wye Delter start.
- B. Division 26 - Electrical: Wiring connection requirements for electrical characteristics.
1. Disconnect Switch: Factory mount disconnect switch on equipment.
  2. Boxes, Conduit, Wiring, and Devices.
  3. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when a separate grounding conductor is also installed across the joint.
  4. Spare Conductors: Include 10 percent extra conductors and two pairs of shielded audio cables in traveling cables. Do not parallel conductors to increase electric current capacity unless individually fused.
  5. Do not use armored flexible metal conduit as a grounding conductor.

6. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.

## 2.4 FACTORY FINISHING

- A. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
- B. Machine Room Components: Clean and degrease; prime one coat, finish with two coats of enamel.
- C. Galvanized Surfaces: Clean with neutralizing solvent; prime one coat.
- D. Aluminum: Clear anodized finish.
- E. Wood Surfaces not Exposed to Public View: One coat primer; one coat enamel.
- F. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of primer sprayed and baked; two coats of enamel sprayed and baked; color as selected.
- G. Stainless Steel: No. 4 Satin Polished.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that hoistway, pit, and machine room are ready for work of this section.
- C. Verify hoistway shaft and openings are of correct size and within tolerance.
- D. Verify that electrical power is available and of the correct characteristics.

### 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. Arrange for temporary electrical power for installation work and testing of elevator components.

### 3.3 INSTALLATION

- A. Install in accordance with ASME A17.1.
- B. Install system components. Connect equipment to building utilities. Install piping between hoistway plunger and pump unit.
- C. Provide conduit, boxes, wiring, and accessories.
- D. Mount motor and pump unit on vibration and acoustic isolators. Securely fasten to building supports. Prevent lateral displacement.
- E. Accommodate equipment in space indicated.
- F. Install guide rails using threaded bolts and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.
- G. Accurately align guide rails. Form smooth joints with machined splice plates.

- H. Bolt or weld brackets directly to structural steel hoistway framing.
- I. Bolt brackets to self drilling expansion shell anchors that will perform to four times the rated pull-out load.
- J. Field Welds: Chip and clean away oxidation and residue, wire brush; spot prime with two coats.
- K. Coordinate installation of hoistway wall construction.
- L. Install hoistway door sills, frames, and headers in hoistway walls. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
- M. Fill hoistway door frames solid with grout and grout sills in accordance with Section 04810.
- N. Adjust equipment for smooth and quiet operation.

### **3.4 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.
- C. Cab Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

### **3.5 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation and testing.
- B. Perform tests required by ASME A17.2.
- C. Provide two weeks written notice of date and time of tests.
- D. Supply instruments and execute specific tests.

### **3.6 MANUFACTURER'S FIELD SERVICES**

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Obtain required permits to perform tests. Perform tests required by regulatory agencies.
- C. Schedule tests with agencies and Architect/Engineer, Owner, and Contractor present.
- D. Furnish test and approval certificates issued by jurisdictional authorities.

### **3.7 ADJUSTING**

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- C. Adjust automatic floor leveling feature at each floor to provide stopping zone of 1/4 inch.

### **3.8 CLEANING**

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove protective coverings from finished surfaces.
- C. Clean surfaces and components ready for inspection.

**3.9 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not permit construction traffic within cab after cleaning.

**3.10 DEMONSTRATION AND TRAINING**

- A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of component of the installed Work.

**3.11 ELEVATOR SCHEDULE**

- A. Elevator:
  - 1. Elevator Type: Holeless type, passenger.
  - 2. Rated Capacity: 3500 lbs.
  - 3. Rated Speed: 110 ft/min.
  - 4. Operation System: TAC50.
  - 5. Travel: 15'-4".
  - 6. Landings: 2 total.
  - 7. Openings:
    - a. Front: 2.
    - b. Rear: 0.
  - 8. Clear Car Inside: 6' - 8" wide x 5' - 5 1/2" deep.
    - a. Dimensions to accommodate ambulance stretcher per 2018 NCSBC 3002.4, 24" X 84" stretcher.
  - 9. Cab Height: 7' - 10" nominal.
  - 10. Hoistway Entrance Size: 3' - 6" wide x 7'-0" high x Right Hand.
  - 11. Door Type: Single Speed.
  - 12. Power Characteristics: 480 volts, 3 Phase, 60 Hz.
  - 13. Seismic Requirements: Seismic Design Category C, Site Classification D.
  - 14. Hoistway Dimensions: 8' - 4" wide x 6' - 11" deep.
  - 15. Pit Depth: 4' - 0".

**END OF SECTION**

