

SECTION 02 30 00
SUBSURFACE INVESTIGATION

PART 1 – SOIL INVESTIGATION DATA

1.1 INVESTIGATION

- A. An investigation of substrate soil conditions at the building site was authorized by the Owner. The investigation was made by Universal Engineering Service, Inc. and dated December 14, 2018.

1.2 REPORT

- A. Subsurface Investigation Program, boring location map and logs of test borings are bound herein for information only.
- B. Report and log of soil borings is available for all bidders, and may be found behind this Section. The requirements in this report are a part of the project. The report is not a warranty of subsurface conditions.

1.3 INTERPRETATION

- A. Bidders are expected to examine the site and the subsurface investigation reports, then decide for themselves the character of materials to be encountered.
- B. The Owner and the Architect/Engineer disclaim any responsibility for the accuracy, true location and extent of the soils investigation that has been prepared by others. They further disclaim responsibility for the interpretation of the data by Bidders, as in projecting soil bearing values, soil stability, and the presence, level, and extent of underground water.

END OF SECTION

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REPORT OF A GEOTECHNICAL EXPLORATION

**St. Johns River State College Student Services
Building Addition
St. Augustine, Florida**

December 14, 2018

**PROJECT NO. 0930.1800265.0000
REPORT NO. 1631220**

Prepared For:

Akel, Logan & Shafer
704 Rosselle Street
Jacksonville, Florida 32204

Prepared By:

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CONSULTANTS:

**Geotechnical Engineering ▪ Environmental Engineering ▪ Construction Materials Testing
Threshold Inspection ▪ Private Provider Inspection**

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December 14, 2018

Akel, Logan & Shafer
704 Rosselle Street
Jacksonville, Florida 32204

Attention: Ms. Melody Bishop

Reference: **REPORT OF A GEOTECHNICAL EXPLORATION**
St. Johns River State College Student Services Building Addition
St. Augustine, Florida
UES Report No. 1631220

Dear Ms. Bishop:

Universal Engineering Sciences, Inc. (UES) has completed a geotechnical exploration at the site of the proposed project located St. Augustine, This report presents the results of our subsurface exploration, an engineering evaluation with respect to the project characteristics described to us, and recommendations for groundwater control, foundation design, and site preparation. A summary of our findings is as follows:


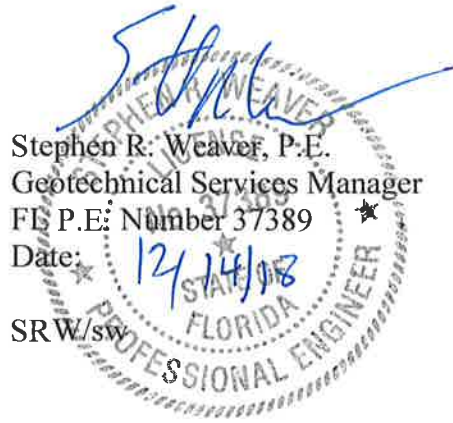
- The borings generally encountered loose to medium dense fine sand (SP) and slightly silty fine sand (SP-SM) in the upper 7.5 to 9 feet underlain by medium dense to very dense fine sand with trace to many shell fragments (SP) to the deepest boring termination depth of 50 feet. As exceptions, boring B-1 encountered very loose silty fine sand (SM) at a depth range of 5 to 8 feet and boring B-3 encountered very loose fine sand (SP) at a depth range of 7.5 to 9.8 feet.
- The stabilized groundwater level was encountered at depths ranging from 2.9 to 3.5 feet below the existing grade at the time of drilling. We estimate the seasonal high groundwater level will occur approximately 1.5 to 2 feet below the existing ground surface at the time of our exploration.
- Assuming the building addition will be constructed in accordance with our Site Preparation Recommendations, we have recommended the proposed structure addition be supported on a conventional, shallow spread foundation system with an allowable soil bearing pressure of 2,500 pounds per square foot.

- We recommend normal, good practice site preparation techniques to prepare the existing subgrade to support the proposed structure addition. These techniques include stripping the construction areas of any topsoil and vegetation; compacting the subgrade with a vibratory drum roller, and placing engineered fill to the desired grades

We trust this report meets your needs and addresses the geotechnical issues associated with the proposed construction. We appreciate the opportunity to have worked with you on this project and look forward to a continued association. Please do not hesitate to contact us if you should have any questions, or if we may further assist you as your plans proceed.

Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES, INC.


Stephen R. Weaver, P.E.
Geotechnical Services Manager
FE P.E. Number 37389
Date: 12/14/18
SRW/sw




Jacob Fuller
Staff Geotechnical Engineer



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1.0 INTRODUCTION

In this report, we present the results of the subsurface exploration of the site for the proposed project located in St. Augustine, Florida. We have divided this report into the following sections:

- SCOPE OF SERVICES - Defines what we did
- FINDINGS - Describes what we encountered
- RECOMMENDATIONS - Describes what we encourage you to do
- LIMITATIONS - Describes the restrictions inherent in this report
- APPENDICES - Presents support materials referenced in this report

2.0 SCOPE OF SERVICES

2.1 PROJECT DESCRIPTION

Project information was provided to us in recent correspondence with you. We were provided with a copy of a Google Earth aerial showing an the layout of the proposed construction overlain on the existing site layout.

We understand that the project consists of construction of an addition to the student services building at the St. Johns River State College St. Augustine campus. The addition will be a one-story structure with a plan area of 5,000 square feet. Detailed structural loading information has not been provided to us, therefore we assume maximum column and wall loads will not exceed 75 kips and 3 klf, respectively. Detailed grading information has not been provided, therefore we assume maximum elevating fill heights will generally not exceed 2 feet, with the exception that up to four feet of fill may be required in the area of the existing truck well.

Our recommendations are based upon the above considerations. If any of this information is incorrect, or if you anticipate any changes, please inform Universal Engineering Sciences so that we may review and revise our recommendations, as necessary.

2.2 PURPOSE

The purposes of this geotechnical exploration were:

- to explore the general subsurface conditions at the site;
- to interpret and evaluate the subsurface conditions with respect to the proposed construction; and
- to provide geotechnical engineering recommendations for groundwater control, foundation design, and site preparation.

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The recovered samples were not examined, either visually



or analytically, for chemical composition or environmental hazards. Universal Engineering Sciences would be pleased to perform these services, if you desire.

Our exploration was confined to the zone of soil likely to be stressed by the proposed construction. Our work did not address the potential for surface expression of deep geological conditions. This evaluation requires a more extensive range of field services than performed in this study. We will be pleased to conduct an investigation to evaluate the probable effect of the regional geology upon the proposed construction, if you desire.

2.3 FIELD EXPLORATION

A field exploration was performed on December 5, 2018. The approximate boring locations are shown on the Boring Location Plan in Appendix A. The approximate boring locations were determined in the field by our personnel using taped measurements from existing site features shown on the Site Plan furnished to us and should be considered accurate only to the degree implied by the method of measurement used. Samples of the soils encountered will be held in our laboratory for your inspection for 60 days unless we are notified otherwise.

2.3.1 SPT Borings

To explore the subsurface conditions within the area of the proposed structure addition, we located and drilled three (3) Standard Penetration Test (SPT) borings to depths of approximately 20 to 50 feet below the existing ground surface in general accordance with the methodology outlined in ASTM D 1586. A summary of this field procedure is included in Appendix A. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory for further evaluation.

2.4 LABORATORY TESTING

Representative soil samples obtained during our field exploration were returned to our office and examined by a geotechnical engineer. The samples were visually classified in general accordance with ASTM D 2488 (Unified Soil Classification System).

Five (5) fines content tests and five (5) moisture content tests were conducted in the laboratory on representative soil samples obtained from the borings. These tests were performed to aid in classifying the soils and to help quantify and correlate engineering properties. The results of these tests are presented on the Boring Logs in Appendix A. A brief description of the laboratory procedures used is also provided in Appendix A.

3.0 FINDINGS

3.1 SOIL SURVEY

Based on the Soil Survey data for St. Johns County, Florida, as prepared by the US Department of Agriculture Soil Conservation Service, the predominant predevelopment soil types at the site



are identified as Immokalee (7) and Paola (23). A summary of characteristics of this soil series was obtained from the Soil Survey and is included in Table 1.

TABLE 1						
Summary of Soil Survey Information						
Soil Type	Constituents	Hydrologic Group	Natural Drainage	Soil Permeability (Inches/Hr)		Seasonal High Water Table
Immokalee (7)	0-8"	Fine sand	B/D	Poorly Drained	0-40"	0 – 1.0
	8-80"	Fine sand, sand			40- 6.0-20	
					64" 0.6-2.0	
					64- 6.0-20	
					80"	
Paola (23)	0-17"	Fine sand	A	Excessively Drained	0-17"	>6.0
	17- 80"	Sand, fine sand			17- >20	
					80" >20	

3.2 SURFACE CONDITIONS

The site of the proposed project is located on the east side of Kenton Morrison Road at the existing St. Johns River State College campus in St. Augustine, FL. The site of the proposed building addition is to the south of the existing student services building and will partially extend into the parking area just south of the existing building. The area is mostly paved with grass areas on the east and west of the paved area and is visually relatively level except for the truck well area to the south of the existing building which is approximately 3 feet lower. The existing building visually appears to be in relatively good condition.

3.3 SUBSURFACE CONDITIONS

The boring locations and detailed subsurface conditions are presented in Appendix A: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are based upon visual characterizations of the recovered soil samples. Also, see Appendix A: Key to Boring Logs, for further explanation of the symbols and placement of data on the Boring Logs.

3.3.1 Soil Conditions

Table 2: General Soil Profile summarizes the soil conditions encountered.



TABLE 2 General Soil Profile		
Typical depth (ft)		Soil Descriptions
From	To	
0	7.5 to 9	Loose to medium dense fine sand (SP) and slightly silty fine sand (SP-SM)
7.5 to 9	50*	Medium dense to very dense fine sand with trace to many shell fragments (SP)
* Termination Depth of Deepest Boring () Indicates Unified Soil Classification		

As exceptions, boring B-1 encountered very loose silty fine sand (SM) at a depth range of 5 to 8 feet and boring B-3 encountered very loose fine sand (SP) at a depth range of 7.5 to 9.8 feet.

The stabilized groundwater level was encountered at depths ranging from 2.9 to 3.5 feet below the existing grade at the time of drilling. We estimate the seasonal high groundwater level will occur approximately 1.5 to 2 feet below the existing ground surface at the time of our exploration.

4.0 RECOMMENDATIONS

4.1 GENERAL

In this section of the report, we present our detailed recommendations for groundwater control, building addition foundation, site preparation, and construction related services. The following recommendations are made based upon a review of the attached soil test data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. We recommend that UES be provided the opportunity to review the project plans and specifications to confirm that our recommendations have been properly interpreted and implemented. If the structural loadings or the building location changes significantly from that discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes. The discovery of any subsurface conditions during construction which deviate from those encountered in the borings should be reported to us immediately for observation, evaluation and recommendations.

4.2 GROUNDWATER CONTROL

The groundwater table will fluctuate seasonally depending upon local rainfall. The rainy season in northeast Florida is normally between June and September. Based upon our review of U.S.G.S. data, Duval County Soils Survey and regional hydrogeology, it is our opinion the seasonal high groundwater level will occur 1.5 to 2 feet below the existing ground surface at the time of our exploration.



Note that it is possible the estimated seasonal high groundwater levels will temporarily exceed these estimated levels during any given year in the future. Should impediments to surface water drainage exist on the site or should rainfall intensity and duration, or total rainfall quantities exceed the normally anticipated rainfall quantities, groundwater levels may exceed our seasonal high estimates. We recommend positive drainage be established and maintained as needed on the site during construction. We further recommend permanent measures be constructed to maintain positive drainage away from the proposed structures throughout the life of the project.

We recommend all foundation and pavement grade designs be based on the seasonal high groundwater conditions.

4.3 BUILDING FOUNDATION

Based on the results of our exploration, we consider the subsurface conditions at the site adaptable for support of the proposed structure additions when constructed on a properly designed conventional shallow foundation system. Provided the site preparation and earthwork construction recommendations outlined in Section 4.5 of this report are performed, the following parameters may be used for foundation design.

4.3.1 Bearing Pressure

The maximum allowable net soil bearing pressure for use in shallow foundation design should not exceed 2,500 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The foundations should be designed based on the maximum load which could be imposed by all loading conditions.

4.3.2 Foundation Size

The minimum widths recommended for any isolated column footings and continuous wall footings are 24 inches and 18 inches, respectively. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the minimum size of the foundations.

4.3.3 Bearing Depth

The exterior foundations should bear at a depth of at least 18 inches below the finished exterior grades and the interior foundations should bear at a depth of at least 12 inches below the finish floor elevation to provide confinement to the bearing level soils. It is recommended that stormwater be diverted away from the building exteriors to reduce the possibility of erosion beneath the exterior footings.

4.3.4 Bearing Material

The foundations may bear in either the compacted suitable natural soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities equivalent to at least 95



percent of the Modified Proctor maximum dry density (ASTM D 1557) to a depth of at least one foot below the foundation bearing level.

4.3.5 Stabilization of Existing Foundations

During excavation of the proposed footings in close proximity to footings supporting the existing structure, it may be required to stabilize the existing footings to preclude settlement of the existing structure. If warranted, the stabilization of the existing footings should be the responsibility of the contractor, but could include bracing/shoring, underpinning, and/or chemical grouting.

4.3.6 Foundation Considerations

The foundations in areas adjacent to the existing structure may need special consideration. It is recommended that the additions be structurally independent of the existing building, since the additional loads of the structure addition on existing footings may cause detrimental settlement and unsightly cracking. For the same reason, new footings should be located in such a way that the stresses under new footings will not overstress the soil under existing footings. This problem applies to new footings in the critical zone which extends about 5 feet laterally from the existing footings.

4.3.7 Settlement Estimates

Post-construction settlements of the structure addition will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the contractor. Our settlement estimates for the structure addition are based on the use of site preparation/earthwork construction techniques as recommended in Section 4.5 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlements of the structure addition.

Due to the sandy nature of the near-surface soils, we expect the majority of settlement to occur in an elastic manner and fairly rapidly during construction. Using the recommended maximum bearing pressure, the assumed maximum structural loads and the field data which we have correlated to geotechnical strength and compressibility characteristics of the subsurface soils, we estimate that total settlements of the structure addition should be on the order of one inch or less.

Differential settlements result from differences in applied bearing pressures and variations in the compressibility characteristics of the subsurface soils. Because of the general uniformity of the subsurface conditions and the recommended site preparation and earthwork construction techniques outlined in Section 4.5, we anticipate that differential settlements of the structure addition should be on the order of ½ inch or less. It should be anticipated that differential settlements on the order of 1 inch could occur between foundations supporting the proposed addition and the existing structure.



4.3.8 Floor Slab

The floor slabs can be constructed as a slab-on-grade member using a modulus of subgrade reaction (K) of 100 pounds per cubic inch (pci) provided the subgrade materials are compacted as outlined in Section 4.5. It is recommended the floor slab bearing soils be covered with an impervious membrane to reduce moisture entry and floor dampness. A 10-mil thick plastic membrane is commonly used for this purpose. Care should be exercised not to tear large sections of the membrane during placement of reinforcing steel and concrete.

4.4 SITE PREPARATION

We recommend normal, good practice site preparation procedures. These procedures include: removing the existing structures and associated utilities and foundations, trees and associated root systems from the construction areas, stripping the construction areas of topsoil and vegetation; compacting the subgrade with a vibratory drum roller and placing engineered fill to the desired grades. A more detailed synopsis of this work is as follows:

1. Prior to construction, the location of any existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may subsequently lead to excessive settlement of overlying structure(s).
2. The stabilized groundwater level was encountered at depths ranging from 2.9 to 3.5 feet below the existing grade at the time of drilling. We estimate the seasonal high groundwater level will occur approximately 1.5 to 2 feet below the existing ground surface at the time of our exploration. The groundwater level should be maintained at least 1 foot below any excavations and 2 feet below the surface of any vibratory compaction procedures.
3. Remove existing utilities and pavements. Strip away the existing vegetation, topsoils and other deleterious materials from within the proposed construction limits. Root rake the exposed subgrade soils (in perpendicular directions) to a depth of at least 12 inches to help locate and remove large roots, extensive root systems and pieces of organic debris that may occur just below the ground surface. The surface stripping and root raking should be performed within and 5 feet beyond the perimeter of the proposed building addition areas. Expect typical stripping at this site to a depth of 6 to 12 inches more or less. Some isolated areas may require more than a foot of stripping or undercutting to remove the root systems of underbrush or trees.
4. Compact the subgrade from the surface with a medium weight vibratory drum roller (a 3- to 4-ton roller, static weight and 3- to 4-foot drum diameter) until you obtain a minimum density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), to a depth of 2 feet below the compacted surface. The surface compaction should be conducted after making any required earthwork cuts but prior to fill placement. Typically, the soils should exhibit moisture contents within ± 2 percent of the Modified Proctor optimum moisture content during compaction. A minimum of eight (8) complete coverages



(in perpendicular directions) should be made in the building addition construction area with the roller to improve the uniformity and increase the density of the underlying sandy soils.

Should the bearing level soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated and (1) the disturbed soils removed and backfilled with dry structural fill soils which are then compacted, or (2) the excess pore pressures within the disturbed soils allowed to dissipate before recompacting.

5. Care should be exercised to avoid damaging any nearby structures while the compaction operation is underway. The existing conditions of any adjacent structures should be documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to the adjacent structures. Universal Engineering Sciences can provide vibration monitoring services to help document and evaluate the effects of the surface compaction operation on existing structures. In the absence of vibration monitoring it is recommended the vibratory roller remain a minimum of 50 feet from existing structures. Within this zone, use of a bulldozer or a vibratory roller operating in the static mode is recommended.
6. Test the subgrade for compaction in the building addition area at a frequency of not less than one test per 2,500 square feet, or a minimum of two test locations, whichever is greater.
7. Place fill material, as required. The fill should consist of an inorganic, non-plastic granular soil with less than 10 percent soil fines (relatively clean fine sand). Typically, the soils should exhibit moisture contents within ± 2 percent of the Modified Proctor optimum moisture content during compaction. Place fill in uniform 10- to 12-inch loose lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density.
8. Perform compliance tests within the fill/backfill at a frequency of not less than one test per 2,500 square feet per lift in the building addition area, or at a minimum of two tests, whichever is greater.
9. Test all footing cuts for compaction to a depth of 2 feet. Additionally, we recommend you conduct density testing in every column footing, and every 100 linear feet in wall footings. Recompanction of the foundation excavation bearing level soils, if loosened by the excavation process, can probably be achieved by making several coverages with a light weight walk-behind vibratory sled or roller.

4.5 CONSTRUCTION RELATED SERVICES

We recommend the owner retain Universal Engineering Sciences to perform construction materials tests and observations on this project. Field tests and observations include verification of foundation and pavement subgrades by performing quality assurance tests on the placement of



compacted structural fill and pavement courses. We can also provide concrete testing, pavement section testing, structural steel testing, and general construction observation services.

The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address problems that might arise during construction in a timely and cost-effective manner.

5.0 LIMITATIONS

Our geotechnical exploration has been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Universal Engineering (UES) is not responsible for any independent conclusions, interpretation, opinions or recommendations made by others based on the data contained in this report.

This report does not reflect any variations which may occur away from the soil borings. The discovery of any site or subsurface condition during construction which deviates from the data obtained during this geotechnical exploration should be reported to us for our evaluation. Also, in the event of any change to the location of the structures, please contact us so that we can review our recommendations.

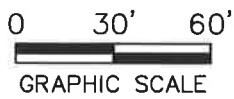
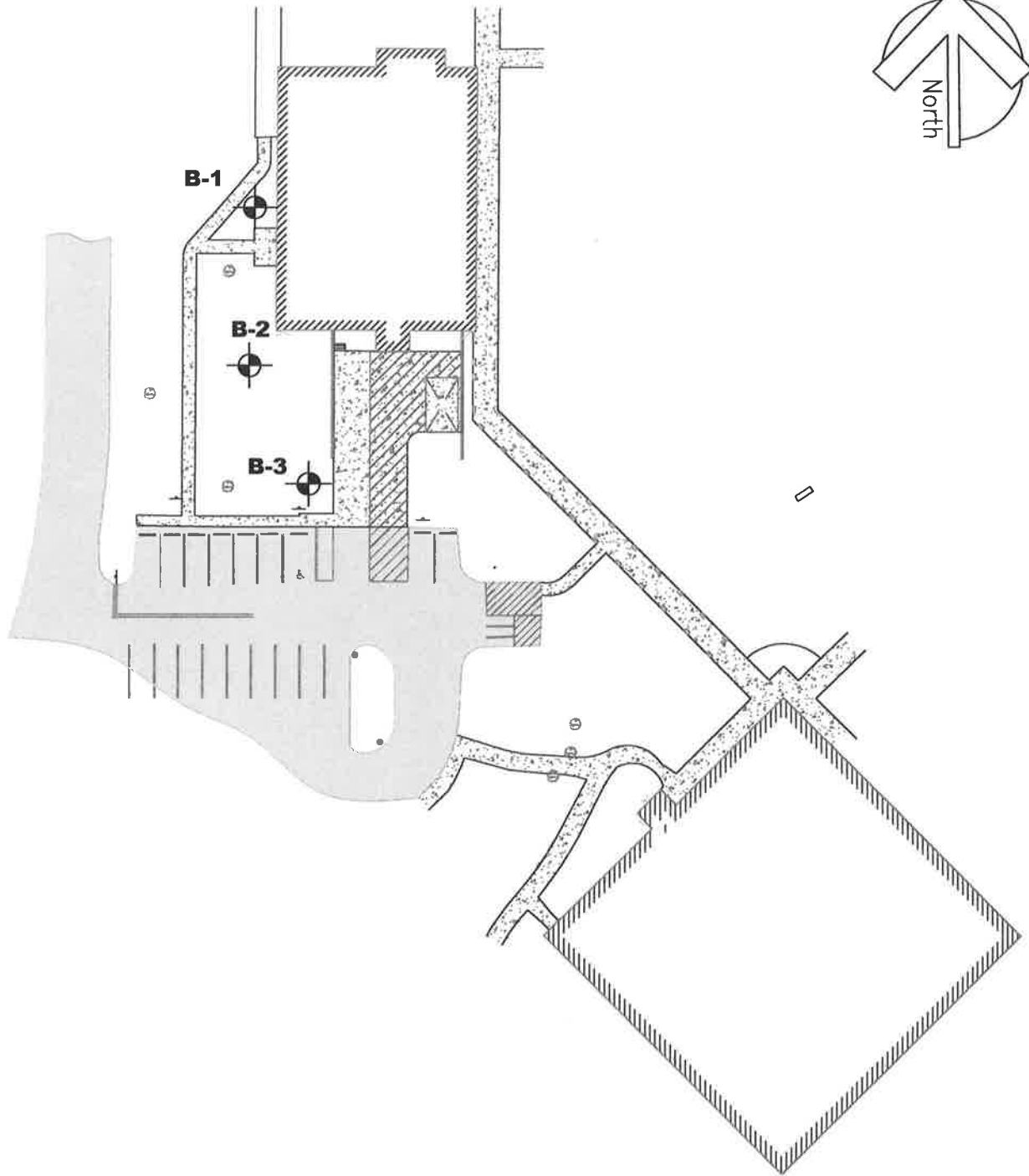
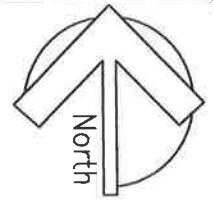
During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An Association of Engineering Firms Practicing in the Geosciences (ASFGE) publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix B, and will help explain the nature of geotechnical issues.

Further, we present documents in Appendix B: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report and the General Conditions under which our services are provided.



APPENDIX A

**BORING LOCATION PLAN
SOIL BORING PROFILES
BORING LOGS
KEY TO BORING LOGS
FIELD EXPLORATION PROCEDURES
LABORATORY TESTING PROCEDURES**



LEGEND

 SPT BORING LOCATIONS

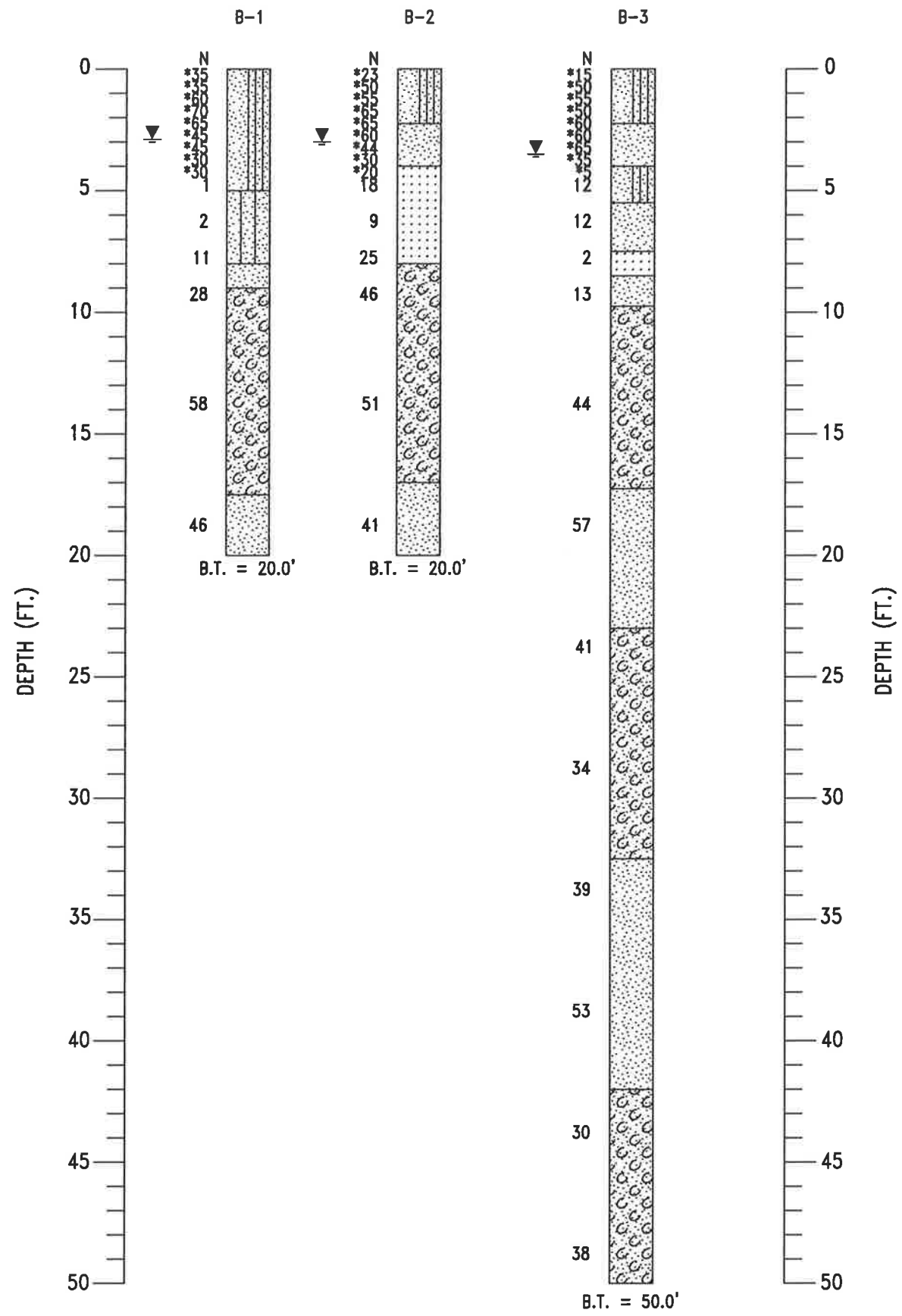


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GEOTECHNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

BORING LOCATION PLAN

REVISED BY: TW	DATE: 12/13/18	CHECKED BY: JF	DATE: 12/13/18
SCALE: 1"=60'	PROJECT NO: 0930.1800265.0000	REPORT NO:	PAGE NO: A-1



LEGEND

- Sand (SP)
- Slightly Silty Sand (SP-SM)
- Slightly Silty Sand (Hardpan) (HP)
- Silty Sand (SM)
- Sand with Many Shell Fragments (SP)
- Groundwater Table
- BT Boring Termination Depth
- N SPT Blow Count

CLIENT:	AKEL, LOGAN, AND SHAFER	
	DRAWN BY: TW	DATE: 12/14/18
GEOTECHNICAL EXPLORATION		CHECKED BY: JF
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION		SCALE: AS SHOWN
ST. AUGUSTINE, FLORIDA		PROJECT NO: 0930.1800265.0000
SOIL BORING PROFILES		REPORT NO:
 UNIVERSAL ENGINEERING SCIENCES		
PAGE NO: FIGURE 1A		



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0930.1800265.0000

REPORT NO.:

PAGE: A-1

PROJECT: GEOTECHNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION SECTION:
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-1**
TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: AKEL, LOGAN AND SHAFER

G.S. ELEVATION (ft):

DATE STARTED: 12/5/18

LOCATION: SEE BORING LOCATION PLAN

WATER TABLE (ft): 2.9

DATE FINISHED: 12/5/18

REMARKS:

DATE OF READING: 12/5/18

DRILLED BY: S. TORRES

EST. W.S.W.T. (ft):

TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLING	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0			*35 *35 *60 *70 *65 *45 *45 *30 *30	▼	SP-SM	Medium dense dark brown to gray slightly Silty fine SAND with some Shell fragments (SP-SM)						
5		1-1-1/12"	1		SM	Very loose brown Silty fine SAND (SM)						
		1-1	2		SP	Medium dense brown fine SAND (SP)						
		1-5-6	11		SP	Medium dense to very dense light gray fine SAND with many Shell fragments (SP)	2.6	21.2				
10		6-10-18	28		SP							
15		10-26-32	58		SP		2.5	21.9				
					SP	Dense light brown fine SAND with trace Shell fragments (SP)						
20		12-18-28	46		SP							

BORING LOG 0930.1800265.0000-ST. JOHNS RIVER STATE COLLEGE STUDENT.GPJ UNIENGS.CDDT 12/13/18



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0930.1800265.0000

REPORT NO.:

PAGE: A-2

PROJECT: GEOTECHNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION SECTION:
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-2**
TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: AKEL, LOGAN AND SHAFER
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.0
DATE OF READING: 12/6/18
EST. W.S.W.T. (ft):
DATE STARTED: 12/6/18
DATE FINISHED: 12/6/18
DRILLED BY: S. TORRES
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLER	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0			*23 *50 *55 *65 *60 *44 *30 *20			Loose to medium dense dark brown slightly Silty fine SAND (SP-SM)						
				▼		Medium dense gray fine SAND (SP)						
5		7-10-8	18			Medium dense to loose brown slightly Silty fine SAND (SP-SM) (Hardpan)	6.4	25.4				
		5-4-5	9									
		5-11-14	25			Medium dense to very dense light gray fine SAND with many Shell fragments (SP)						
10		13-22-24	46									
15		16-21-30	51									
						Dense light brown fine SAND with trace Shell fragments (SP)						
20		18-21-20	41									

BORING LOG 0930.1800265.0000-ST. JOHNS RIVER STATE COLLEGE STUDENT.GPJ UNIENGSC.GDT 12/13/18



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0930.1800265.0000

REPORT NO.:

PAGE: A-3

PROJECT: GEOTECHNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION SECTION:
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-3**
TOWNSHIP:

SHEET: **1 of 2**
RANGE:

CLIENT: AKEL, LOGAN AND SHAFER
LOCATION: SEE BORING LOCATION PLAN
REMARKS:






G.S. ELEVATION (ft):
WATER TABLE (ft): 3.5
DATE OF READING: 12/5/18
EST. W.S.W.T. (ft):
DATE STARTED: 12/5/18
DATE FINISHED: 12/5/18
DRILLED BY: S. TORRES
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0			*15 *50 *55 *50 *60 *60 *65 *35 *5			Loose to medium dense dark brown slightly Silty fine SAND and trace Shell fragments (SP-SM)	3.8	11.6				
						Medium dense brown to light brown fine SAND (SP)						
						Medium dense dark brown slightly Silty fine SAND with Roots (SP-SM)						
5		1-4-8	12			Medium dense to very loose dark brown fine SAND (SP)						
		7-5-7	12			Medium dense dark brown slightly Silty fine SAND (SP-SM) (Hardpan)						
		WOH-1-1	2			Very loose dark brown fine SAND (SP)						
10		WOH-3-10	13			Medium dense to dense light grayish-brown fine SAND with many Shell fragments (SP)						
15		10-20-24	44									
						Very dense light gray fine SAND with trace Shell fragments (SP)						
20		15-25-36	57									
						Dense light gray fine SAND with many Shell fragments (SP)						
25		18-21-20	41									

BORING LOG 0930.1800265.0000-ST. JOHNS RIVER STATE COLLEGE STUDENT GPJ UNIENGS.C.GDT 12/13/18



SYMBOLS AND ABBREVIATIONS

<u>SYMBOL</u>	<u>DESCRIPTION</u>
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
NP	Non-Plastic (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES	
COARSE GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW Well-graded gravels and gravel-sand mixtures, little or no fines	
			GP Poorly graded gravels and gravel-sand mixtures, little or no fines	
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM** Silty sands, sand-silt mixtures	
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays	
		OL	Organic silts and organic silty clays of low plasticity	
	SILTS AND CLAYS Liquid limit greater than 50%	MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts	
		CH	Inorganic clays or clays of high plasticity, fat clays	
		OH	Organic clays of medium to high plasticity	
		PT	Peat, muck and other highly organic soils	

*Based on the material passing the 3-inch (75 mm) sieve
 ** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)

Very loose – Less than 4 Blow/Foot
 Loose – 4 to 10 Blows/Foot
 Medium Dense – 11 to 30 Blows/Foot
 Dense – 31 to 50 Blows/Foot
 Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Sils and Clays)

Very Soft – Less than 2 Blows/Foot
 Soft – 2 to 4 Blows/Foot
 Firm – 5 to 8 Blows/Foot
 Stiff – 9 to 15 Blows/Foot
 Very Stiff – 16 to 30 Blows/Foot
 Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)

Soft – 100 Blows for more than 2 Inches
 Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample

Trace – 5% or less
 With Silt or With Clay – 6% to 11%
 Silty or Clayey – 12% to 30%
 Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample

Trace – Less than 3%
 Few – 3% to 4%
 Some – 5% to 8%
 Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample

Trace – 5% or less
 Few – 6% to 12%
 Some – 13% to 30%
 Many – 31% to 50%

FIELD EXPLORATION PROCEDURES

Standard Penetration Test Boring

The penetration boring was made in general accordance with the latest revision of ASTM D 1586, "Penetration Test and Split-Barrel Sampling of Soils". The boring was advanced by rotary drilling techniques using a circulating bentonite fluid for borehole flushing and stability. At 2 ½ to 5 foot intervals, the drilling tools were removed from the borehole and a split-barrel sampler inserted to the borehole bottom and driven 18 inches into the soil using a 140 pound hammer falling on the average 30 inches per hammer blow. The number of blows for the final 12 inches of penetration is termed the "penetration resistance, blow count, or N-value". This value is an index to several in-place geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler 18 inches (or less if in hard rock-like material), the sampler was retrieved from the borehole and representative samples of the material within the split-barrel were placed in glass jars and sealed. After completing the drilling operations, the samples for each boring were transported to our laboratory where they were examined by our engineer in order to verify the driller's field classification.

LABORATORY TESTING PROCEDURES

Natural Moisture Content

The water content of the sample tested was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of “pore” or “free” water in a given mass of material to the mass of solid material particles.

Percent Fines Content

The percent fines or material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with the latest revision of ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.

APPENDIX B

**IMPORTANT INFORMATION ABOUT THIS
GEOTECHNICAL ENGINEERING REPORT**

CONSTRAINTS AND RESTRICTIONS

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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CONSTRAINTS AND RESTRICTIONS

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not

be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration

and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of investigation. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

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PART 1 - GENERAL**1.01 DESCRIPTION**

- A. Work Included as indicated on the drawings and elsewhere in these Specifications:
1. Selective demolition and removal generally includes the following types of materials and systems:
 - a. Masonry Assemblies
 - b. Concrete slab and pavers
 - c. Partitions
 - d. Ceiling and flooring
 - e. Doors – interior and exterior
 - f. Windows
 - g. Mechanical equipment
 - h. Plumbing fixtures
 - i. Lighting fixtures
 - j. Electrical equipment
 2. Selective demolition and removal generally processes such as:
 - a. Demolishing designated building equipment and fixtures.
 - b. Demolishing designated construction.
 - c. Cutting and alterations for completion of the Work.
 - d. Removing designated items for reuse and Owner's retention.
 - e. Protecting items designated to remain.
 - f. Removing demolished materials.
 3. Protection of existing facilities, hardscape, and landscape, not shown on drawings or specified to be removed, and project controls including such requirements as safeguard of emergency egress, dust control.
 4. Disconnection of existing utilities.
- B. Related Work Specified Elsewhere:
1. Water service disconnections and mechanical modifications: Division 15 - Mechanical.
 2. Electrical modifications: Division 16 – Electrical.
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SUBMITTALS

- A. Closeout: Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition and subsurface obstructions.

1.03 QUALITY ASSURANCE

- A. Contractor Qualifications: Experience in demolition of comparable type and scope.
- B. Conform to applicable local codes for demolition work, dust control, products requiring electrical disconnection and re-connection.
- C. Contact St. Johns River State College immediately upon discovery of any hazardous or contaminated materials.
- D. Obtain required permits from authorities having jurisdiction.

1.04 DISPOSITION OF MATERIAL

- A. All materials and equipment, specified or shown on drawings to be demolished or removed is vested in Contractor upon execution of contract except those items indicated to be turned over to SJRSC, or to be used in new work of this project.
 - 1. Remove and store materials and equipment specified or shown on drawings to be removed and used in new work of this project, in manner that will prevent damage.
 - 2. Columns and/or Walls effected by the Work (to have finishes removed-repaired-painted and Walls to be removed): Remove, store in manner that will prevent damage, and reinstall as directed by Architect: existing clocks, fire extinguishers, wall or column mounted mirrors, medical equipment, tack/bulletin boards, hand sanitizer; toilet room accessories if impacted, and may be reused in new ADA accessible stalls; signs leading into room unaffected by the work and other miscellaneous furnishings and equipment; store and reinstall in location as directed by owner within the building.
 - 3. Remove and transport as directed materials and equipment specified or shown on drawings to be removed and turned over to Owner, in manner that will prevent damage.
 - 4. Remove all materials and equipment, specified or shown on drawings to be demolished or removed, and vested in Contractor from project site.
- B. The Owner will not be responsible for condition, loss, or damage to such property as specified above after execution of contract.

1.05 SCHEDULING AND PROJECT CONDITIONS

- A. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation in Administration Building.
 - 1. Conduct demolition to minimize interference with adjacent and occupied building areas.
 - 2. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.
- B. Coordinate utility and building service interruptions with Owner.
 - 1. Do not disable or disrupt building fire or life safety systems without three (3) days prior written notice to Owner.
 - 2. Schedule tie-ins to existing systems to minimize disruption.
 - 3. Coordinate Work to ensure fire alarms, smoke detectors, emergency lighting, exit signs and other safety systems remain in full operation in occupied areas.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide appropriate temporary signage for exit or building egress.
- B. Do not close or obstruct building egress path.
- C. Do not disable or disrupt building fire or life safety systems without prior written notice to Owner
- D. Notify affected utility companies before starting work and comply with their requirements.
- B. Mark location and termination of utilities.
- C. Erect and maintain temporary barriers and security, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.
- D. Erect and maintain weatherproof closures for exterior openings.
- F. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy as indicated on drawings.
- G. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure such as Mezzanine.

3.02 SALVAGE REQUIREMENTS

- A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
 - 1. Tag components and equipment Owner designates for salvage.
- B. Protect designated salvage items from demolition operations until items can be removed.
- C. Carefully remove building components and equipment indicated to be re-used / salvaged.
 - 1. Disassemble as required to permit removal from building.
 - 2. Package small and loose parts to avoid loss.
 - 3. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
 - 4. Prepare assembly instructions consistent with disassembled parts.
 - 5. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

- I. Properly store items for re-use. Deliver applicable salvaged items to Owner; obtain signed receipt from Owner.

3.03 DEMOLITION

- A. Debris Control:
 - 1. Remove rubbish and debris from site on regular basis acceptable to Owner.
 - 2. Do not allow accumulations inside or outside building.
 - 3. Store materials which cannot be removed regularly only in areas and quantities approved in advance.
- B. Dust Control:
 - 1. Provide protection to check spread of dust to occupied portions of building.
 - 2. Take appropriate action to avoid creation of nuisance in surrounding areas.
 - 3. Do not use water for dust control.
 - 4. Comply with all dust regulations imposed by local air pollution agencies.
- C. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- D. Remove temporary Work.

3.03 SAFETY AND PROTECTION

- A. Buildings:
 - 1. Protect all existing work that is to remain in place by temporary covers, shoring, bracing, and supports.
 - 2. Repair items of work to remain in place damaged during performance of work or replace with new as approved.
 - 3. Do not overload structural elements.
 - 4. Provide new supports or reinforcement for existing construction weakened by demolition or removal of work.
- B. Weather Protection:
 - 1. Where removal of existing roofing or roof-mounted equipment is necessary to accomplish work, have materials and workmen ready to provide adequate and approved temporary covering of exposed areas.
 - 2. Attend temporary coverings as necessary to insure effectiveness and to prevent displacement.
 - 3. Protect building interior and all materials and equipment from weather at all times.
- C. Personnel: Where pedestrian and driver safety is endangered in area of removal work, provide protection as required.

3.04 EXISTING FACILITIES TO BE REMOVED

- A. Masonry Walls and finishes: Remove masonry walls and associated gypsum board assemblies to top of floor slab, bottom of structure or as otherwise indicated, and inside face of columns unless specifically shown otherwise.
- B. Walls and Partitions: Remove interior walls and partitions to top of floor slab unless specifically shown otherwise.

- C. Ceilings: Remove ceilings or portions of ceilings as indicated on drawings; intent is to impact only minimally Toilet Room gyp bd ceilings in Base Bid (additional in Bid Alt 2). Existing fixtures and ceiling mounted devices indicated for reuse or to be turned over to the College, are to be tied up in place, transmitted to College, or secured in another approved manner and reinstalled as indicated on the drawings.
- C. Concrete Slabs: Remove floor slab/sidewalk as shown or as required for utilities.
- D. Utilities:
 - 1. Remove all existing utilities where shown on drawings and terminate in manner conforming to nationally recognized Code covering specific utility and at time satisfactory to Architect.
 - 2. Contact Architect should any existing utilities, structures, etc. be uncovered that are not shown on drawings for direction by Architect; utilities to be abandoned shall be terminated in accordance with drawings and associated sections of these Specifications or if not indicated in a manner conforming to nationally recognized code covering specific utility and at time satisfactory to Architect.
- E. Other building materials, equipment, fixtures, identified within 1.01, A Work Included and 1.04 Disposition of Materials.

3.05 CLEAN-UP

- A. Debris and rubbish: Remove and transport debris and rubbish in manner that will prevent spillage on streets or adjacent areas. Turn-over dump tickets to Owner.
 - 1. Clean-up spillage from streets and adjacent areas.
 - 2. Comply with Federal, state and local hauling disposal regulations.
 - 3. Do not burn materials on site.
- B. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- C. Remove temporary Work.

3.06 LIABILITY OF CONTRACTOR

- A. The Contractor shall be liable of any and all damages to hardscape, landscape, facilities, property, which result from his performance. He shall, without cost to the Owner, restore to the original condition any areas and/or construction damaged, defaced, disturbed, or destroyed by him or his workers.
- B. Protect and preserve the Owner harmless against damage and claims for damage resulting from these activities

End of Section

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design requirements, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. .
 - 5. Building walls.

- B. Related Sections:
 - 1. Earthwork Section 02 30 00
 - 2. Masonry Grout Section 04 05 00
 - 3. Joint Protection Section 07 90 00
 - 4. Non-metallic Grout Section 03 60 30

- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

- D. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 DEFINITIONS

- A. SER: Structural Engineer of Record for this project.

- B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

- C. Sub-contractor: Provides materials or services for the project through the Contractor.

- D. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

- E. Delegated Engineer: Also referred to as Specialty Engineer, is a Florida professional engineer who undertakes a specialty service and provides services or creative work (delegated engineering document) regarding a portion of the engineering project. The delegated engineer is the engineer of record for that portion of the engineering project. Refer to Chapter 61G15-30 Responsibility Rules Common to All Engineers, Board of Professional Engineers, Florida Administrative Code, for additional information.

1.3 ACTION SUBMITTALS

- A. General:
1. Submit all documents and samples in conformance to Specification Section 01 33 00.
 2. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer and contract provided by the Engineer and payment for files by the requesting sub-contractor.
 3. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
 4. Review of shop drawings does not constitute authorization to vary from the contract documents.
 5. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.
- B. Design Mixtures: For each concrete mixture, per ASTM C-192. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings:
1. Submit shop drawings for fabrication and placement of all reinforcing. Include bar schedules, stirrup spacing, arrangement and concrete cover. Provide full information for placing without reference to design drawings. Indicate walls in elevation at a scale of not less than $\frac{1}{4}'' = 1'0''$. Indicate openings which interrupt reinforcing, including special reinforcing. Coordinate openings with HVAC, electrical and plumbing contractors. Show all areas fully. Do not use "similar" or "opposite hand" notations.
 - a. Electronic submittal is required and file format utilizing PDF format is preferred.
 - b. All placing work must be checked against the contract drawings. All drawings and details shall be checked by Contractor and show Contractor's approval and the initials of the checker before they are submitted to Architect and SER for review. If required dimensions or necessary details are not clearly shown on the contract drawings, Contractor shall circle and question them on the working plans. These dimensions and details will be checked or furnished by the Architect.
 - c. Drawings shall be clearly marked "FOR APPROVAL ONLY – NOT FOR FIELD USE". If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped "FOR FIELD USE".
- D. Product Data: For each type of product indicated.
- E. Manufacturer's Data: For information only, submit manufacturer's data with application and installation instructions for all proprietary materials and items relative to the concrete work.
- F. Advance Mix Design:
1. Comply with ASTM C-192; each class of concrete required for the job shall be designed by the Contractor's independent engineering testing laboratory or supplier to determine the proper proportions of ingredients to insure concrete of the desired strength, workability and durability.
 2. The maximum permissible water cement ratio, based on a five inch (5") slump, shall be maximum 0.50 unless noted otherwise, and shall produce a laboratory strength at least fifteen percent (15%) greater than the strengths specified.
 3. Advance mix designs shall be submitted for review far enough in advance (at least 14 days) of the placing of concrete in order not to create delays in the work. Mix designs shall be prepared in accordance with latest version of ACI 318 "Building Code

Requirements for Reinforced Concrete”, Section 5.3, field experience method or trial batches.

4. Regardless of the recommendations of the testing laboratory or supplier, it shall be the responsibility of the Contractor to furnish the strength and quality of concrete specified.
 5. Test results will be reported to the Architect, Engineer, Contractor, Concrete Producer, and other firms listed on the distribution list on the same day that the tests are performed. All test reports indicating non-compliance should be e-mailed or faxed immediately to all parties on the test report distribution list.
 6. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- G. Formwork Shop Drawings: Contractor shall erect and remove all forms and shores. Forms and shores shall be designed to safely carry their own weight plus all superimposed dead, wind, lateral construction loads, and not less than fifty (50) pounds per square foot live load. Applicable codes and standards, including ACI 347, exceeding these requirements shall also be met.
1. All specialty formwork design shall be prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Shop drawings shall be signed and sealed by an Engineer registered in the State of Florida.
 2. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- H. Reports:
1. Report test results to Architect and SER immediately after tests are made.
 2. Report tests of materials and advance concrete mix designs before job concrete work is started.
 3. Reports of compressive strength tests shall contain the cylinder set number, project identification name and number, date of concrete placement, name of Contractor, name of supplier, truck number, name of testing service, concrete type and class, concrete mix number, location of concrete batch in structure, design compressive strengths at 28 days, compressive breaking strength, type of break for both 7 day and 28 day tests, entrained air content, slump, air temperature, weather, and any water added after leaving the plant.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Slab-on-grade Installer.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Curing compounds.
 6. Floor and slab treatments.
 7. Bonding agents.
 8. Adhesives.
 9. Vapor retarders.
 10. Semi-rigid joint filler.
 11. Joint-filler strips.
 12. Repair materials.

- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates.
- E. Field quality-control reports.
- F. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

- A. Applicable Codes, Specifications, and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:
 - 1. American Concrete Institute (ACI):
 - a. ACI 117 Tolerances for Concrete Construction
 - b. ACI 211.1 Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
 - c. ACI 211.4 Recommended Practice for Evaluation of Strength Test Results of Concrete
 - d. ACI 301 Structural Concrete for Buildings
 - e. ACI 302 Recommended Practice for Concrete Floor and Slab Construction
 - f. ACI 304 Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
 - g. ACI 305 Hot Weather Concreting
 - h. ACI 306 Cold Weather Concreting
 - i. ACI 308 Recommended Practice for Curing Concrete
 - j. ACI 309 Recommended Practice for Consolidating Concrete
 - k. ACI 315 Detailing Manual
 - l. ACI 318 Building Code Requirements for Reinforced Concrete
 - m. ACI 347 Concrete Formwork
 - 2. Concrete Reinforcing Steel Institute (CRSI): Manual of Standard Practice
 - 3. American Society for Testing Materials (ASTM): All ASTM standards shall apply where appropriate.
 - 4. American Welding Society (AWS):
 - a. AWS-D1.1 Structural Welding Code
 - b. AWS-D1.4 Structural Welding Code-Reinforcing Steel
 - 5. American Institute of Steel Construction (AISC): Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- B. Workmanship: Contractor shall furnish a full time qualified foreman to oversee and direct the construction of all formwork, reinforcing steel placement and concrete placing. Contractor shall correct work which does not conform to specified requirements, including strength, tolerances and finish. Deficiencies shall be corrected as directed by Architect and as specified herein, at the Contractor's expense.
- C. Installer Qualifications: A qualified installer who employs on this Project, personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

- D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- E. Testing Agency Qualifications: An independent agency, acceptable to the Architect and SER, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- F. Concrete Testing Service:
1. The Contractor shall employ, at his expense, a qualified Independent Engineering Testing Laboratory, approved by Architect and Engineer, to perform material evaluation tests, and to design the concrete mixes, and to perform quality control testing during construction, as specified.
 2. Materials and installed work may require testing and retesting, as directed by Architect, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times.
 3. When retesting of rejected materials or installed work is required, Contractor pays for tests. When retesting of installed work is required by the Architect due to negligence or improper construction practices by the Contractor, or low test results of Contractor installed work, the Contractor will be responsible for all costs pertaining to determination of acceptability of the work.
 4. Material Sources: Sources of materials must remain unchanged during the course of the work; any variation of materials will require retesting. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Architect, provided the proposed materials have a satisfactory service record and have been tested within the past year and such previous tests have met the specified requirements. Certificates of compliance for each material must be signed by the Contractor and the supplier.
- G. Quality Control Tests During Construction: Concrete shall be sampled and tested for adequacy of design for strength, as a basis for acceptance of the concrete and for shore removal. Test cylinders shall be made, stored and tested by the testing laboratory. Protect test cylinders while stored on the site. Handle and store carefully prior to testing. Concrete shall be sampled and tested as follows:
1. Sampling and Field Concrete: ASTM C-172; except modified for slump to comply with ASTM C-94.
 2. Slump: ASTM C-143; one test for each concrete load at point of placement in the structure and one for each set of compression strength test specimens.
 3. Air Content: ASTM C-231, pressure method or ASTM C-174, volumetric method. Use volumetric method for lightweight concrete. Air content tests must be made each time compressive test specimens are molded from concrete required to be entrained.
 4. Acceptance Test Specimens: ASTM C-31; one set of 4 standard test cylinders for each compression strength test. Mold and store for laboratory cured test specimens.
 5. Field Stored Test Specimens: ASTM C-31; one set of three standard test cylinders of all shored areas, for each compression strength test made. Store in protected location on

job site, under the same conditions as concrete from which cylinders were taken, until tests are required.

6. Compressive Strength Tests:
 - a. Comply with ASTM C-39 and ASTM C-31; one set of 4 cylinders (minimum) for each 50 cubic yards or fraction thereof, for each class of concrete placed in any one day or for each 4000 sq. ft. of surface area placed, whichever is less.
 - 1) Every arithmetic average of any consecutive three tests shall equal or exceed f'_c and
 - 2) No individual strength test (average of two cylinders) shall be less than f'_c by more than 500 psi.
 - b. For acceptance tests, break 1 cylinder at 7 days for information and 2 at 28 days for acceptance, with 1 cylinder held in reserve.
 - c. Field stored cylinders shall be taken in same manner as acceptance cylinders, except they shall be taken only from those portions of the structure which are shored or braced or as noted. To check items for removing shores, break one cylinder at a time until required strength is reached.
 - d. When the strength of field stored cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
7. Tests of In-Place Concrete:
 - a. Testing service shall make additional tests of in-place concrete when results indicate to the Architect that specified concrete strengths or other characteristics have not been met.
 - b. Tests may consist of cored cylinders complying with ASTM C-42, or if these tests are not conclusive, by load test performed in accordance with Chapter 20 of ACI Standard 318-05.
 - c. These tests shall be paid for by the Contractor.
- H. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- I. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."
- J. Pre-installation Conference: Conduct conference at Project site
 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete testing.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Threshold Inspector
 2. Review inspection and testing agency procedures for field quality control, concrete finishes and finishing, cold-weather and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel

reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Exposed Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - a. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows: B-B Plyform (Concrete Form), Class 1 Exterior Type – Douglas Fir Plywood Association or better; mill oiled and edge sealed.
- B. Unexposed Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation. Coordinate with Architectural requirements.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, or as shown on the drawings.
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal. Refer to drawings for details.
- F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars:

1. ASTM A 615, Grade 60 (minimum).
2. 95% (minimum) recycled steel content.
3. Produced within 500 miles of the project.

B. Plain-Steel Welded Wire Reinforcement:

1. ASTM A 185 Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
2. Provide 6x6 – W1.4xW1.4 WWF (min.) unless otherwise indicated.
3. 95% (minimum) recycled steel content.
4. Produced within 500 miles of the project.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars:

1. ASTM A 615.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. Size and spacing sufficient to hold and support in position all reinforcing during construction and placing of concrete, but not less than the recommendations of ACI-315 and CRSI Manuals of Standard Practice Class C & D.
2. Bar supports resting on wooden forms shall have upturned legs. All supports for reinforcing shall be adequate to hold reinforcing in place during construction and during placing of concrete.
3. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 all-plastic bar supports or CRSI Class 2 stainless-steel bar supports.
4. Support foundation reinforcing on concrete support blocks as detailed on the drawings.
5. Reinforcing for slabs on grade shall be maintained in the specified locations within the slab or approved support blocks or chairs shall be used.

C. Dovetail Slots: Refer to Section 04 20 00 Masonry Assemblies. Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I or Type III, gray. May be Supplemented with the following:
 - a. Fly Ash: ASTM C 618, Class F. Fly ash (ASTM C-618, Type F) may be used in quantities up to 25% of cement content by weight.

- b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120. Replacement of a portion of Type I cement with ground iron blast-furnace slag ASTM C989 shall be limited to 50% by weight.
- c. Silica Fume: ASTM C 1240, amorphous silica. Replacement of a portion of Type I cement with Silica/Fume, AASHTO M307, shall be limited to 25% by weight.

B. Normal-Weight Aggregates:

- 1. Maximum Coarse-Aggregate Size: Crushed stone, rock or gravel meeting requirements of ASTM C-33 and graded in accordance with Table 2 size No. 57 (max.). All aggregate for exposed concrete shall be from the same source.
- 2. Fine Aggregate: Clean, sharp silica or quartz sand meeting all requirements of ASTM C-33 and having a fineness modulus between 2.25 and 3.0. Free of materials with deleterious reactivity to alkali in cement.
- 3. Aggregate shall be free of soft or friable particles, be free of unfavorable capillary absorption characteristics and shall not produce weather stains

C. Water: ASTM C 94 and potable, free from acid, oil or other injurious matter.

2.5 ADMIXTURES

A. General Requirements:

- 1. When any specified admixture is used in the concrete, the compressive strength, bond strength and flexural strength shall not be less than that of the specified concrete strengths without admixtures.
- 2. All admixtures used in a mix design shall be compatible with each other.
- 3. Volume change of concrete shall not be more with admixtures than without admixtures.
- 4. No concrete ingredient shall contain more than 0.05% chloride ions or the amount present in municipal drinking water, whichever is less.
- 5. Written conformance to above mentioned requirements and the chloride ion content will be required from the admixture manufacturer prior to mix design review by the SER.

B. Air-Entraining Admixture: ASTM C 260.

C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

- 1. Water-Reducing Admixture: ASTM C 494, Type A.
- 2. Retarding Admixture: ASTM C 494, Type B.
- 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- 4. High-Range, Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F.
- 5. High-Range, Water-Reducing and Retarding Admixture (Superplasticizer): ASTM C 494, Type G.
- 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

D. Calcium Chloride: Calcium chloride is **not** permitted.

E. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

- F. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: 15 mil minimum, ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, provide the following or equal approved by the SER or the Architect prior to bidding:
 - a. Stego Industries, LLC; Stego Wrap 15 mil Class A.
 - 2. Install vapor retarder directly under all interior slabs-on-grade. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with the longest dimension parallel with direction of pour. Joints shall be lapped at least 6 inches and sealed with a completely continuous pressure sensitive tape. Just prior to the pouring of the concrete, the vapor retarder shall be checked for punctures. All holes shall be covered with strips of the same material lapping holes 6 inches on all sides. Vapor retarder installation must be reviewed prior to concrete placement.

2.7 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- E. Post-Installed anchors and anchoring systems: Refer to the General Structural Notes on the construction drawings.
- F. Non-Shrink Grout:
 - 1. Refer to Specification 03 60 30.
 - 2. Steel base and bearing plates: Refer to Specification 05 12 00.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

C. FLOOR PATCHING RESURFACER

1. Military Spec. MIL-D-3135. Fed. Spec. SS-C-1302. Latex or acrylic epoxy type.

2.11 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.
- B. Proportions: All concrete shall be accurately proportioned by weight so as to give an ultimate compressive strength at 28 days, or at a time of use, as called for on the structural drawings. The proportions of materials shall be such as to produce concrete that can be readily puddled into the corners and angles of the forms and around the reinforcement without segregation or undue accumulation of water or laitance on the surface. Water/cementitious ratio shall be held to the minimum consistent with proper placing and finishing. The amount of mixing water used shall take into account the moisture, or lack of the same, in the aggregate and liquid admixtures used.
- C. Cementitious Materials Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 25 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to that present in the local Municipal water supply.
- E. 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.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 3000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.55.
 3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
 4. Maximum Aggregate Size: 1".
 5. Slump Range: 3 inches to 6 inches.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Minimum Cementitious Materials Content: 500 lb/cu. yd.
4. Maximum Aggregate Size: 3/4".
5. Slump Range: 2 inches to 4 inches.
- 6.

C. Building Frame Members: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Maximum Aggregate Size: 3/4".
5. Slump Range: 3 inches to 5 inches.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information. A competent foreman shall be in charge of concrete mixing at all times.

B. Mixers shall be in first class working order. Mixer blades shall not have their height reduced by more than one inch. Blades showing more wear than this shall be replaced or the mixer shall not be used.

C. Mixers shall be equipped with accurate and dependable water measuring devices.

D. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

E. Concrete Temperature

1. When concrete temperature is below 85 degrees when the mixer (truck) arrives on site, the total maximum time that concrete may be placed from the truck from the time of batching is 90 minutes.
2. When concrete is between 85 and 90 degrees when the mixer (truck) arrives on site, the total maximum time that concrete may be placed from the truck from the time of batching is 75 minutes.
3. When concrete is between 90 and 95 degrees when the mixer (truck) arrives on site, the total maximum time that concrete may be placed from the truck from the time of batching is 60 minutes. In this case, the following conditions must be monitored:
 - a. Temperature of the concrete shall be monitored with a properly calibrated thermometer. Should the temperature during placement exceed 95 degrees, the placement of concrete from the truck shall cease.

4. When concrete temperature is greater than 95 degrees when the truck arrives on site, the truck shall be rejected and may not return to the site during the current product placement.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Chamfer exterior corners and edges of permanently exposed concrete, unless noted otherwise.
 1. Exposed corners of beams, columns and walls shall be chamfered with 3/4" x 3/4", or size shown on Drawings, wood strip or PVC manufactured plastic strips. Accurately form surface to product uniformly straight lines and tight edge joints. Miter joints at changes in direction and where terminated in an exposed condition.
 2. Where masonry or other framing or finish material butts flush to columns, beams or walls, corners shall be square or as noted on the drawings.
- H. Form openings, chases, offsets, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Size and location of openings, recesses and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into the forms.

- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges" as noted below:
 - a. Anchor bolts and foundation bolts are set by the owner (contractor) in accordance with an approved drawing. They must not vary from the dimensions shown on the erection drawings by more than the following:
 - 1) 1/8-inch center to center of any two bolts within an anchor bolt group, where an anchor bolt group is defined as the set of anchor bolts which receive a single fabricated steel shipping piece.
 - 2) 1/4-inch center to center of adjacent anchor bolt groups.
 - 3) Elevation of the top of anchor bolts \pm 1/2-inch.
 - 4) Maximum accumulation of 1/4-inch per hundred feet along the established column line of multiple anchor bolt groups, but not to exceed a total of 1 inch, where the established column line is the actual field line most representative of the centers of the as-built anchor bolt groups along a line of columns.
 - 5) 1/4-inch from the center of any anchor bolt group to the established column line through that group.
 - 6) The tolerances of paragraphs 2, 3, and 4 apply to offset dimensions shown on the plans, measured parallel and perpendicular to the nearest established column line for individual columns shown on the plans to be offset from established column lines.
 - b. Unless shown otherwise, anchor bolts are set perpendicular to the theoretical bearing surface.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures where masonry abuts structure and as indicated.
 - 4. Set and build into the work: anchorage devices, steel angles and plates, dovetail anchor slots, ceiling inserts and other embedded items required for work that is attached to, or supported by, cast-in-place concrete.
 - 5. Use setting drawings, diagrams, instructions and directions provided by the supplier of the items attached thereto and to other sections of these specifications.
 - 6. Protect all embedded items that must be set by others.
 - 7. Set all bolts, anchors, grounds and inserts as required.

8. Where structural steel shapes and other members are shown bolted to the concrete, bolts shall be set in proper position in the forms before the concrete is placed and space as indicated on the drawings.
9. Bolts and nuts exposed to moisture conditions shall be galvanized.
10. Conduit: Conduit may be placed in slabs 4-1/2" or more in thickness provided conduit or layers or conduit fall completely within the middle 1/3 of the slab depth and are spaced not closer than 24" o.c. No conduit in slabs shall be more than 1" in diameter. No pipe or conduit shall interfere with the placing or functioning of the reinforcing and it shall be rigidly held in the specified positions.
11. Conduit shall not be placed within slabs in composite slab construction or in concrete placed on steel form deck – typical.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 1. ACI 301 and ACI 347 require concrete to reach its specified compressive strength.
 2. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
 4. When completed, all forms shall be completely removed and all form ties shall be broken back or pushed out and filled as specified.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.
- D. Apply new form coating compound material to concrete contact form surfaces as specified for new formwork.

3.4 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 1. Lap joints 6 inches and seal with manufacturer's recommended tape or sealant.

3.5 STEEL REINFORCEMENT

- A. General: Contractor shall be responsible for the placing and functioning of the reinforcement. Comply with the codes and standards specified, and the Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placing and supports, and as herein specified.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Cleaning: Reinforcing shall be free of loose scale, flaking, rust, oil, mud or other foreign matter when placed in the forms and when concrete is placed. Where any spilled concrete has dried on the steel, it shall be thoroughly cleaned before additional concrete is placed.
- C. Bending:
1. Reinforcement shall be of correct length and size and accurately bent in accordance with contract drawings.
 2. All bars shall be shop fabricated and shall be bent cold.
 3. Unless otherwise specifically noted, "recommended" hooks and bends as per ACI 315 shall be used. Slant hooks as required to maintain specified clearances – do not cut hook tails.
 4. Bars which are straight except for hooks are scheduled as straight bars.
 5. Where lengths of bars are called for on the drawings, they are exclusive of hooks.
- D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
1. Weld reinforcing bars according to AWS D1.4, only where indicated.
- E. Set wire ties (18 gauge wire minimum) with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splicing: No splicing of main reinforcing steel will be permitted unless specifically shown on the drawings. Bars marked continuous shall be lapped forty (40) diameters (minimum) at splices and at corner conditions where corner bars shall be provided. Wire mesh shall be lapped six inches minimum and shall be wired together.
- G. Protection of Reinforcing: As indicated on drawings.
- H. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2". Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- I. Tolerances: Minimum concrete cover for reinforcing indicated on drawings must be maintained. Tolerances for location of reinforcing shall fall within the limits listed below:
1. Cover on bottom bars.....±1/4 inch
 2. Lengthwise positioning of bars.....±1 inch
 3. Spacing of bars in walls, slabs and footings.....±1 inch
 4. Spacing of bars in beams.....-1/4 inch
 5. Cover on top bars.....+1/4 inch
 6. Stirrup spacing:
 - For one stirrup.....-1/2 inch
 - Overall group of stirrups.....+2 inches

3.6 JOINTS

- A. General:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Except as otherwise indicated on drawings, the work shall be planned to provide a minimum number of construction joints consistent with good placing practices.
 3. Location of joints not indicated must be approved by Architect.
 4. Columns shall be placed continuously to an even level of the bottoms of connecting beams.
 5. Give particular attention to cleaning of laitance from top of vertical members and to cleaning of concrete from projecting reinforcing.
 6. Reinforcing shall run continuous through construction joints.
 7. Provide 1-1/2" deep keyways between walls and beams and walls and footings.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction (Control) Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide gap 1/4 of the slab depth joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 900 "Sealants," are indicated.
- E. Expansion joints: Construct expansion joints where indicated on drawings and in slabs to form patterns of panels as indicated on drawings.

3.7 CONCRETE PLACEMENT

- A. General:
1. Comply with ACI 304, and as herein specified.
 2. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified.
 3. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
 4. Clean all dowels of concrete before placing new concrete.
 5. Do not place concrete in standing water nor in rainy weather.
- B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1.
- G. Hot-Weather Placement: Comply with ACI 305.
- H. Pre-Placement Inspection:
1. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be imbedded or cast-in.
 2. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required.

3. Coordinate the installation of joint materials and moisture retarders with placement of forms and reinforcing steel.
4. Before placing concrete for slab on grade, all piping and other utilities under slab shall have been inspected and tested and all excavations back-filled and properly compacted and tested to the specified modified proctor (95% minimum).
5. Completely clean forms of all debris, sawdust, dirt, etc. prior to concrete placement.
6. Thoroughly wet wood forms, earth, and masonry, immediately before placing concrete where forms coatings are not used.
7. Notify Architect and Engineer of placing schedule at least 48 hours in advance.

I. Placing Concrete in Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid cold joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
2. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
3. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use vibrators designed to operate with vibratory element submerged in concrete, maintaining a speed of not less than 10,000 impulses per minute. Have available for use at least two vibrators, in case of breakdown, for each concrete placing crew. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions. Vibration of forms and reinforcing will not be permitted, unless expressly accepted by the Engineer. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the placed layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
4. Do not place concrete on supporting elements until the concrete previously placed in columns and walls is no longer plastic. (2 hrs. min.)

J. Placing Horizontal Concrete Work:

1. Maintain reinforcing in the proper position during concrete placement operations.
2. Deposit and consolidate concrete in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.
3. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners. Consolidate concrete in slabs by vibrating bridge screeds, roller pipe screeds, or other acceptable methods. Limit the time of vibrating consolidation to prevent bringing an excess of fine aggregate to the surface.
4. Bring slab surfaces to the correct level with a straightedge and strikeoff. Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water or cement on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations. Maintain reinforcing in the proper position during concrete placement operations.

3.8 BONDING

- A. General: Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent, and clean surfaces of laitance, coatings, loose particles and

foreign matter. Roughen surfaces in a manner to expose bonded aggregate, or remove damaged concrete at the surface.

- B. New to Hardened Fresh Concrete: Dampen but do not saturate the roughened and cleaned surface of set concrete and apply a coat of neat cement grout composed of equal parts of Portland Cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply with a stiff broom or brush to a minimum thickness of 1/16". Deposit fresh concrete before cement grout has attained its initial set. In lieu of neat cement grout, surface in accordance with manufacturer's printed instructions. Acceptable: Euclid "Euco Weld"; Larsen "Weldcrete".

3.9 FINISHING FORMED SURFACES

- A. General: Immediately after removing forms, inspect concrete for honeycombs, voids, fins, stone pockets, and other imperfections. Remove fins and other unintended projections; properly fill and patch all imperfections.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched.
 - 1. Apply to concrete surfaces not exposed to public view.
 - 2. After patching is completed, sack grout to fill all air and bubble holes.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete
- D. Rubbed Finish: Unless specifically noted otherwise, provide all concrete surfaces with a smooth rubbed finish, uniform in color and texture. Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated to receive trowel finish and to surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
 2. After screeding and consolidating concrete slabs, do not work surface until ready for floating.
 3. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven or hand floating if area is small or inaccessible to power units.
 4. Check and level surface plane to a tolerance not exceeding 1/4" in 10 feet when tested with a 10 foot straightedge. Cut down high spots and fill low spots.
 5. Uniformly slope surface to drains.
 6. Immediately after leveling, refloat surface to a uniform, smooth texture.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. After floating, make first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Surface shall be troweled at least two additional times to produce a dense surface free of trowel marks and uniform in texture and appearance.
 3. For all slab-on-grade, finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
 4. Grind smooth surface defects which would telegraph trough applied floor covering system.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
 2. Coordinate required final finish with Architect before application.
- F. Non-Slip Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 2. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: For exposed slabs, provide a non-slip surface utilizing a light broom finish.

- H. Chemical-Hardener Finish: Apply chemical-hardener finish to all exposed interior concrete floors and exterior covered walks, including topping slabs, not scheduled to receive other finishes.
1. Coordinate required final finish with Architect before application.
 2. Apply liquid chemical-hardener after complete curing and drying of the concrete surface.
 3. Apply proprietary chemical hardeners in accordance with manufacturer's printed instructions.
 4. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded, unless otherwise indicated on the drawings.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 4 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for equipment anchor support.
 3. Minimum Compressive Strength: 3500 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, unless otherwise indicated, install galvanized anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
 6. Prior to placing concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.
1. Minimum concrete strength: 3000 psi at 28 days.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305 for hot-weather protection during curing.
1. Protect freshly placed concrete from premature drying, excessive cold or hot temperature, rain and mechanical injury.
 2. Maintain without drying at a relatively constant temperature for a period of time necessary for hydration of cement and proper hardening. Start initial curing as soon as free water

has disappeared from concrete surface after placing and finishing of slabs and as soon as forms are removed from formed surfaces. Keep slabs and other exposed fresh concrete continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried.

3. Where mechanical trades set up work areas within the building, protect concrete slabs from oil, grease and other injurious materials by substantial covering of Kraft paper or polyethylene sheeting
 4. Cold Weather Concreting: Concrete shall not be placed during period when the air temperature is at or below 40°F or whenever it appears to the Architect, from weather reports or otherwise, that air temperature may fall below 40°F within the twenty-four (24) hour period next following the completion of a concrete placement without taking approved precautions. Contractor shall take approved precautions to maintain the temperature of the concrete at no less than 70°F for three (3) days or 50°F for five (5) days after placement. For approved procedures see ACI 306 "Recommended Practice for Cold Weather Concreting".
 5. Hot Weather Concreting: During hot weather use all available means to keep concrete temperature as low as practical, but in no case shall temperature of concrete at time of placement be higher than 90°F. At air temperature above 80°F, use retarding admixture. For approved procedures see ACI 305 "Recommended Practice for Hot Weather Concreting".
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods and as required for the finishes to be applied to the surface:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on the Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
- F. Non-Oxidizing Metallic Hardener: All slabs, in the loading dock area and other areas noted on the drawings, shall receive an application of the non-oxidizing, metallic floor hardener applied per the manufacturer's recommendations. The surface shall then be troweled, at least twice, to a smooth dense finish. Cure slab surface with curing compound recommended by hardener manufacturer. Apply curing compound immediately after final finishing.
- G. Mineral Aggregate Hardener: All slabs in areas noted on the drawings, shall receive an application of the mineral aggregate hardener applied per the manufacturer's recommendations. The surface shall be floated again to properly bond the hardener to the base concrete slab. The surface shall then be troweled, at least twice, to a smooth, dense finish.

3.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than 28 days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least three month(s). Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template. All repairs shall be made using project approved materials.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around the reinforcing. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to SER and Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to SER and Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing: Contractor will engage a qualified testing agency to perform field tests and prepare test reports.
- B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's placement of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Slump: ASTM C 143 one test at point of placement for each composite sample, but not less than one test for each day's placement of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Concrete Temperature: ASTM C 1064 one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 4. Compression Test Specimens: ASTM C 31.
 - a. Cast and laboratory cure two sets of four standard (6" x 12") cylinder specimens for each composite sample. Cast five specimens when using 4" x 8" cylinders.
 - b. Cast and field cure a minimum of two sets of two additional standard cylinder specimens for each composite sample for all shored concrete members.
 5. Compressive-Strength Tests: ASTM C 39 test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one field-cured specimen at 7 days and one set of two laboratory cured specimens at 28 days. Hold one specimen in reserve for 56 day testing if required. Note that if 4" x 8" cylinders are used, a minimum of 3 specimens are required to be tested at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

6. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Architect, SER, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, concrete mix design number, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements. When retesting of rejected materials or installed work is required, Contractor pays for tests. When retesting of installed work is required by the Architect due to negligence or improper construction practices by the Contractor, or low test results of Contractor installed work, the Contractor will be responsible for all costs pertaining to determination of acceptability of the work.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents at Contractor's expense.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 03 60 30 - NON-METALLIC GROUT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Grout for securing column base plates, anchor rods and other items bearing on concrete and/or masonry. This applies only to areas where not detailed otherwise on the drawings.

B. Related Sections:

1. Cast-In-Place Concrete Section 03 30 00
2. Structural Steel Section 05 12 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for this project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor

1.3 INFORMATION SUBMITTALS

A. General:

1. Submit all documents in conformance to Specification Section 01 00 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Product Data: Manufacturer's literature shall include storage, surface preparation, mixing and application instructions.

C. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

- D. Test Data: Confirm grout performance is compliant with specified requirements in Section 2.1A.
- E. Test Reports:
 - 1. Report test results to Architect and SER immediately after tests are made.
 - 2. Reports of compressive strength tests shall contain the grout set number, project identification name and number, date of concrete placement, name of Contractor, name of grout manufacturer, name of testing service, grout type, location of grout batch placed in the structure, design compressive strengths at 28 days, compressive breaking strength, type of break 3 day, 7 day and 28 day tests.
 - 3. Refer to Section 4.1B.

1.4 QUALITY ASSURANCE

- A. Applicable reference Specifications and Standards: Comply with provisions of the following specifications and standards, except where more stringent requirements are shown or specified. All specifications and standards referred to shall be latest editions:
 - 1. ACOE CRD-C621 – Specification for Nonshrink Grout.
 - 2. ASTM C 78 / C 78M – Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - 3. ASTM C 190 – Method of Test for Tensile Strength of Hydraulic Cement Mortars.
 - 4. ASTM C 191 – Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.
 - 5. ASTM C 469 / C 469M – Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
 - 6. ASTM C 496 / C 496M – Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - 7. ASTM C 531 – Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - 8. ASTM C 939 – Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - 9. ASTM C 942 – Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - 10. ASTM C 1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.
 - 11. ASTM C 1107 / C 1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - 12. ASTM C 1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- B. Workmanship: Contractor's personnel must have prior experience in mixing and applying specified product or similar products, or have manufacturer's representative on site ensuring that preparation and application are performed correctly.
- C. Delivery, Storage, and Handling
 - 1. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
 - 2. Storage and Handling Requirements:
 - 3. Store and handle materials in accordance with manufacturer's instructions.
 - 4. Keep materials in manufacturer's original, unopened containers and packaging until application.
 - 5. Store materials in clean, dry area indoors.
 - 6. Do not store materials directly on floor.

7. Protect materials during storage, handling, and application to prevent contamination or damage.

PART 2 - PRODUCTS

2.1 GROUT MATERIAL:

- A. Commercial Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents in compliance with the following standard specifications:
 1. ASTM C 1107.
 2. Army Corps of Engineers CRD-C621
- B. Physical Properties Performance Test Data:
 1. Minimum Compressive Strength according to ASTM C 1107:
 - a. 3 Days: 3,000 psi
 - b. 28 Days: 8,000 psi
 2. Flow Rate according to ASTM C 939/CRD-C621
 3. Volume Change according to ASTM C 1090/CRD-C621
- C. Approved Manufacturers:
 1. NS Grout by The Euclid Chemical Company
 2. Sure-Grip High Performance Grout, by Dayton Superior
 3. Master Flow 100, Master Builders Solutions by BASF.
 4. SC Precision Grout, by Specchem.
 5. Engineer approved equal prior to bidding

PART 3 - EXECUTION

3.1 CONDITION OF PRECEDING WORK

- A. Review Construction documents for locations to receive grout.
 1. Grout under steel column base plates.
 2. Other locations as indicated on the structural Construction Documents.
- B. Notify the SER should constructed conditions at locations to receive grout are not in accordance with manufacturer's written specifications. (i.e. - Minimum or maximum placement thicknesses exceed approved product limitations).
 1. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

- A. Prepare surfaces to be in contact with grout in accordance with manufacturer's written instructions.

1. Remove free-standing water from application area.
 2. Clean and prepare surfaces in accordance with manufacturer's written instructions.
 - a. Use surface cleaners only compatible with grout manufacturer's written instructions.
 3. Saturate concrete surfaces with clean water for 24 hours just before grouting, or as required by manufacturer's written instructions.
 4. Maintain surfaces to be in contact with grout at temperature ranges in accordance with manufacturer's written instructions prior to placing, throughout placing and during specified curing of grout.
- B. Provide forms to receive grout placement. Form surfaces shall be clean per manufacturer's written instructions.

3.3 GROUT MIXING

- A. Use only clean container as required for mixing with grout.
- B. Use only clean potable water as required for mixing with grout.
- C. Proportion water to mix with grout in accordance with manufacturer's written instructions.
- D. Mix grout with water mechanically or by other means acceptable per manufacturer's written instructions.

3.4 GROUT PLACING

- A. Place grout at required locations in accordance with manufacturer's written instructions.
- B. Placing duration shall not exceed manufacturer's written instructions.
- C. Placement and curing temperatures shall not exceed manufacturer's written limitations.
- D. Place non-shrink grout in continuous pour to prevent entrapment of air or water.
 1. Ensure non-shrink grout fills entire space being grouted and remains in contact with bearing surfaces throughout entire grouting process.
 2. Use rod or strapping as required to assist in uniform placement.
 3. Do not vibrate grout.
- E. Discard grout that becomes unworkable.
- F. Trim non-shrink grout surfaces immediately after placement and cover exposed grout with clean wet rags, or pond with water.

3.5 CURING

- A. Cure in accordance with manufacturer's written instructions.

3.6 TESTING AGENCY

- A. Testing: Contractor will engage a qualified testing agency to perform field tests and prepare test reports.

- B. Grout Tests: Testing of samples of fresh grout obtained according to ASTM C 1107 shall be performed according to the following requirements:
1. Testing Frequency: Obtain a set of 4 cubes sampled from each day's grout placement.
 - a. Obtain additional test sets if a noticeable change in the mixed grout consistency or color is noted between batches, or if the time or temperature limits specified are exceeded.
 2. Record and Report Grout Manufacturer and type used, date/time mixed, and placement location.
 3. Record and Report grout batch mixing and curing temperatures.
 4. Laboratory cure grout specimens in accordance manufacturer's written instructions.
 5. Perform Compressive-Strength Test results at 3, 7, and 28 days. Retain the last cube for 56-day strength testing, should it become required.
 6. Test results shall be reported to Architect, SER, and Contractor within 48 hours of testing.
 7. Grout compressive strength test reports shall contain Project identification name and number, date of grout placement, name of testing agency, grout manufacturer type location of grout batch in work, mixing and curing temperatures, compressive strength at 3, 7, and 28 days.

END OF SECTION

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SECTION 04 05 00 - MASONRY GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes grout for masonry.
- B. Related Sections:
 - 1. Cast-In-Place Concrete Section 03 30 00
 - 2. Reinforced Unit Masonry Section 04 23 00
 - 3. Masonry Assemblies Section 04 20 00
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

- A. SER: Structural Engineer of Record for the project.
- B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.
- C. Sub-contractor: Provides materials or services for the project through the Contractor.

1.3 SUBMITTALS

- A. General:
 - 1. Submit all documents and samples in conformance to Specification Section 01 33 00.
 - 2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
 - 3. Review of shop drawings does not constitute authorization to vary from the contract documents.
 - 4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.
- B. Manufacturer's Data:
 - 1. Submit manufacturer's product data, with application and installation instructions, for all proprietary materials and items relative to the grout work.
- C. Test Reports:

1. Report test results in writing to the Architect, Engineer and Contractor immediately after tests are made.
2. Reports of compressive strength tests shall contain the prism set number, product identification name and number, date of grout placement, name of Contractor, name of supplier, truck number, name of testing service, grout type and class, location of grout batch in structure, design compressive strengths at 28 days, compressive breaking strength, slump, air temperature, weather, and any water added after leaving the plant.

1.4 QUALITY ASSURANCE

A. Codes and Standards:

1. Comply with the provisions of the latest editions of the following codes, specifications and standards, except as shown or specified.
2. Where provisions of these codes and standards are in conflict with the building code in force for this project, the more stringent requirement shall govern.
 - a. American Concrete Institute: ACI 530 and ASCE 5, Building Code Requirements for Masonry Structures.
 - b. American Concrete Institute: ACI 530.1 and ASCE 6, Specification for Masonry Structures.
 - c. American Society for Testing Materials (ASTM): All ASTM Standards shall apply where appropriate.

B. Workmanship:

1. The Contractor is responsible for correction of grout work which does not conform to the specified requirements, including strength, tolerances and finish.
2. Deficiencies shall be corrected as directed by the Architect and as specified herein, at no additional cost to the Owner.

C. Grout Testing Service:

1. The Contractor shall employ and pay all costs for an independent testing laboratory, acceptable to the Architect and Engineer, to perform required tests during construction.
2. Contractor shall notify laboratory three days in advance of schedule for grout placement and allow free access to the site for testing operations.

D. Material Sources:

1. Sources of materials must remain unchanged during the course of the work.
2. Any variation in materials will require retesting.
3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Architect, provided that the proposed materials have a satisfactory service record and have been tested within the past year and such previous tests have met the specified requirements.
4. Certificates of compliance for each material must be signed by the Contractor and the supplier.

E. Advanced Design Mix:

1. Comply with ASTM C 476. The Contractor shall furnish mix designs for each type of grout (i.e., aggregate size, slump, etc.) anticipated to be provided throughout the project. Furnish at least 14 days prior to any grout placement.

2. Mix designs shall be prepared by a qualified independent testing laboratory or the grout supplier's laboratory.

F. Quality Control Tests During Construction:

1. Grout shall be sampled and tested for adequacy of design for strength.
2. Test prisms shall be made, stored and tested by the testing laboratory.
3. Protect test prisms while stored on site.
4. Handle and store carefully prior to testing.
5. Grout shall be sampled and tested as follows:
 - a. Slump: Comply with ASTM C 143. One test for each set of prisms, taken at point of placement in the structure. Additional slump tests may be required when observed slumps appear to exceed the allowed limit.
 - b. Test Prisms: Comply with ASTM C 1019. Make one set of three test prisms for each 30 cubic yards, or fraction thereof, of each mix design of grout placed in any one day.
 - c. Compressive Strength Tests: Comply with ASTM C 617 and C 39. Test 1 prism at 7 days and 2 at 28 days. Additional samples shall be taken whenever there is any change in mix proportions, method of mixing, or materials used.
 - d. Tests of In-Place Grout: Testing service shall make additional tests of in-place grout when results indicate that specified grout strengths or other characteristics, such as complete filling of masonry cores, have not been met. Costs of tests shall be at Contractor's expense.

G. Perform Work in accordance with State of Florida standards.

H. Maintain one copy of each document on site.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- B. 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.

PART 2 PRODUCTS

2.1 GROUT MATERIALS

- A. Cement: Portland Cement complying with ASTM C 150, Type I or Type III.
- B. Lime: Hydrated Lime, Type S, complying with ASTM C 207.
- C. Coarse Stone Aggregate: Crushed stone, rock or gravel complying with ASTM C 404 and C 33. Maximum size 3/8 inch with no material smaller than No. 30 sieve size.
- D. Fine Aggregate: Clean, sharp silica or quartz sand complying with ASTM C 404.
- E. Special Considerations: Aggregate shall be free of soft or friable particles and be free of unfavorable capillary absorption characteristics.

2.2 WATER

- A. Clean, fresh, potable, free from acid, oil or other injurious matter.

2.3 ADMIXTURES

A. General:

1. No admixture shall be used in the manufacturer of grout without prior acceptance of the Architect and Engineer.
2. When any accepted admixture is used in the grout, the compressive strength, bond strength and flexural strength shall not be less than that of the specified grout strengths without admixtures.
3. Volume change of grout shall not be more with admixtures than without admixtures.
4. No grout ingredient shall contain more than 0.1% chloride ions or the amount present in municipal drinking water, whichever is less.

PART 3 EXECUTION

3.1 MASONRY GROUT QUALITY

- A. General: Grout to be used for reinforced masonry shall comply with ASTM C 476 and as follows.

B. Mixing:

1. Proportions:

- a. Fine Grout: For spaces (masonry cells) not exceeding 3 inches , grout mix shall consist of one (1) part Portland Cement, 0 to 1/10 part hydrated lime, and sand at 2-1/2 times the sum of the volumes of the cementitious materials.
- b. Coarse Grout: For spaces (masonry cells) greater than 3 inches , grout mix shall consist of one (1) part Portland Cement, 0 to 1/10 part hydrated lime, sand (fine aggregate) at 2 times the sum of the volumes of the cementitious materials, and coarse aggregate at 2 times the sum of the volumes of the cementitious materials.
- c. Water: Add enough water to bring grout to a consistency as fluid as possible without causing segregation of materials.

C. Strength

1. All grout shall have a minimum compressive strength at 28 days of 2,500 psi or as required by ASTM C 476, whichever is the greater.

D. Slump

1. Comply with ASTM C 143. Slump shall be 8 inches to 10 inches at point of placement in structure.

3.2 READY-MIX GROUT

- A. If ready-mixed grout is used, the grout shall be mixed and delivered in accordance with the requirements set forth in ASTM C 94.
- B. Mixers shall be in proper working order and appropriate for the intended use.
- C. Mixer blades shall not have their height reduced by more than one inch.
- D. Blades showing more wear than this shall be replaced or the mixer shall not be used.
- E. Mixers shall be equipped with accurate and dependable water measuring devices.
- F. Grout shall not be placed if it has been in the mixer for more than one and one-half hours after addition of the water or after grout has begun to heat up due to hydration.

3.3 GROUT PLACEMENT

- A. General:
 - 1. Grout shall be placed by the High-Lift or Low-Lift method of grouting.
 - 2. Pump or place a uniform height of grout in maximum 5 foot lifts and immediately vibrate the grout.
 - 3. Grout vibrations shall be performed not longer than 10 minutes after grout lift placement.
- B. High-Lift Grouting:
 - 1. Pour succeeding 5 foot (maximum) lifts after waiting 30 to 60 minutes to allow for settlement and absorption of excess water.
 - 2. Reconsolidate top lift of pour after the required waiting period and fill any void left by settlement shrinkage with grout.
- C. Low-Lift Grouting:
 - 1. Rod or vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.
- D. Preparation for Placement:
 - 1. Prior to grout placement, remove all mortar droppings, protruding mortar, foreign materials or debris from masonry cells and lintels to be filled with grout.
 - 2. The minimum clear vertical cell shall be 3 inches square or as required to properly position detailed reinforcing and provide specified clearances.
 - 3. Notify Architect and inspection authorities at least 72 hours prior to a scheduled pour.

3.4 BONDING

- A. General: If complete grouting of a scheduled pour cannot be completed, or time between placement of lifts will exceed the specified time, hold grout a minimum of 1-1/2 inches down from mortar joint to provide a horizontal key between successive lifts.

3.5 EMBEDDED ITEMS

A. General:

1. Set and build into the work any anchorage devices, steel angles and plates, or other embedded items required for the work that is attached to, or supported by reinforcement masonry.
2. Use setting drawings, diagrams, instructions and directions provided by the supplier of the items to be attached.
3. Where structural steel shapes and other members are shown bolted to the reinforced masonry, bolts shall be set in proper position and spacing in the masonry units before the grout is placed.
4. Bolts and nuts exposed to moisture conditions shall be galvanized.

END OF SECTION

**SECTION 04 20 00
MASONRY ASSEMBLIES**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
1. Concrete masonry unit work, including Architectural CMU in addition to Standard.
 2. Metal wall ties and anchors.
 3. Masonry reinforcement.
 4. Mortar for masonry work.
 5. Material pointing, grouting and cleaning masonry work, particularly Architectural CMU.
 6. Lintels and bond beams.
 7. Membrane flashing and Fluid Applied Air & Water Resistive Barrier also referred to as Vapor Barrier.
 8. And as required to complete the masonry assemblies as shown on drawings.
- B. Related Work Specified Elsewhere:
1. Cast-in-Place Concrete: Section 03 30 00
 2. Masonry Grout: Section 04 05 00
 3. Reinforced Unit Masonry: Section 04 23 00.
 4. Caulking: Section 07 90 00 - Joint Sealers.
 5. Vapor Barrier: Section 07 27 20 – Fluid Applied Air & Water Resistive Barrier
 6. Aluminum door frames: Section 08 40 00 - Aluminum Storefronts.
 7. Portland Cement Stucco: Section 09 24 23
 7. Division 16 for Electrical Systems.
- C. Installed But Not Furnished: Insulation (section 07210), and miscellaneous metal items embedded in masonry, steel lintels, bolts, and anchors: Section 05500 - Metal Fabrications.

1.02 QUALITY ASSURANCE

- A. Conform to requirements of American Concrete Institute (ACI), Building Code Requirements for Concrete Masonry Structures and Specification for Concrete Masonry Construction.
- B. Acceptable Manufacturer: Regularly engaged in production of specified products.
- C. Sample Wall Panel:
1. Construct 4 foot by 6 foot sample panel, adequately braced and protected, with one 90 degree corner. Sample wall shall remain standing during the course of the construction and acceptance of the masonry work, and will be used as a standard for all masonry work.
 - a. Use full size masonry units to show full masonry/finish system construction, color range, maximum texture range, bond, mortar, finish of joints, reinforcing, insulation and quality of workmanship.
 - b. Do not proceed with work until panel is accepted by Architect.
 - c. Retain accepted sample as reference standard for project.

2. At contractor's option, sample wall panel may be utilized in the construction of the Work. Otherwise, demolish and remove sample panel from project site after completion and acceptance of project masonry work by Architect.

1.03 SUBMITTALS

- A. Samples: Five individual samples of architectural concrete masonry units (CMU) showing extreme variations in color and texture. Full range of available mortar colors. Printed color charts are not acceptable.
- B. Certifications: Furnish manufacturer's certification that materials meet specification requirements.
- C. Mix design of grout showing compliance with specified standards.
- D. Product Literature indicating compliance with specifications for wall ties, anchors reinforcing, membrane flashing, and dampproofing.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and store manufactured products in original unopened containers.
- B. Store cementitious ingredients in weather tight enclosures and protect against contamination and warehouse set.
- C. Stockpile and handle aggregates to prevent contamination.
- D. Keep water free of harmful materials.
- E. Deliver reinforcing and accessories in original unopened containers or in bundles marked with metal tags indicating material and size.
- F. Store masonry units above ground on level platforms that allow air circulation under stacked units.
 1. Handle units in manner that will prevent chipping or cracking.
 2. Protect units against wetting and dusting on job site.
 3. Handle units on pallets or flat bed barrows.
- G. Vapors of certain dampproofing products are harmful or flammable. Follow manufacturer's recommendations regarding safe handling, storage, personal protection, health and environmental consideration. Apply dampproofing only when existing and forecasts indicate dry weather. Follow manufacturer's instructions regarding proper temperature ranges for installation.
- H. Dampproofing may be incompatible with certain sealant products. Verify with manufacturer prior to installation.

1.05 JOB CONDITIONS

- A. Weather Conditions:

1. Do not erect masonry when temperature is 40 degrees F and falling except by written approval of Architect. Do not build upon frozen work. Protect masonry from freezing for 48 hours after laying.
2. Protect masonry from rain as described in Part 3.
3. During hot weather conditions, protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 99 degrees F., or higher, in shade with relative humidity less than 50 percent.
4. Maintain mortar between 70 and 120 degrees F.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. General:
1. Aggregate: Normal weight unless otherwise specified or specifically shown otherwise on drawings.
 2. Size and Shape: Modular units of nominal dimensions (8 inches by 16 inches face dimensions, unless otherwise noted for width as shown on drawings) including all special shapes and sizes required to complete work.
 3. Appearance: Fine texture, free of cracks, chips, and surface defects noticeable at a distance of 12 feet, if exposed.
- B. Types:
1. Hollow Load Bearing:
 - a. Conform to ASTM C 90, Type II
 - b. Minimum Compressive Strength: $f_m = 1,500$ psi.
 2. Hollow Non-Load Bearing: Conform to ASTM C 129, Type II.
 3. Concrete Building Brick: Conform to ASTM C55, Grade N-II.
 4. Architectural Concrete Masonry Units, including load bearing conforming to ASTM C 90, Type I: Nominal size 8" x 16" face dimension 8" depth and 12" depth, equal to Trendstone, ground face, by Trenwyth industries, color: Natural. Masonry units shall be manufactured with W.R. Grace Dryblock water repellent admixture.

2.02 MORTAR (GROUT, See 04 05 00)

- A. Cements:
1. Mortar:
 - a. Portland: Conform to ASTM C 150, Type I.
 - b. Masonry: Conform to ASTM C 91.
 2. Grout: Portland cement conforming to ASTM C 150. Type I.
 3. Color of mortar for brick and CMU including Architectural CMU, gray mortar. [Note, for further clarification, if the cost is less to construct the architectural CMU with mortar that matches the architectural CMU due to care required to keep all mortar off face surface during installation, this is acceptable.]
- B. Lime: Hydrated, conform to ASTM C 207, Type AS.
- C. Aggregate:
1. Mortar: Conform to ASTM C 144, fineness modulus 1.8 to 2.2.
 2. Grout: Conform to ASTM C 404 and see 04 05 00.

- D. Admix: Cement dispersing and water repellent agent, conform to ASTM C 494; water repellent agent equal to W. R. Grace Dryblock water repellent mortar additive, following manufacturer's instructions, to be used in all exterior mortar.
- E. Water: Clean and free of deleterious substances, oils, acids, salts, and chlorides.

2.03 ACCESSORIES

- A. Horizontal Joint Reinforcing:
 - 1. Fabricate from cold drawn wire, conforming to ANSI/ASTM A82, hot dip galvanized after fabrication.
 - 2. Longitudinal Wires: Deformed, 9 gauge or larger.
 - 3. Cross Wires: Deformed or smooth, 9 gauge or larger.
 - 4. Weld cross wires at 16-inch intervals to longitudinal wires; ladder type.
 - 5. Width of Assembly: Two inches less than nominal wall thickness.
- B. Reinforcing Bars for Lintels, Bond Beams and Vertical Cells: Comply with 04 23 00 Reinforced Unit Masonry and conform to ASTM A 615, Grade 60 and as indicated on drawings.
- C. Anchors and Ties: General: Standard designs, copper clad steel, galvanized steel, or non-corrosive metal having equivalent total strength of steel types.
- D. Bond Inhibitors: Non-petroleum based, not harmful to masonry work or adjoining materials.
- F. Control Joint Material:
 - 1. One of the following:
 - a. Preformed rubber, neoprene or polyvinyl chloride material.
 - (1) Provide with corner and tee accessories.
 - (2) Heat or cement fused joints.
 - (3) Acceptable:
 - (a) Dur-O-Wall, Inc.
 - (b) Williams Products, Inc.
 - (c) Substitutions; Items of same function and performance by other manufacturers are acceptable as approved by Architect.
 - b. Building Paper: Asphalt saturated felt, ASTM D 226, Type II (30 Pounds), nonperforated.
 - 2. Joint Fillers: See Section 07900 - Joint Sealers.
- G. Membrane Flashing: For miscellaneous flashing, including thru-wall, lintel, sill and spandrel flashings and flashings at heads of openings use one of following:
 - 1. Rubberized Asphalt:
 - a. Self-Adhering 40 mil membrane consisting of 32 mils of pliable, highly adhesive rubberized asphalt completely and integrally bonded to 8 mil, high density, and cross-laminated polyethylene film.
 - b. Acceptable: W.R. Grace & Co., Perm-A-Barrier Wall Flashing.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect foundation surfaces to support masonry units to assure they are to correct grades and elevations.
- B. Verify that surfaces are free of all dirt and other deleterious material.

3.02 MORTAR AND GROUT

- A. Mixing:
 - 1. Mix ingredients in clean mechanical batch type mixer to uniform color and consistency.
 - 2. Do not mix greater quantity than can be used within 2-1/2 hours.
 - 3. Re-tempering of mortar or grout in which cement has begun to set will not be permitted.
 - 4. Water to replace loss due to evaporation may be added up to 2-1/2 hours after initial mixing.
 - 5. Keep equipment clean.

3.03 INSTALLATION

- A. General:
 - 1. Verify coursing prior to start of work.
 - 2. Do not use cracked, broken, or chipped masonry units.
 - 3. Use masonry saws to cut and fit masonry units.
 - 4. Architectural CMU: **Install preparation and installation of Architectural CMU in strict accordance with Manufacturer's published instructions.**
 - 5. Set units plumb, true to lines, and brick and block with level courses accurately spaced.
 - a. Adjust masonry unit to final position while mortar is soft and plastic.
 - b. If units are displaced after mortar has stiffened, remove, clean joints and units of mortar, and relay with fresh mortar.
 - 6. When joining fresh masonry to set or partially set masonry construction, clean exposed surfaces of set masonry and remove loose mortar prior to laying fresh masonry.
 - 7. Where masonry work is not exposed to view such as below slab Standard CMU acceptable.
- B. Protection of Work:
 - 1. Protect existing adjacent work from damage during construction.
 - 2. Cover top of exterior walls with non-staining waterproof coverings when work is not in progress.
 - 3. Protect face materials against staining.
 - 4. Adequately brace all masonry walls exposed to wind and/or other lateral loads.
 - 5. Apply bond inhibitor as required preventing cementitious material from bonding to adjoining metals, glass and other materials.
- C. Mortar Beds:
 - 1. Concrete Masonry Units:
 - a. Hollow Units:
 - (1) Lay with full mortar coverage on horizontal and vertical face shells.
 - (2) Provide full mortar coverage on horizontal and vertical face shells and webs in all courses of piers, columns, and pilasters, in starting course on slabs, footings, and foundation walls, and where adjacent to cells or cavities to be reinforced and/or filled with grout or concrete.

- b. Solid Units: Lay with full coverage on horizontal and vertical faces.
- D. Joints:
- 1. Nominal Thickness: 3/8 inch
 - 2. Construct uniform joints.
 - 3. Shove vertical joints tight, removing excess mortar.
 - 4. Exterior and Interior Joints:
 - a. Exposed: Tool concave with 3/4-inch diameter tool, u.o.n.
 - b. Concealed Joints: Strike flush.
 - 5. Fill horizontal joints with mortar between top of masonry walls and partitions and underside of structure above with mortar, unless otherwise shown on drawings.
- E. Joint Reinforcing:
- 1. Place reinforcement so that longitudinal wires are located over shell mortar with minimum mortar cover of 5/8 inch on exterior side of walls and 2 inch cover elsewhere.
 - 2. Provide in all masonry walls at 16 inches on center vertically and in 2 successive joints above and below openings.
 - 3. Extend reinforcing at openings 24 inches beyond each side of opening or to end of panel if distance is less than 24 inches.
 - 4. Lap splices 12 inches.
 - 5. Install factory-fabricated sections at wall and corner intersections.
 - 6. Interrupt reinforcing at control joints and expansion joints.
- F. Vertical Reinforcing:
- 1. Position reinforcing accurately.
 - 2. Form splices by lapping bars not less than 48 diameters and wire tying.
 - 3. Maintain minimum clearance of 2 inch between reinforcing and masonry.
 - 4. Hook vertical reinforcing into bond beams.
- G. Grouting:
- 1. Align vertical cells of concrete masonry units to be filled with grout to provide continuous unobstructed opening.
 - 2. Avoid obstructions in core that prevent proper grout fill.
 - 3. Place grout in 4 feet lifts.
 - 4. Obtain approval from Architect if grouting is to be done in higher lifts. Provide clean-out holes and lifts shall not exceed eight (8) feet.
 - 5. Do not begin placement of grout until alignment of cells is inspected and approved by Architect.
- H. Bonding:
- 1. Masonry to Steel: Weld-on adjustable column anchors at 24 inches on centers.
 - 2. Intersecting of Abutting Walls and Partitions:
 - a. Lay at least 50 percent of units at intersection in masonry bond with 3 inches (minimum) bearing of alternate units on unit below.
 - b. At non-load bearing walls or partitions carried up separately provide wall ties at 24 inches on centers.
 - c. At load bearing walls or partitions carried up separately provide rigid steel anchors at 24 inches on centers.
- I. Control and Expansion Joints:
- 1. Spacing:

- a. Expansion Joints: At building expansion joint lines.
 - b. Control Joints: Three times ratio of panel length to height (L/H) with panel length not to exceed 50 feet, and aligning with exterior finish joints.
2. One of the following:
- a. Form with building paper bond breaker fitted to one side of hollow contour of block unit.
 - (1) Fill resultant core with grout fill.
 - (2) Rake joint at exposed face for placement of backer rod and sealant.
 - b. Preformed Control Joint Device:
 - (1) Install in continuous lengths.
 - (2) Seal butt and corner joints in accordance with manufacturer's instructions.
 - c. Size control joint in accordance with Section 07900 - Joint Sealers for sealant performance.
- J. Built-In Work:
- 1. Avoid cutting and patching.
 - 2. Install bolts, anchors, nailers, inserts, frames, flashing, conduit, pipe, wood plugs, and other similar built-in items as masonry work progresses.
 - 3. Solidly grout spaces around built-in items.
 - 4. Fill cells, as work progresses, with grout where anchors, bolts and ties occur within cells of units.
 - 5. Build walls and partitions enclosing piping only after pipes are in place, tested, and approved.
 - 6. Coordinate erection of walls and partitions with installation of electric conduit, wall boxes, and piping.
 - 7. Where masonry will remain exposed cut neatly for electrical outlets and similar items. Note locations where Electrical boxes to be exposed and surface mounted in controlled design configuration.
 - 8. Membrane Flashing:
 - a. Clean surface of masonry smooth and free from projections that might puncture or damage flashing material.
 - b. Place through-wall flashing on bed of mortar and cover flashing with mortar.
- K. Concrete Masonry Unit Lintels and Bond Beams:
- 1. Form of lintel block, fill cells solidly with grout or concrete, and provide with not less than two #5 reinforcing bars unless otherwise shown on drawings.
 - 2. Lap reinforcing a minimum of 48 bar diameters at splices.
 - 3. Break bond beams and reinforcing at expansion joints.
 - 4. Use special shaped concrete masonry units for bond beams and lintels.
 - 5. Match material and texture of adjoining masonry units.
 - 6. Build lintels straight and true with at least 8 inches of bearing each end.
 - 7. Fill cells of units a minimum of 2 courses below lintel bearing with grout.
- L. Preparation for Vapor Barrier/Drainage Plane:
- 1. All concrete and masonry shall be cured a minimum of seven (7) days and be dry before application of Barrier. Prior to application of Barrier, surfaces shall be inspected and repaired as required by manufacturer to provide proper surfaces to receive barrier. All surfaces shall be free of voids, spalled areas, loose aggregate and sharp protrusions, with no coarse aggregate visible. Remove all contaminates from the surface and clean surface (broom, vacuum cleaner or compressed air) to remove dust, dirt, loose stones and debris. Repair concrete and CMU in the following

manner.

- Bugholes over 1/2 inch (13 mm) in length and 1/4 inch (6mm) deep shall be plugged with concrete finished flush with surrounding surfaces.
 - Form tie rod holes must be filled flush with surrounding surfaces.
 - Fins shall be ground smooth.
 - Scaling shall be removed to sound, unaffected concrete and the exposed area repaired.
 - Irregular construction joints shall be corrected by feathering the repair material or by grinding.
3. Install flashing and corner protection stripping as recommended by barrier materials manufacturer, preceding application.
 4. Application of primer shall be in accordance with the materials manufacturer.

3.04 POINTING AND CLEANING

- A. At final completion of masonry work fill holes in joints and tool.
- B. Cut out and repoint defective joints.
- C. Dry brush masonry surface after mortar has been set, at end of each days work, and after final pointing. NOTE: Architectural Concrete Masonry Units to be kept clean throughout construction in strict accordance to manufacturers published instructions.**
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.
- E. Clean exposed masonry work with cleaning agents as recommended by manufacturer of cleaning agent and manufacturer of masonry unit to be cleaned.
- F. Clean masonry from top down.

End of Section

SECTION 04 23 00 – REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes reinforced masonry installation, reinforcement, and forming as required to complete this project. All reinforced masonry installation shall conform to the requirements of this and referenced specifications.
- B. Related Sections:
 - 1. Cast-In-Place Concrete Section 03 30 00
 - 2. Masonry Grout Section 04 05 00
 - 3. Masonry Assemblies Section 04 20 00
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

- A. SER: Structural Engineer of Record for the project.
- B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.
- C. Sub-contractor: Provides materials or services for the project through the Contractor.

1.3 SUBMITTALS

- A. General:
 - 1. Submit all documents and samples in conformance to Specification Section 01 33 00.
 - 2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
 - 3. Review of shop drawings does not constitute authorization to vary from the contract documents.
 - 4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.
- B. Mill Certificates: Submit certificates as follows:
 - 1. Certificate of compliance for concrete masonry units, aggregates, cement, and lime.
 - 2. Steel producer's certificates of mill analysis, tensile and bend tests for reinforcement steel required for project.
- C. Fire Resistance Documentation:

1. Submit documents indicating the material composition, equivalent thickness, and hourly fire rating provided by unfilled block units in conformance to the requirements of the Quality Assurance Article of this Specification Section for all concrete masonry to be installed as part of a fire rated assembly.
- D. Mix Design for Grout: At the same time as the Concrete Masonry submittal, submit documents required by Specification Section 04 05 00 – Masonry Grout as a separate submittal number.
- E. Test Reports: Submit reports on all tests required herein.
- F. Shop Drawings for Reinforcing:
1. Submit shop drawings for fabrication, bending, and placement of all reinforcement bars.
 - a. Comply with ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures”.
 - b. Electronic submittal is required and file format utilizing PDF format is preferred.
 - c. Drawings shall be clearly marked “FOR APPROVAL ONLY – NOT FOR FIELD USE”. If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped “FOR FIELD USE”.
 - d. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.
 2. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer and which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.
 3. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements as established in Specification Section 01 33 00.
- B. Materials Resources Certificates:
1. Certify recycled material content for recycled content products.
 - a. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content by weight per unit of product or assembly containing the product.
 - b. Indicate the percentage of the dollar value of the recycled content compared to the total dollar value of the product or assembly containing the product.
- C. Regional Materials Certificates:
1. Indicate location and distance for all materials where the distance to the source of extraction, recovery, processing, and manufacturing is 500 miles or less from the Project site.

- a. Indicate the dollar value of the material cost of the product containing local/regional materials.
- b. Where product components are sourced or manufactured in separate locations, provide location and percentage by weight of each component per unit of product.

1.5 QUALITY ASSURANCE

A. Reinforced Masonry Standards:

1. All concrete masonry work shall comply with the latest edition of the Specifications for Masonry Structures (ACI 530.1/ASCE 6) except as noted herein.

B. Concrete Masonry for Fire Rated Construction:

1. All concrete masonry to be installed as part of a fire rated assembly shall have their equivalent thickness calculated based on their material composition and nominal unit width in accordance with the latest edition of ASTM C140.
 - a. The equivalent thickness shall be used to determine the appropriateness of concrete masonry units to be installed for the required hourly fire rating of Project fire assemblies.
2. The hourly rating provided by an unfilled or non-grouted concrete masonry unit shall be based on the currently enforced edition of the Florida Building Code for all concrete masonry to be installed as part of a fire rated assembly.
 - a. Underwriter's Laboratory (UL) tested and listed CMU assemblies shall only be considered if deemed acceptable by the Code Authority Having Jurisdiction over this Project.
 - b. The Contractor shall notify the Architect, in writing, if concrete masonry intended for fire rated assemblies will not provide the required hourly rating as an unfilled unit and propose remedial course of action for Architect's review and approval.
 - 1) Only remedial action approved by the Architect will be carried out.

C. General Testing Requirements:

1. Submit all test reports required by this Spec Section within 3 days of completion of the test to permit verification of compliance with the requirements of the Construction Documents.
 - a. These findings shall be reported both electronically and in print to the Architect and Engineer.
 - b. The Contractor shall keep a log of all testing with date of submittal to the Architect and Engineer indicated for each entry.

D. Grout Testing: Refer to Specification Section 04 05 00 – Masonry Grout.

E. Mortar Testing: Refer to Specification Section 04 20 00 – Masonry Assemblies.

F. The Contractor shall employ and pay an independent testing laboratory, acceptable to the Architect and Engineer, to provide the following tests:

1. Lab Qualifications: Testing laboratory shall meet the requirements of ASTM E329.
2. Concrete Masonry Unit Tests (Preconstruction):

- a. Prior to any construction, verify by laboratory tests in accordance with ASTM C140 that the concrete masonry units to be used on this project comply with the project requirements.
 - 1) Tests for the following information: compressive strength, absorption, unit weight (density), moisture content, and dimensions.
 - 2) Test 6 units minimum for the first lot of 10,000 units scheduled for the project and 6 additional units for every 50,000 units thereafter which are scheduled for the project.
- 3. Concrete Masonry Unit Tests (During Construction):
 - a. During construction, verify by laboratory tests in accordance with ASTM C 140 that the concrete masonry units being used on the project comply with the project requirements and reflect similar results to the preconstruction tests.
 - b. Test 6 units for every 10,000 square feet of each type of masonry constructed.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F (4 degrees C).
- B. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F (38 degrees C) or ambient temperature is greater than 90 degrees F (32 degrees C) with wind velocity greater than 8 mph (13 km/h).

PART 2 PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

- A. Materials and Resources Characteristics:
 - 1. Recycled Content Materials: Furnish materials with maximum available recycled content.
 - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

2.2 MATERIALS

- A. Concrete Masonry Units (CMU):
 - 1. General:
 - a. Refer to Section 04 20 00 – Masonry Assemblies for masonry materials and accessories not included in this section.
 - b. Aggregate: All aggregate shall consist of clean, hard, uncoated grains, uniform in color, free from dust, soft or flaky particles, shale, alkali, organic matter, loam, or other deleterious substances.
 - 2. Smooth Face Units:
 - a. Unless required otherwise by the Architect, normal, blended or lightweight units conforming to ASTM C 90 and, in addition, to the requirements of the Quality Control Standards of the National Concrete Masonry Association.

- b. The units shall have a minimum compressive strength of 2000 psi on the net cross-sectional area.
- c. Units shall have cured for not less than 28 days when placed in the structure.
- d. Units shall be of cellular construction, with the cells vertical and an exposed face of 7-5/8 inches high x 15-5/8 inches long (8 inches x 16 inches nominal sized) x the (nominal) thicknesses indicated on the Drawings.

B. Reinforcement:

1. Deformed Reinforcement Bars: Provide deformed bars of following grades complying with ASTM A615, except as otherwise indicated.
 - a. Provide Grade 60 for bars No. 3 to No. 18, except as otherwise indicated.
 - b. Where No. 2 bars are shown, provide plain, round, carbon steel bars, ASTM A675, Grade 80.
 - c. Shop-fabricate reinforcement bars which are shown to be bent or hooked.
2. Welded Wire Reinforcement: Provide wire reinforcement conforming to ASTM A82.
 - a. For joint reinforcement in concrete masonry, provide welded wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units.
 - b. Width shall be approximately two inches less than the nominal width of walls as required to provide mortar coverage of not less than 5/8 inch on joint faces exposed to the exterior and 1/2 inch elsewhere.
 - c. Wire size for side rods shall be 0.1875-inch diameter.
 - 1) Optionally, the Contractor may submit #8 side rods for installation at 8 inches o.c.
 - d. Wire size for cross-rods shall be #8.
 - e. Joint reinforcement shall be of a ladder design.
 - 1) Joint reinforcement for exterior wall construction shall be hot dipped galvanized after fabrication in accordance with ASTM A153, Class B-2.
 - 2) Joint reinforcement for interior wall construction shall be mill galvanized in accordance with ASTM A641, Class I.
 - f. Provide and install prefabricated "L" and "T" of the same construction as the main units to provide continuity at corners and intersections.

PART 3 EXECUTION

3.1 INSTALLATION – GENERAL

- A. Refer to Section 04 20 00 – Masonry Assemblies for general installation requirements of unit masonry
- B. All masonry shall be laid true, level, plumb and neat, reflecting the highest quality of workmanship. Masonry units shall be sound, dry, clean, and free from cracks when placed. Wetting of concrete masonry units shall not be permitted.
- C. Proper masonry units shall be used to minimize cutting of units. Where cutting is necessary, all cuts shall be neat and true, and shall be cut using motor-driven saws. Provide the necessary materials to cover and to protect the masonry units and the walls from weather and other dangers during the progress of the work.

- D. Use special shaped units where shown, and as required for corners, jambs, sashes, control joints, lintels, bond beams and other special conditions.
 - 1. Where shaped units are part of a decorative CMU assembly, use shaped unit of the same character and appearance.
- E. The top surface of the concrete foundation shall be clean, all laitance removed, and aggregate exposed before starting the masonry construction.
- F. Use continuous dovetail anchors between masonry units and cast-in-place concrete members.
- G. Coordinate placement of all built-in work, bearing plates, and anchors supplied by other sections.
- H. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.
 - 1. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie, and support as required in order to maintain position and shape during construction and curing of reinforced masonry.
- I. Isolate masonry partitions from vertical structural framing members with movement joint as indicated on drawings.
- J. Isolate top of masonry from horizontal structural framing members and slabs or decks as detailed on the drawings.

3.2 REINFORCEMENT

- A. General:
 - 1. Clean reinforcement of loose rust, mill scale, concrete, earth, ice or other materials which will reduce bond to mortar or grout.
 - 2. Reinforcing bars shall be straight except for bends around corners and where bends or hooks are indicated on the Drawings or approved shop drawings.
 - a. Do not use reinforcement bars with kinks or bends not shown on Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
 - b. Foundation dowels shall not slope more than 1:6 (H:V), and shall be grouted into a core in vertical alignment.
- B. Position reinforcement accurately at the spacing indicated.
 - 1. Support and secure vertical bars against displacement.
 - a. Vertical bars shall be held in position at the top and bottom and at intervals not exceeding 192 bar diameters.
 - 2. Keep reinforcing bars clear of adjacent components.
 - a. Vertical bars shall have a minimum clearance of 1/4 inch from the masonry.
 - b. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1 inch, whichever is greater.

- c. For columns, piers and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2 inches, whichever is greater. Provide lateral ties as indicated.
- 3. Horizontal reinforcement shall be placed as the masonry work progresses.
 - a. Horizontal bars shall be laid on the webs of the units in continuous masonry courses, consisting of bond beam or channel units, and shall be solidly grouted in place.
- C. Extend reinforcement beyond top of masonry lift as required for splicing. Pour grout to within 1-1/2" of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequences if more pours are required.
- D. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Engineer. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or with dowels, lap ends, place in contact and wire-tie together. Lap bars side by side in plane of wall to maintain proper clearances.
 - 1. Provide not less than minimum lap shown, or if not indicated, as required by governing code or 48 times the bar diameter, whichever is greater.
- E. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 5/8 inch on exterior face of walls and 1/2 inch at other locations.
- F. Horizontal Joint Reinforcement:
 - 1. Unless otherwise indicated, provide horizontal joint reinforcement in every other horizontal joint for 3/16 inch side rod reinforcing, or on every joint for #8 side rod reinforcing.
 - 2. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 5/8 inch on exterior face of walls and 1/2 inch at other locations.
 - 3. Wire reinforcement shall be lapped at least 6 inches at splices and shall contain at least one cross-wire of each piece of reinforcement in the lap distance.
 - 4. Install prefabricated "L" and "T" at their respective corner and intersection conditions.
 - a. Cut and bend units only as recommended by manufacturer for continuity at returns, offsets, pipe enclosures and other special conditions.
 - b. Field cut and shaped corner "L's" and intersection "T's" are strictly prohibited.
- G. Lateral Tie Reinforcement:
 - 1. Embed lateral tie reinforcement in mortar joints where indicated. Place reinforcement at vertical spacing shown as masonry units are laid.
 - 2. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16 inches o.c. for members with 20 inches or less side dimensions, and 8 inches o.c. for members with side dimensions exceeding 20 inches.

3.3 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

- A. General:

1. Do not wet concrete masonry units (CMU) except for saw cutting per OSHA requirements.
2. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs in mortar in starting courses and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be reinforced and filled with grout. Maintain head and bed joint widths shown, or if not shown, provide 3/8 inch joints.
 - a. Where solid CMU units are shown, lay with full mortar head and bed joints.

B. Walls:

1. Pattern Bond: Lay CMU wall units in a 1/2-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated.
2. Bond and interlock each course at corners and intersections. Reinforce and solid-grout all cells at corners and intersections.
 - a. Corners shall have a standard masonry bond by overlapping units.
 - b. Intersecting masonry walls without control joints shall be interlocked by 50% overlap.
3. All masonry below grade shall be solid-grouted.
4. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
5. Place horizontal beam reinforcement as the masonry units are laid.
6. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms (unless shown otherwise). Do not use building paper or sheet plastic to close voids due to breakage of mortar bond.
 - a. Option: Where all vertical cores are not shown to be grouted. Contractor may elect to fill all vertical cores with grout provided that the area is not supported by beams but is continuous to the foundation.

C. Columns, Piers and Pilasters:

1. Use CMU units of the size, shape and number of vertical core spaces shown. If not shown, use units which provide minimum clearances and grout coverage for the number and size of vertical reinforcement bars shown.
2. Provide pattern bond shown, or if not shown, alternate head joints in vertical alignment.
3. Where bonded pilaster construction is shown, lay wall and pilaster units together to maximum pour height specified.

3.4 MORTAR

- A. All mortar used for concrete masonry shall conform to the requirements of Specification Section 04 20 00 – Masonry Assemblies.
- B. Mix mortar in a power-driven batch mixer of one bag minimum capacity for at least three minutes after all materials have been added.

- C. Hand mixing will not be allowed. Use mortar within two hours after mixing; discard mortar not used within this time limit. Retempering will be allowed to restore the required consistency as needed until the two hour limit is reached.
- D. Mortar joints shall be 3/8-inch thick with full mortar coverage on the face shells and webs surrounding the cells to be filled.
 - 1. Interior Joints shall be:
 - a. Tooled at faces to be painted.
 - b. Flush at faces to received drywall, hardcoat or ceramic tile.
 - 2. Exterior Joints shall be:
 - a. Tooled at faces to be exposed.
 - b. Flush at faces to receive brick, ceramic tile or other veneer.
 - 3. Joints of 8" wide units shall be laid with the interior faces true.
 - 4. Joints of 4" wide units (to receive stucco) shall be laid with exterior faces true.
- E. The starting joint on foundations shall be laid with full mortar coverage on the bed joint except that the area where grout occurs shall be free from mortar so that the grout will contact the foundation.

3.5 GROUTING

- A. General:
 - 1. Refer to Section 04 05 00 – Masonry Grout.
 - 2. Use "Fine Grout" per ASTM C476 for filling spaces less than 3 inches in one or both horizontal directions.
 - 3. Use "Course Grout" per ASTM C476 for filling 3 inches spaces or larger in both horizontal directions.
 - 4. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect and Engineer.
 - 5. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.
 - 6. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation.
 - 7. Place grout in lintels or beams over openings in one continuous pour.
 - 8. Where bond beams occur more than one course below top of pour, fill bond beam during construction of masonry.
- B. Preparation of Grout Spaces:
 - 1. Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcing and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond.
 - 2. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond, 3 days minimum. Install shores and bracing, if required, before starting grouting operations.
 - 3. High-Lift Grouting: After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

C. Grouting Technique: Use grouting techniques subject to requirements which follow.

1. High-Lift Grouting:

- a. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension is 3 inches and area is 12 sq. in.
- b. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.
 - 1) Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell (preferred alternate). Minimum cleanout size shall be 3 inches x 4 inches. Locate cleanouts in areas not exposed to view in finished structure.
- c. Construct masonry to full height of maximum grout pour specified, prior to placing grout.
 - 1) Limit grout lifts to a maximum height of 4 feet -8 inches and grout pour to a maximum height 24 feet, for single wythe hollow concrete masonry walls, unless otherwise indicated.
- d. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. The vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10 feet.
 - 1) Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.
 - 2) Where reinforcement is prefabricated into caged units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.
- e. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour.
- f. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.
- g. Do not penetrate or damage grout placed in previous lifts or pours.

2. Low-Lift Grouting:

- a. Construct masonry to height of maximum grout lift specified, prior to placing grout.
 - 1) Limit grout lifts to a maximum height of 4 feet - 8 inches, unless otherwise indicated.
- b. Clean debris and mortar droppings out of cells prior to installing reinforcing.
- c. Place vertical reinforcement before grouting. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 4 feet - 8 inches in one grout lift.
- d. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.

3. Place horizontal beam reinforcement as the masonry units are laid.

4. Embed lateral tie reinforcement in mortar joints where indicated. Place reinforcement at vertical spacing shown as masonry units are laid.

- a. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16" o.c. for

members with 20" or less side dimensions, and 8" o.c. for members with side dimensions exceeding 20".

5. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcing and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond.
 - a. High-Lift Grouting: After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.
6. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond, 3 days minimum. Install shores and bracing, if required, before starting grouting operations.
7. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect and Engineer.
8. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4'-8". Place grout in lintels or beams over openings in one continuous pour.
 - a. High-Lift Grouting: Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost. Do not damage grout placed in previous lifts or pours.
 - b. Low-Lifting Grouting: Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.
9. Where bond beams occur more than one course below top of pour, fill bond beam during construction of masonry

3.6 POINTING

- A. Point-up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.

3.7 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- B. Maximum Variation from Level Coursing: 1/8 inch in 5 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

3.8 CONTROL AND EXPANSION JOINTS

- A. Locate all CMU control and expansion joints per the Drawings.
- B. Do not continue horizontal joint reinforcement through control and expansion joints.
- C. Install preformed control joint device in continuous lengths as shown in the Drawings.
 1. Seal butt and corner joints.
 2. Size control joint in accordance with Section 07 90 00 for sealant performance.

3.9 BUILT-IN WORK

- A. As work progresses, install all built-in components, bearing plates, and anchors furnished by other sections.
- B. Electrical boxes and any other items that are built into exposed masonry shall be flush with face of wall.
 - 1. Maximum recess for any built in item is 1/8 inch.
 - 2. No protrusion from face of wall shall be allowed.
 - 3. Maximum clearance between masonry and built in item shall be ¼ inch.

3.10 REPAIR AND REMEDIATION

- A. In the event of damage, immediately make all repairs and replacement necessary to the approval of the Architect and at no additional cost to the Owner.
 - 1. Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended.
 - 2. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement. During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar.
- B. Any concrete masonry construct that the Architect or Engineer deems to be in non-conformance to the requirements of this and all related Specification Sections shall be subject to demolition and reconstruction in conformance to the Specifications to the extent defined Architect or Engineer.
 - 1. Any and all remedial work to resolve any non-conformance or deficiency will be wholly at Contractor's expense.

3.11 CLEANING AND PROTECTION

- A. Concrete scum and grout stains shall be removed immediately. After the concrete masonry assembly is constructed, it shall not be saturated with water for curing or any other purpose.

3.12 MOISTURE AND AIR BARRIERS

- A. Prior to applying any moisture and/or air barrier on concrete masonry, fill all voids, pits and depressions greater than 1/8 inch deep measured from the CMU face surface with Spec compliant mortar. In addition, remove any debris, unused form fasteners, or excess mortar and patch as required.
 - 1. Resultant surface shall be continuous, smooth, and free of debris to permit undisturbed sheeting of moisture over the subsequently installed moisture membrane.
 - 2. Mortar shall not be used as a filling material after the moisture/air membrane is installed.
- B. See Division 7 for moisture and air membrane materials and installation requirements.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. AESS Requirements
2. Structural shapes.
3. Channels and angles.
4. Hollow structural sections.
5. Structural pipe.
6. Structural plates and bars.
7. Bolts, connectors, and anchors.
8. Temporary Bracing
9. Permanent Bracing
10. Grout.

B. Related Sections:

- | | |
|-----------------------------------|------------------|
| 1. Cast-In-Place Concrete | Section 03 30 00 |
| 2. Non-Metallic Grout | Section 03 60 30 |
| 3. Steel Joists and Joist Girders | Section 05 22 00 |
| 4. Steel Roof Deck | Section 05 33 00 |
| 5. Painting and Coating | Section 09 90 00 |

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for the project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

D. Delegated Engineer: Also referred to as Specialty Engineer, is a Florida professional engineer who undertakes a specialty service and provides services or creative work (delegated engineering document) regarding a portion of the engineering project. The delegated engineer is the engineer of record for that portion of the engineering project. Refer to Chapter 61G15-30 Responsibility Rules Common to All Engineers, Board of Professional Engineers, Florida Administrative Code, for additional information.

E. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

- F. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.

1.3 SUBMITTALS

A. General:

1. Submit all documents and samples in conformance to Specification Section 01 33 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Shop Drawings:

1. Submit complete fabrication and erection shop drawings, including details of each piece (show match marks on both erection and detail drawings, and fabricated member) indicating principal lines of connection pieces.
 - a. Electronic submittal is required and file format utilizing PDF format is preferred.
 - b. Drawings shall be clearly marked "FOR APPROVAL ONLY – NOT FOR FIELD USE". If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped "FOR FIELD USE".
 - c. Indicate welds by standard AWS symbols and show size, length and type of each weld. Seat angles are not to interfere with architectural clearances.
 - d. Acceptance will be for size, and for arrangement of principal and auxiliary members.
 - e. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.
 - f. Prepare any deviation from design drawings under supervision of a professional engineer, registered in the State of Florida, acting as the manufacturer's Delegated engineer, who shall sign and seal these calculations and submit them with the relevant shop drawings per the statutes of the State of Florida. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State of Florida. Refer to Section 01 33 00 for method of handling the submission of signed and sealed documents
2. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.
3. Connection Designs:
 - a. Shop drawings submitted without required connection designs will be rejected.
 - b. Bolted and welded connections shall be designed in accordance with referenced standards and specifications.
 - c. Unless noted otherwise, connections shall be designed for a minimum of one-half the total uniform load capacity shown on the tables of Uniform Load Constants, Part 2 of the AISC Manual, for the given beam, span, and grade of steel specified.

- d. Connection designs must conform to AISC publication "Engineering for Steel Construction".
 - e. Connection designs not specifically detailed on the drawings shall be designed by a Florida Registered Structural Engineer who shall be the manufacturer's Delegated Engineer. Signed and sealed calculations and drawings are required and shall be submitted for Architect's records. Structural steel shop drawings will be rejected unless the required calculations are included. Manufacturer's Delegated Engineer shall comply with Statutes of the State of Florida.
4. Templates: Furnish for setting anchors and anchor bolts together with instructions.
 5. Indicate exposed surfaces and edges and surface preparation being used paying close attention for all AESS members.
 6. Indicate special tolerances and erection requirements.
 7. Erection Procedure: Accompany shop drawings with description of detailed procedure including sequence of erection and temporary staying and bracing.
- C. Product Data:
1. Submit manufacturer's specifications and installation instructions for the following products.
 - a. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties of steel supplied.
 - b. High strength bolts (each type), including nuts and washers. Include direct tension indicators if used.
 - c. Structural steel primer paint.
 - d. Non-shrink grout.
- D. Test Reports:
1. Submit laboratory test reports and other data to show compliance with specifications (including specified standards).
 2. Submit test reports conducted on shop and field bolted and welded connections.
 3. Include data on type(s) of tests conducted and test results.
- E. Fabricator & Installer's Certifications:
1. Submit documentation demonstrating that Fabricator and Erector each have a minimum of five (5) years of experience in fabricating or erection of structural steel and has produced three (3) projects of similar scope.
 2. Welder's Certificate: Submit current welders' certifications for review prior to commencing any welding.
 - a. Copy of approved welders' certifications shall remain on the job-site at all times up to Substantial Completion.

1.4 QUALITY ASSURANCE

- A. Applicable Codes: Specifications and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:
1. American Institute of Steel Construction (AISC):
 - a. Manual of Steel Construction

- b. Code of Standard Practice for Steel Buildings and Bridges.
 - c. Engineering for Steel Construction.
 - 2. American Welding Society (AWS): Structural Welding Code, D-1.1.
 - 3. Research Council on Structural Connections of the Engineering Foundation: Specification for Structural Joints Using ASTM-A325 or A-490 Bolts.
- B. Qualification of Welders:
- 1. All welding shall be done by currently qualified welders.
 - 2. Qualification and duration of qualification shall be in accordance with the requirements of the latest editions of ASW D1.1 – Structural Steel Welding Code, Steel and AWS D1.3 – Structural Steel Welding Code, Sheet Steel.
- C. Quality Control: Refer to AISC, Section M5 and AISC Code of Standard Practice, Section 8, with additions noted below.
- 1. Inspection: The Contractor shall employ at his expense a qualified Independent Testing Laboratory, approved by the Architect and Engineer, to provide inspection of all connections, and to verify conformance to applicable codes and standards.
 - a. When test results or inspections indicate apparent failure to meet specification requirements, orally report such deficiency to Architect, Structural Engineer, and General Contractor, and follow with a written report (copies to each). Prepare written reports and issue within two days after results are obtained.
 - b. Identify specific location to which report pertains. Distribute copies to Architect, Structural Engineer, and General Contractor.
 - 2. Shop Inspections: Periodic and timely inspections of steel fabricator's facilities shall include but not be limited to the following:
 - a. Qualification of Welders.
 - b. Welding Procedures and Testing Specified.
 - c. Proper Cleaning of Steel Prior to Galvanization.
 - d. Conformance to shop drawings concerning member sizes, connection assemblies, fabrication procedures.
 - e. The number of shop inspections shall be adequate to assure conformance. These inspections shall be performed by the qualified testing laboratory personnel (AWS certified) at critical times to verify shop fabrication is in conformance with contract documents.
 - 3. Field Inspections: Periodic, timely inspections of steel erection at job site shall be made. They shall include, but not be limited to the following:
 - a. Inspection of field connections to verify conformance with design and applicable codes. This shall be done as required to inspect connections prior to being covered by any subsequent work. Perform once per week during erection, minimum.
 - b. Establish and recheck a job bolt torque for calibration of impact wrenches in conformance with referenced standards. This shall be done at least once per week during general steel erection.
 - c. High Strength Bolts: Visually observe nut rotation as indicated by match marks and "peening" of nut corners due to impact wrench for all bolts. Spot check 10 percent of bolts for proper tension by use of a calibrated torque wrench. Check all high strength anchor bolts using calibrated torque wrench.
 - d. Inspection and marking of field welds, welder qualifications and procedures.

- e. Fillet Welds: Inspect and check by visual observation and physical measurements.
- f. Full Penetration Welds: Visual check and ultrasonic inspection of 100% per AWS Code, Division 6, Part C.

D. Source Quality Control:

- 1. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. Promptly remove and replace materials or fabricated components that do not comply.
- 2. Design of Members and Connections: Details shown are typical. Similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

E. Delivery, Storage and Handling:

- 1. Deliver materials to site at such intervals to insure uninterrupted progress of work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time not to delay work.
- 2. Store materials on platforms, skids or other supports above the ground and so position as to minimize water-holding pockets. Keep free from dirt, grease and other foreign matter, and protect from corrosion. Provide easy access for inspection and identification.
- 3. Exercise care to maintain members in undamaged condition. Handle and temporarily brace members in such manner as to prevent damage to work or creation of hazards to workmen or public. During erection, tie or brace the building frame to resist erection and wind forces.

F. Fabricator's Qualifications: Fabricator shall have a minimum of five (5) years' experience in fabricating structural steel and having facilities and personnel adequate to have successfully produced three (3) projects of similar scope.

G. Erector Qualifications: Erector shall have a minimum of five (5) years' experience in erecting structural steel and have equipment and personnel who have successfully erected three (3) projects of similar size and complexity.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural Steel Components:

- 1. Minimum recycled steel content shall be 80%.
- 2. Hot-rolled Shapes: ASTM A992, Grade 50.
- 3. Cold Formed Steel Tubing: ASTM A500, Grade B.
- 4. Steel Pipes: ASTM A53, Type E or S, Grade B.
- 5. Plates, Angles, Channels: ASTM A36.

B. Welding Electrodes:

- 1. AWS D1.1.
- 2. Shield Metal Arc: AWS A5.1.
- 3. Submerged Arc: AWS A5.17.

C. Bolts and Nuts:

1. Length sufficient to extend entirely through but no more than quarter (1/4) inch beyond nuts. Bolts which transmit shear shall be threaded to such length that no more than one thread will be within the grip of the metal.
2. High Strength Bolts: Use unless noted otherwise ASTM A-325X, Bearing Type with threads excluded from shear plane.
3. Anchor Bolts: Threaded F1554, Grade 36 or 55 rod, refer to structural drawings.
4. Machine Bolts: ASTM A-307 - , 60,000 psi Tensile Strength, Grade A, and ANSI #A-18.2. Hex head unfinished bolts with hex nuts.
5. Concrete Inserts: Refer to Section 033000.
6. Nuts: ASTM A563, Grade A, and Style as specified in the applicable ASTM bolt standard.

D. Washers:

1. Plain: ANSI #B-18.22; ASTM F844.
2. Hardened: ASTM #F-436; ASTM F436 beveled as required.
3. Load Indicator Washers:
4. Galvanized: ASTM B695, Class 50, Type 1 – Use where steel is galvanized.

E. Primer & Paint:

1. Primer: SSPC-PS Guide 7.00, or approved equal.
2. Galvanizing Repair: 85-per cent zinc dust content in organic resin. ASTM A780.
3. Primer for AESS: Comply with Section 09 90 00 – Painting and Coating.
4. Refer to Division 9 of these specifications for painting requirements.

F. Non-Metallic Shrinkage Resistant Grout: Premixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

1. Refer to Section 03 60 30.
2. Refer to Section 05 12 00 3.4 B.1 for grout testing requirements.

2.2 FABRICATION

A. Fabricator: Project steel Fabricator shall meet all qualification requirements established in the Quality Assurance section of this Specification.

B. Fabrication:

1. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate in accordance with referenced standards and reviewed shop drawings. Fabricate items of structural steel in accordance with AISC specifications and as indicated on final shop drawings. Provide camber in structural members where indicated. Properly mark and match mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.
2. Connections: Shop connections shall be standard connections developing full strength of members, except as otherwise specifically indicated on drawings. Mill abutting section in compression. Punch, drill, tap and ream holes as necessary for attachment of materials of other trades. Weld shop connections; field weld only where indicated. Drill holes in base or bearing plates. Punch, drill, or cut (do not burn) holes at right angle to the

surface of the metal and one-sixteenth (1/16) inch larger than the diameter of the bolt. Provide clean-cut holes without torn or ragged edges. Remove outside burrs resulting from drilling or reaming.

3. Correction of Work: Where items will remain exposed to view in the finished work, mispunched holes shall be plugged, welded and ground flush; repair notches or gouges by completing filling with weld metal, using procedures appropriate to the condition. Obtain Architect's prior approval of repair procedure and final approval of repaired section.
4. Fastenings: Furnish specified bolts and nuts for anchoring steel to steel, concrete, brace rods, connections, and ties. $\frac{3}{4}$ " diameter, minimum, unless noted otherwise.
5. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members as shown on final shop drawings. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
6. AESS Requirements:
 - a. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
 - b. In addition to special care used to handle and fabricate AESS, comply with the following:
 - 1) Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - 2) Grind sheared, punched, and flame-cut edges of all Categories of AESS to remove burrs and provide smooth surfaces and edges.
 - 3) Fabricate all categories of AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - 4) Fabricate all categories of AESS with exposed surfaces free of seams to maximum extent possible.
 - 5) Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - 6) Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 - 7) Fabricate all categories of AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - 8) Fabricate all categories of AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
 - 9) Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for all categories of AESS.
 - c. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for all categories of AESS.
 - d. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
 - e. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1) Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2) Baseplate Holes: Cut, drill, or punch holes perpendicular to steel surfaces.
 - 3) Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.3 SHOP PAINTING/TREATMENTS

- A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed

portions and initial 2 inches of embedded areas only. Do not paint surfaces to be welded or high strength bolted with friction-type connections. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

- B. Painting: Provide a one coat, shop applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00 and as specified in this section.
- C. Surface Preparation:
 - 1. Power Tool Clean surfaces to be painted which will not remain exposed by removing oil, grease, loose mill scale and rust, and foreign matter to the degree illustrated by SSPC-3; one-half (1/2) mil profile.
 - 2. Commercial Blast Clean, to the degree indicated by SSPC-6, surfaces that will remain exposed to view. Apply shop paint the same day as steel is cleaned.
- D. Painting: Apply 2.5-mil thick dry film of shop paint, worked well into joints. Finish surface smooth and uniform without voids or runs. Permit drying before handling.
- E. Galvanize all items exposed to weather or which are located outside building exterior wall lines. Prepare members in accordance with ASTM A-385 and apply in accordance with ASTM A-386 to deposit 1.25-oz. per square foot of surface per ASTM A-123. Finished surfaces shall be free of bare spots, stalactites, and inclusions of flux or ash.
- F. Marking: Mark each piece legibly in a protected location to correspond with match marks on reviewed shop drawings.
- G. For AESS, Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
- H. For AESS Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 EXECUTION

3.1 CONDITION OF PRECEDING WORK

- A. Erector: Project steel Erector shall meet all qualification requirements established in the Quality Assurance section of this Specification.
- B. Prior to commencing erection, inspect condition of prior work where connections will be made thereto. Report to Contractor, in writing, any condition that is unacceptable. Do not commence erection until unacceptable condition has been corrected. Commencing erection will be held as acceptance of conditions.

3.2 EXAMINATION FOR AESS

- A. Verify, with steel erector present, elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
 - 1. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected to the Architect's and Engineer's satisfaction.

3.3 WORKMANSHIP

- A. Erect in accordance with AISC "Manual". After assembling the various members forming a portion of the framework, align, plumb and adjust properly before fastening. Use drift pins only to bring members together in such manner as to prevent distortion or damage of the metal. Align holes using drift pins (so bolts will not bind but may be turned readily with a wrench). Provide adequate temporary bracing necessary to hold frame plumb. Bracing is to remain in place until roof diaphragm is completed and anchored to walls.

3.4 BASE AND BEARING PLATES

- A. Support on steel shims and double nuts and washers as required; align using wedges and tighten nuts.
- B. Grouting: Specified in Section 03 60 30.
 - 1. Testing: Grout shall be tested by obtaining and testing cubes per ASTM C1107 for each day's placement.
- C. Trimming: Cut wedges and shims off flush with edges of plates and leave in place.

3.5 CUTTING

- A. Use of a cutting torch for correction of fabrication errors will not be permitted on any essential member of the structural frame; its use will be allowed on minor members, while not under stress, only after such use is specifically authorized in each case by the Engineer. Do not burn field holes; drill and ream.

3.6 CONNECTIONS

- A. Bolting:
 - 1. Refer to Research Council on Structural Connections "Specification for Structural Joints using ASTM A325 or A490 Bolts". Hereafter referred to as "H.S. Bolt Spec."
 - 2. Use high tensile strength bolts and nuts for field connections of primary members (columns, beams, trusses, etc.) and machine bolts and nuts for secondary members and miscellaneous steel. Do not reuse bolts.

3. Where structural joints are made using high strength bolts, hardened washers and nuts, the materials, methods of installation, tension control, type of wrenches to be used and inspection methods shall conform to referenced Specification. High strength connections shall have hardened washers at each assembly of size as specified by ASTM for size of bolt used. Place washer under element (nut or head) which will be turned by the power wrench and under bolt elements in a slotted connection. Insert bolts into holes so heads will be toward decking and/or finish, except in places where clearance is generous (so projection of nuts and overrun of bolts present no problem).

B. Handling and Storage of Fasteners: Refer to H.S. Bolt Spec. Subsection 8(a).

C. Bearing Type Connections shall comply with H.S. Bolt Spec. Subsection 8(a) of the referenced specification. These shall be visually inspected by the Independent Testing Laboratory.

D. Welded: Provide AWS D1.1 qualified welders, welding operators, and tackers. Field weld only where indicated. Welding procedure shall be such as to minimize distortion and stress concentration and to produce connection of required strength.

1. Surfaces within two inches of any field welded location shall be wire brushed before welding to reduce the shop paint film to a minimum.

E. Connection Design:

1. Refer to Paragraph 1.3 – Submittals.

3.7 PREPARATION FOR AESS

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

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.8 ERECTION OF AESS

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

1. Erect all AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

B. Do not use thermal cutting during erection.

3.9 FIELD CONNECTIONS OF AESS

1. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

a. Joint Type: Snug tightened

- b. Orient bolt heads as indicated on Drawings or as directed by Architect.
- 2. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

3.10 FIELD PAINTING

- A. After assembly and testing, clean unprimed areas at connections, markings, welds and bolts free of rust and loose mill scale. Then touch-up these areas, bolts and burned, scratched or abraded shop coat with specified shop paint. Touch-up galvanized surfaces applying zinc-rich organic coating 2.5 mils thick. Refer to Division 9 for painting of exposed steel.

3.11 FIELD QUALITY CONTROL

- A. Bolted Connections: Inspect in accordance with AISC 303.
 - 1. Visually inspect all bolted connections.
 - 2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.
- B. Welding:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Visually inspect all welds.
 - 3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
- C. Correct all defective bolted connections and welds.
- D. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION

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SECTION 05 22 00 - STEEL JOISTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. K-series steel joists.
 - 2. Joist accessories.
- B. Related Sections:
 - 1. Cast-In-Place Concrete Section 03 30 00
 - 2. Reinforced Unit Masonry Section 04 23 00
 - 3. Structural Steel Section 05 12 00
 - 4. Steel Roof Deck Section 05 33 00
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. SER: Structural Engineer of Record for the project.
- B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.
- C. Sub-contractor: Provides materials or services for the project through the Contractor.
- D. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- E. Joists: Includes Joist Girders when the term "Joist" is used generically in this specification.
- F. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.3 SUBMITTALS

- A. General:
 - 1. Submit all documents in conformance to Specification Section 01 33 00.
 - 2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.

3. Review of shop drawings does not constitute authorization to vary from the contract documents.
 4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.
- B. Shop Drawings:
1. Submit complete fabrication and erection shop drawings, including details of each piece (show match marks on both erection and detail drawings, and fabricated member).
 - a. Electronic submittal is required and file format utilizing PDF format is preferred.
 - b. Drawings shall be clearly marked "FOR APPROVAL ONLY – NOT FOR FIELD USE". If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped "FOR FIELD USE".
 - c. Indicate welds by standard AWS symbols and show size, length and type of each weld.
 - d. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.
- C. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer and which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.
- D. Qualification Data: For manufacturer.
- E. Welding certificates.
- F. Manufacturer certificates.
- G. Mill Certificates: For each type of bolt.
- H. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation registered in the State of Florida.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications.
1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State of Florida. Refer to Section 01 33 00 for method of handling the submission of signed and sealed documents.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1 "Structural Welding Code - Steel."
- C. Steel Testing Service:
1. The Contractor shall employ, at his expense, a qualified Independent Engineering Testing Laboratory, approved by Architect and Engineer, to perform weld quality review during construction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Deliver to site in a dry, undamaged condition.
- C. Store out of contact with the ground in an upright position, under a weathertight cover permitting good circulation of air.
- D. Use fabric or coated slings to minimize paint damage in handling.
- E. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 PRODUCTS

2.1 GENERAL

- A. Joists shall be manufactured by a member of the Steel Joist Institute, with a satisfactory record of at least 5 years in the design and manufacture of the types of joists covered in this specification. All work shall be performed in a modern fabricating shop equipped to properly handle such work.

2.2 PERFORMANCE REQUIREMENTS

- A. Applicable Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:
 - 1. Steel Joist Institute (S.J.I.): "Standard Specifications, for Open Web Steel Joists, K-Series."
 - 2. Steel Joist Institute (S.J.I.): "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series."
 - 3. American Institute of Steel Construction (AISC): "Manual of Steel Construction".
 - 4. American Welding Society (AWS): Standard Qualification Procedure – D1.1, Section #5. Structural Welding Code – D1.1.
 - 5. Steel Structures Painting Council (SSPC).
- B. Structural Performance: Provide special joists, joist girders and connections capable of withstanding design loads indicated.
 - 1. Use ASD: data is provided at service-load level unless noted otherwise on the drawings.
 - 2. Design special joists to withstand design loads with live-load deflections no greater than the following:
 - a. Roof Joists: Maximum Total Vertical Deflection of 1/240 of the span.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

2.3 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists.
- B. Provide holes in chord members for connecting and securing other construction to joists.
- C. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- D. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- E. Camber joists according to SJI's "Specifications."
- F. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.5 JOIST ACCESSORIES

- A. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications Furnish additional erection bridging if required for stability.
- B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.
- C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
 - 1. Finish: Hot-dip zinc coating, ASTM A 153 Class C.
- D. High-Strength Bolts, Nuts, and Washers: ASTM A , Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating, ASTM A 153 Class C.
- E. Welding Electrodes: Comply with AWS standards.
- F. Galvanizing Repair Paint: ASTM A 780.

- G. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 EXECUTION

3.1 DAMAGED JOISTS

- A. Joists damaged so as to affect their structural properties or appearance will be rejected. Special care shall be taken when welding to top chords so as not to reduce top chord area as a result of holes blown thru top chords when welding. Field repairs may be allowed only by the special permission of the Engineer and Architect, providing repair procedures have been approved by the joist supplier's engineer.

3.2 CONDITION OF PRECEDING WORK

- A. Before commencing erection, inspect condition of prior work that is relative to this section. Report to the Contractor, in writing, any condition that is unacceptable. Do not commence erection of joists until condition is corrected.

3.3 ERECTION

- A. Erection shall be done by a qualified erector using experienced personnel and suitable and adequate equipment. Erect in accordance with AISC Manual and S.J.I. Specification. Care shall be exercised at all times in handling and placing joists. All joists shall be aligned, plumb and permanently anchored and all bridging and bracing in place prior to receiving any structural load. See details on drawings. Comply with all requirements of OSHA.

3.4 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 BRIDGING

- A. Bridging shall comply with S.J.I. "Standard Specifications". Attach bridging anchors in walls to concrete members with drilled-in inserts, or as detailed. These inserts shall not be drilled until

joists are seated so that camber and deflection at joists can be considered in their locations. See details on structural drawings.

3.6 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 - 4. Delay rigidly connecting the bottom-chord extensions to columns or supports until dead loads are applied.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, as applicable:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709.
 - c. Ultrasonic Testing: ASTM E 164.
 - d. Radiographic Testing: ASTM E 94.
- C. Visually inspect bolted connections.
- D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- E. Perform additional testing to determine compliance of corrected Work with specified requirements.

3.8 PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touch-up Painting: After installation, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
 - 1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
 - 2. Apply a compatible primer of same type as primer used on adjacent surfaces.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

3.9 NOTIFICATION

- A. Notify Architect, Engineer, and qualified Testing Lab (AWS Certified) Inspectors for inspection of completed joist installation before any decking is applied.

END OF SECTION

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SECTION 05 33 00 - STEEL ROOF DECK

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes vented steel roof deck and accessories; framing for openings up to and including 12 inches; bearing plates and angles; closure strips; and any required miscellaneous framing for deck as may be required to provide the completed assembly.
- B. Related Sections:
 - 1. Structural Steel Section 05 12 00
 - 2. Steel Joists Section 05 22 00
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

- A. SER: Structural Engineer of Record for the project.
- B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.
- C. Sub-contractor: Provides materials or services for the project through the Contractor.
- D. Insulating Concrete: A mixture including Portland cement, pre-generated foam and vermiculite aggregate.

1.3 SUBMITTALS

- A. General:
 - 1. Submit all documents and samples in conformance to Specification Section 01 33 00.
 - 2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
 - 3. Review of shop drawings does not constitute authorization to vary from the contract documents.
 - 4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.
- B. Shop Drawings:
 - 1. Submit complete fabrication and erection shop drawings, including details of each piece (show match marks on both erection and detail drawings, and fabricated member).

- a. Electronic submittal is required and file format utilizing PDF format is preferred.
 - b. Drawings shall be clearly marked "FOR APPROVAL ONLY – NOT FOR FIELD USE". If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped "FOR FIELD USE".
 - c. Indicate welds by standard AWS symbols and show size, length and type of each weld.
 - d. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.
- C. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer and which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.
- D. Product Data:
- 1. Submit deck profile characteristics and dimensions, structural properties and finishes. Include installation instructions with welding and side lap screw details and spacing.
- E. Test Reports:
- 1. Submit laboratory test reports and other data to show compliance with specifications (including specified standards).
 - 2. Submit test reports conducted on field welded connections.
 - 3. Include data on type(s) of tests conducted and test results.
- F. Fabricator & Installer's Certifications:
- 1. Submit documentation demonstrating that Fabricator and Erector each have a minimum of five (5) years' experience in fabricating or erection of steel roof decks and has produced three (3) projects of similar scope.
 - 2. Welder's Certificate: Submit current welders' certifications for review prior to commencing any welding.
 - a. Copy of approved welders' certifications shall remain on the job-site at all times up to Substantial Completion.

1.4 QUALITY ASSURANCE

- A. Applicable Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:
- 1. Steel Deck Institute (SDI): Design Manual for Composite Decks, Form Decks, and Roof Decks.
 - 2. American Iron and Steel Institute (AISI) Publication: Specification for the Design of Cold-Formed Steel Structural Members.
 - 3. American Society for Testing and Materials (ASTM): A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 4. American Welding Society Specifications (AWS): D1.1 – Structural Welding Code – Steel; D1.3 – Structural Welding Code – Sheet Steel
- B. Qualification of Welders:

1. All welding shall be done by currently qualified welders. Qualification and duration of qualification shall be in accordance with the requirements of AWS D1.1 and D1.3.
- C. Steel Testing Service:
1. The Contractor shall employ, at his expense, a qualified Independent Engineering Testing Laboratory, acceptable by Architect and Engineer, to perform weld and side lap screw installation quality review, as well as overall compliance, during construction.
- D. Perform Work in accordance with State of Florida standards.
- E. Coordination with Roofing Systems: The Contractor shall verify that the steel roof deck conditions accommodate the requirements of the roofing system to be installed on the deck as described in Division 7 of the Project Specifications and in the Construction Drawings.
1. Provide and install vented roof decks with percentage of openings required by the lightweight insulating concrete or other roofing trade at locations where such systems are installed.
 2. Where conflicts are found between the requirements of the roofing system and the steel roof deck, the Contractor shall immediately notify the Architect, in writing, with recommendations for remediation. Final and actual remediation shall be determined by the A/E.
- F. Maintain one copy of each document on site.

PART 2 PRODUCTS

2.1 STEEL ROOF DECK

- A. Manufacturers:
1. Vulcraft Steel Deck
 2. New Millennium
 3. Canam
 4. Substitutions: Permitted when approved by the A/E prior to bidding
- B. Sheet Steel: ASTM A653 Grade 33 Structural Quality; with G90 galvanized coating class.
- C. Bearing Plates and Angles: ASTM A36 steel, unfinished Welding Materials: AWS D1.1.
- D. Touch-Up Primer: 85-percent zinc dust content in organic resin, ASTM A780. Zinc chromate type.
1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.
- E. Flute Closures: #26-ga. Steel with 1.25 oz. zinc coating or pre-molded neoprene.
- F. Sidelap Fasteners:
1. #10 HWH TEK.
- G. Field Touch-Up Paint:

1. 85-percent zinc dust content in organic resin. ASTM A780.

2.2 FABRICATION

- A. Per Steel Deck Institute and to comply with the drawing requirements.
- B. Deck Accessories: Metal closure strips cant strips and cover plates 20 gage thick galvanized sheet steel.
- C. Sump Pan: 14 gage thick sheet steel.
- D. Fasteners: Hardened steel, galvanized, self-tapping or direct welding.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Erect metal decking in accordance with Steel Deck Institute Design Manual for Composite Decks, Form Decks, Roof Decks.
- B. Erect in accordance with manufacturer's recommendations, reviewed shop drawings and as specified herein. Apply deck units only over supports which are permanently anchored and properly aligned. Deck lengths shall be a minimum of three spans in length. Join ends only over supports. Decks shall be tightly held against supports when welded.
- C. Damage to the decking caused before, during, or after installation of the decking which causes reduction of either the structural integrity of the deck or the architectural appearance of exposed decking shall be the basis for removal and replacement of damaged deck by the Contractor, at the Contractor's expense. Determination of replacement requirements shall be in the opinion of the project Architect or Engineer.
- D. Bear decking on masonry and concrete support surfaces with 4 inch minimum bearing. Align and level.
- E. Bear decking on steel supports with 2 inch minimum bearing. Align and level.
- F. Fasten ribbed deck to steel support members at ends and intermediate supports with fusion welds per drawings.
- G. Fastening
 1. Refer to details on the drawings for requirements. Minimum anchor pattern shall be not less than one weld every 12" and 1 sidelap screw midspan unless otherwise indicated on drawings.
 2. Weld in accordance with AWS D1.1.
 3. Mechanically fasten male/female side laps per drawings.
- H. Reinforce steel deck openings per drawing details.

- I. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking or greater, where deck changes direction. Fusion weld spaced at 6 inches o.c. maximum.
- J. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.
- K. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes .
- L. Position roof sump pans with flange bearing on top surface of deck. Attach at each deck flute.
- M. Immediately after welding deck and other metal components in position, coat welds, weld blooms, burned areas, and damaged surface coating, with touch-up prime paint.

3.3 FIELD TOUCH-UP PAINTING

- A. Clean and paint all welds on roof decks with specified touch-up paint.

3.4 NOTIFICATION

- A. Notify Architect and Engineer for review of decking installation before any roofing is applied and after Steel Testing Service has completed their inspection.

3.5 FIELD QUALITY CONTROL

- A. Notification: Notify Architect and Engineer for review of decking installation before any roofing is applied and after Steel Testing Service has completed their inspection
- B. Welding: Inspect welds in accordance with AWS D1.1.

END OF SECTION

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

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Load bearing and non-load bearing cold formed mtl steel stud framing: Exterior studs such as Bid Alt 2 Walkway Canopy, and Structural Load Bearing locations (including all walls where walls 13'-6" and higher, and where studs load bearing such as associated with storefront system support, counter rolling door, and supporting overhead cabinetry and equipments, or as specifically indicated on drawings.
- B. Related Work Specified Elsewhere:
 - 1. Rough wood blocking: Section 06 10 00 – Rough Carpentry
 - 2. Wall insulation: Section 07 21 00 – Building Insulation.
 - 3. Steel lintels: 05 12 00 – Structural Steel
 - 4. Storefront frames: 08 40 00 – Entrances and Storefronts
 - 5. Automatic doors: 08 46 00 – Automatic Entrance Doors
 - 6. Gypsum board: 09 25 00 – Gypsum Board

1.02 SYSTEM DESCRIPTION

- A. Size and space components as follows and/or as required to withstand design loads. All metal studs used as backup for exterior supporting elements or load bearing elements shall be designed by a specialty engineer registered in the state of Florida with calculations submitted for review and approval.
 - 1. Gauge: Eighteen and/or as shown on drawings.
 - 2. Spacing: As shown on drawings.
 - 3. Width: As shown on drawings.
 - 4. Bridging: Four feet on center and/or as shown on drawings.
- B. Maximum Allowable Deflection: 1/600 of span for brick backup otherwise 1/360.
- C. Design wall systems 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.
- D. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.03 QUALITY ASSURANCE

The Contractor is to provide cold-formed metal framing capable of withstanding loads within limits and under conditions indicated; dependent of product and system used, design of which will vary, and design of which is the responsibility of a Professional Engineer legally qualified to practice engineering for the requirements of the Florida Building Code. The specifications and drawings set forth the design intent but the Contractor is to submit the industry standard Shop Drawings indicating necessary installation specific data as specified in 1.04 D.

- A. Manufacturer: Company specializing in structural framing components with 3 years minimum experience.

- B. Design structural elements under direct supervision of registered professional engineer experienced in design of structural building framing members.
- C. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.
- D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project located, and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate following:
 - 1. Location of all framing members including size and gauge.
 - 2. Connections between members and connections to building structure, including size and number of fastenings and any required connection materials.
 - 3. Framed openings.
 - 4. Bracing and anchorage required for secure and stable installation.
 - 5. Accessories or items required of other related work.
- B. Manufacturer's Literature:
 - 1. Provide product data on standard framing members.
 - 2. Describe materials and finish, product criteria and limitations.
 - 3. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S:

- A. United States Gypsum Co.
- B. Dale Industries, Inc.
- C. Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

2.02 FRAMING MATERIALS

- A. Studs: ASTM A446 sheet steel, formed to channel shape, punched web, galvanized.
- B. Runners: Formed steel; channel shaped; same width as studs, tight fit; solid web; galvanized.
- C. Roll from new sheet steel; re-rolled steel not acceptable; galvanized.

2.03 ACCESSORIES

- A. Bracing, Furring and Bridging: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20, Type I Inorganic, zinc rich.

2.04 FASTENERS

- A. Self-Drilling, self-tapping screws, bolts, nuts and washers, hot dip galvanized.
- B. Anchorage Devices: Power driven.
- C. Welding: In conformance with AWS D1.1.

2.05 FINISH

- A. Galvanized, G90 coating class.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that substrate surfaces and building framing components are ready to receive work.
- B. Verify that rough-in utilities are in proper location.
- C. Beginning of installation means acceptance of conditions.

3.02 ERECTION OF STUDDING

- A. Install components in accordance with manufacturer's instructions.
- B. Align runners; locate to wall layout.
- C. Secure in place with fasteners or welding at maximum 24 inches.
- D. Place studs at 16 inches on center minimum, or as shown on drawings if less than 16 inches and not more than 2 inches from abutting walls and at each side of openings.
- E. Connect studs to tracks using fastener method.
- F. Construct corners using minimum 3 studs.
- G. Double stud wall openings and door jambs.

- H. Erect studs one-piece full length.
- I. Splicing of studs is not permitted.
- J. Coordinate placement of insulation in multiple stud spaces after erection.
- K. Install intermediate studs above and below openings to align with wall stud spacing.
- L. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- M. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- N. Touch up field welds and damaged galvanized surfaces with primer.
- O. Do not cover-up work after Framing Inspection completed.

End of Section

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
1. Shop fabricated or manufactured metal items.
 2. Provide and install items listed and/or show on drawings with anchorage and attachments necessary for installation. General and principal items only, are listed below. Refer to drawings and related work for mechanical and electrical for items not specifically listed.
 - a. Exterior handrail at Truck Dock west retaining wall, and modification to existing exterior handrails and guardrails at Truck Dock north retaining wall, incl elimination of stair handrail.
 - b. Structural angles.
 - c. Loose angles and lintels.
 - d. Embedded items.
 - e. Miscellaneous framing and support for such items as counters, roll-up doors, mechanical and electrical equipment.
 - f. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - g. Steel weld plates and angles for casting into concrete not specified in other Sections.
 - h. Fabrication, including connections, plates and related items.
 - i. Connection bolts, anchor bolts, nuts, washers and shim plates.
 - j. Shop prime coat.
 - k. Delivery to site.
 3. Provide and coordinate for Aluminum Storefront Perforated Panel insert referenced under Section 08 41 13 *Preface*, subsection 1.01 B, 2, 2, and identified on drawings C1/A301, A1/A301. Product more fully described under Part 2 Products.
- B. Related Work Specified Elsewhere:
1. Structural concrete: Section 03300 - Cast-in-Place Concrete.
 2. Structural steel sections: Section 05120 - Structural Steel.
 3. Field Painting: Section 09900 - Paints and Coatings.
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections and other detrimental effects. Base engineering calculation on surface temperatures of materials due to solar heat gain and nighttime sky heat loss. Temperature Change (Range): 120°F, ambient; 180°F, material surfaces.

1.03 REFERENCES

- A. American Institute of Steel Construction (AISC)
- B. American Iron and Steel Institute (AISI).
- C. American Society for Testing and Materials (ASTM).
 - A 36 Structural Steel
 - A 53 Pipe, Steel, Black & Hot-Dipped, Zinc-Coated Welded & Seamless
 - A 108 Steel Bars, Carbon, Cold-Finished, Standard Quality
 - A 123 Zinc (Hot Dipped galvanized) Coatings on Iron and Steel Products
 - A 307 Carbon Steel Bolts and Studs, 60000 psi Tensile
 - A 496 Steel Wire, Deformed, for Concrete Reinforcement
 - A 500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - A 501 Hot-Formed Welded & Seamless Carbon Steel Structural Tubing
 - A 653/A653M Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process, Structural (Physical Quality)
 - ASTM B 209 Aluminum Plate and Sheet, Alloy 6061-T6 for hoods, electrical enclosures & sim; 5052-H32 for perforated panels (sheet).
- D. American Welding Society (AWS)
 - D1.1 Structural Welding Code - Steel.
- E. Military Specification (Mil. Spec):
 - DOD-P-21035 Paint, High Zinc Dust Content, Galvanizing-Repair.
- F. Steel Structures Painting Council (SSPC) Systems and Specifications

1.04 QUALITY ASSURANCE:

- A. Acceptable Fabricators: Regularly engaged in manufacture of specified items.
- B. Erector Qualifications: Minimum of 2 years experience installing similar systems.
- C. Structural Steel Work: In accordance with applicable requirements of American Institute of Steel Construction):
 - 1. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - 2. Code of Standard Practice except as follows:
 - Paragraph 4.2.1: Delete second sentence in its entirety and substitute the following:
 - “Approval does not relieve the fabricator of the responsibility for design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings.
- D. Light Gauge, Cold Rolled Steel Work: In accordance with applicable requirements of American Iron and Steel Institute.
- E. Steel Structures Painting Council (SSPC): Systems and Specifications.
- F. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1 “Structural Welding Code – Steel”
 - 2. AWS D1.2 “Structural Welding Code – Aluminum”
 - 3. AWS D1.3 “Structural Welding Code – Sheet Steel”

1.05 SUBMITTALS:

- A. Prior to fabrication submit complete shop drawings to Architect for approval; shop drawings showing layouts and details of fabrication and installation:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 2. Include plans, elevations, sections and details of metal fabrications and their connections. Show anchorage and accessory items. Include erection drawings, elevations and details where applicable. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 4. Indicate welded connections using standard AWS welding symbols.
- B. Manufacturer's Literature: Assembly, installation instructions, methods and procedures, and standard drawings.
- C. Furnish mill certificates, indicating conformance with applicable material specification, if requested by Architect.
- D. Welder's Certificates:
 - 1. Submit qualification certificates to Architect for all welders qualified for each type of welding to be employed on project before beginning work.
 - 2. Criteria: In accordance with AWS 5.30.
 - 3. Date of Certificate Examination: Within last 1 year.
- E. Product Data for the following:
 - 1. Paint products
 - 2. Grout
- F. Qualification Data: For professional engineer. Must be licensed in the State of Florida.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle items in such a manner as to ensure proper ventilation and drainage and to protect against damage.
- B. Protect finished surfaces from marring.
- C. Protect form dirt, grease, foreign matter and corrosion.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other constructions contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements.
Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.08 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors that are to be embedded in concrete. Deliver such items to Project site in time for completion.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. General:
 - 1. Free from defects impairing strength, durability or appearance.
 - 2. Thickness or weight indicated, and if not indicated, manufacturer's standard and sufficient to withstand strains of intended use.
- B. Steel:
 - 1. Sections and plates; conform to ASTM A 572, Grade 50, or as shown on drawings; All other, ASTM A 36.
 - 2. Pipe: ASTM A 53, Grade B, Schedule 40 unless another weight is indicated or required by structural loads.
 - 3. Tubing: ASTM A 500, Grade B or ASTM A 501.
 - 4. Sheet: ASTM A 653/A653M, Grade B, structural quality.
 - 5. Deformed Anchor Bars: ASTM A 496, deformed wire anchors, 80,000 psi (minimum) tensile strength, 70,000 psi (minimum) yield strength.
 - 6. Welded Studs: ASTM A 108.
 - 7. Slotted Channel Framing: Cold-Formed metal channels with continuous slot complying with MFMA-3
 - a. Size of Channels: 1 5/8" x 1 5/8"
 - b. Material: Galvanized steel complying with ASTM A 653/A 653M, commercial steel, Type B, w/ G90 coating; 0.018" nominal thickness.
- C. Aluminum Plate and Sheet: Alloy 5052-H32
 - 1. Perforated Aluminum Sheet for use in Storefront (see 1.01, A, 3 above) is equal to McNichols Item 17311432- 48" x88", for one panel location as illustrated on drawing A301.
 - 2. Description: Perforated Metal, Round, Aluminum, Mill Finish, 20 Gauge, 3/16" Round on 1/4" Staggered Centers, Minimum Solid Margins Both Sides of Sheet Parallel to Length of Sheet, 51% Open Area.
 - a. Other configuration acceptable, provided free/open area between 40-51% and holes no greater than 1/2" and no less than 3/16".
 - 3. Powder Coat finish, AAMA 2605, Performance requirements and Test procedures for Superior Coatings. Note that block letters spelling "BOOKSTORE" to be painted on both sides of 4'x7'-4" sheet; two paint colors to be selected from metal shop's standard. Lettering Font, Size, and Layout to be reviewed with the Architect approved prior to fabrication.

2.02 FASTENERS:

- A. Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless steel fasteners for fastening

aluminum. Select fasteners for type, grade and class required.

- B. Steel Bolts and Nuts: Regular, hexagon head bolts, ASTM A 307, Grade A or high strength bolts ASTM A 325, where shown or specified; with hex nuts, ASTM A 63; and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular, hexagon head annealed stainless steel bolts, nuts and where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1
- D. Anchor Bolts: ASTM F 1554, Grade 36. Provide hot-dip or mechanically deposited, zinc coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489
- F. Machine Screws: ASME B18.2.1
- G. Lag Bolts: ASME B18.2.1
- H. Plain Washers: Round, ASME B18.22.1
- I. Lock Washers: Helical, spring type, ASME B18.21.1
- J. Cast-In-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency. Threaded or wedge type; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- K. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
- L. Accessories and Miscellaneous:
 - 1. Welding Materials: AWS D1/1, E70 series welding electrolytes.
 - 2. Additional Anchoring Materials:
 - a. Hydraulic Cement: Quick Setting, ASTM C 595, factory prepared with accelerator.
 - b. Waterproof Anchoring Cement:
 - (1) Pourable, cement-base waterproof, non-shrinking, quick setting, hydraulic compound.
 - (2) Acceptable:
 - (a) Thoro System Products, Thorogrip.
 - (b) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
 - c. Epoxy Anchoring System:
 - (1) High modulus, high strength, 2 component adhesive.
 - (2) Multi-purpose, solvent free, moisture insensitive.
 - (3) Acceptable:

- (a) Hilti Fastener Systems, HVA Adhesive Anchoring System.
- (b) ITW Ramset, Epcon Ceramic 6 Injection System.
- (c) Allied Fastener and Tool, Allied Gold A-1000.
- (d) Sika Corp., Sikadur 32, Hi-Mod.
- (e) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

M. Paints:

- 1. Universal Shop Primer: Fast curing, lead and chromate free, universal modified alkyd primer complying with MPI #79.
 - a. Use primer with a VOC content of 420g/L (3.5lb/gal) or less when calculated according to 40 CFR, Subpart D (EPA Method 24)
Use primer containing pigments that make it easily distinguishable from zinc rich primer.
 - b. Galvanizing Repair: Mil. Spec DOD-P-21035, or High zinc content dust paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.
- 2. See also 2.01, C, 3 previous Sub-section.

2.03 FABRICATION

- A. Shop Assembly: Pre-assemble items in the shop to the greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for re-assembly and coordinated installation.
- B. Cut, drill and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32", unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing gain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws and similar items.

- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads. Where units are indicated to be cast into concrete, equip with integrally welded steel trap anchors, 1/8" by 1 1/2" with a minimum 6" embedment and 2" hook, not less than 8" from ends and corners of units and 24" o.c., unless otherwise indicated.

2.04 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill and tap units to receive hardware, hangers and similar items.
 1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts if units are installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition shop drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.05 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other sections for items supported from concrete construction as needed to complete the Work. Provide each units with not less than two integrally welded steel strap anchors for embedding in concrete.

2.06 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings and anchorages as needed to coordinate assembly and installation with other work. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize miscellaneous interior and exterior steel trim, where indicated.
- D. Prime interior miscellaneous steel trim, where not indicated to be galvanized with zinc rich primer.

2.07 FINISHES, GENERAL

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

2.08 STEEL & IRON FINISHES

- A. Galvanizing: Hot dip galvanize items as indicated to comply with requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc Rich Primer: SSPC SP6/NACE No. 3, "Commercial Blast Cleaning".
 - 2. Interiors (SSPC Zone 1A): SSPC-SP3, "Power Tool Cleaning"
- B. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field & Maintenance Painting of Steel," for shop painting. Stripe paint corners, crevices, bolts, welds and sharp edges.

2.04 FINISH

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces to be embedded in concrete.
- C. Prime paint items scheduled with one coat, or galvanized to be left unpainted.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Obtain Architect approval prior to site cutting or making adjustments not scheduled.
- B. Clean and strip site primed steel items to bare metal where site welding is scheduled.
- C. Make provisions for erection loads with temporary bracing.
- D. Keep work in alignment.
- E. Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.02 INSTALLATION, GENERAL

- A. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment and elevations, with edges and surfaces level, plumb, true and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade surfaces of exterior units that have been hot dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete inserts, toggle bolts, through bolts, lag bolts and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete or dissimilar metals with a heavy coat of bituminous paint.

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers written instructions and requirements indicated on Shop Drawings.
- B. Install pipe columns on concrete footings with grouted base plates. Position and grout column base plates as specified in "Installing Bearing and Leveling Plates" Article. Grout base plates of columns supporting steel girders after girders are installed and leveled.

3.04 INSTALLING BEARING AND LEVELING PLATES

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

3.05 SCHEDULE

- A. Steel Railing System-to match existing in material:
1. Material: Steel pipe or tubing.
 2. Fittings: Cast or machined steel.
 3. Splice connectors: Steel welding collars.
 4. Finish-to match existing.
- B. Miscellaneous:
1. General:
 - a. Fabricate as shown on drawings and in accordance with approved shop drawings.
 - b. Sizes: As shown on drawings.
 - c. Connections and Anchors:

- (1) As shown on drawings, as specified, and/or as required to safely sustain anticipated loads.
- (2) Provide holes and attachments as required.
2. Guard Posts: Standard weight steel pipe.
3. Miscellaneous Frames: Welded connections, top surface ground smooth.
4. Loose Lintels: Provide for 8 inches (minimum) bearing each side of opening unless otherwise shown on drawings.
5. Embedded Items:
 - a. Anchor in place with deformed anchor bars or welded studs.
 - b. Do not use reinforcing bars unless otherwise specified on structural drawings.

3.06 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop painted surfaces. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and repair galvanizing to comply with ASTM A 780.

End of Section

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Light framing
 - 2. Rough wood bucks
 - 3. Blocking
 - 4. Furring
 - 5. Plywood and Particleboard

- B. Related Work Specified Elsewhere:
 - 1. Concrete forms: Section 03 30 00 - Cast-in-Place Concrete
 - 2. Cabinets and trim: Section 06 40 00 - Millwork
 - 3. Wood doors: Section 08 21 00 - Wood Doors
 - 4. Painting: Section 09 90 00 - Paints and Coatings

1.02 QUALITY ASSURANCE

- A. Lumber Grading Rules and Wood Species: Conform to National Bureau of Standards Voluntary Product Standard PS 20.

- B. Grading rules of following associations apply to materials furnished:
 - 1. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
 - 2. Southern Pine Inspection Bureau (SPIB).
 - 3. Western Wood Products Association (WWPA).

- C. Plywood Grading Rules: Softwood Plywood; NBS Voluntary Product Standard PS 1.

- D. Grade Marks:
 - 1. Identify all lumber and plywood by official grade mark.
 - 2. Lumber:
 - a. Grade stamp to contain symbol of grading agency certified by National Forest Products Association (NFPA), mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded where applicable, and condition of seasoning at time of manufacture.
 - b. S-GRN: Unseasoned.
 - c. S-DRY: Maximum 19 percent moisture content.
 - d. MC-15 or KD: Conform to PS 1.

- E. Requirements of Regulatory Agency: Pressure Treated Lumber and Plywood; American Wood Preservers Bureau (AWPB), Quality Mark.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Store materials minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing adequate air circulation or ventilation.

- B. Protect sheet materials from corners breaking and damaging surfaces while unloading.

PART 2 - PRODUCTS

2.01 LUMBER

- A. Dimensions:
 - 1. Specified Lumber Dimensions: Nominal.
 - 2. Actual Dimensions: Conform to PS 20.
- B. Surfacing: Surface 4 sides (S4S), unless specified otherwise.
- C. Moisture Content: Unless indicated or specified otherwise, as follows:
 - 1. Board or Framing Lumber: 19 percent.
 - 2. Materials Other than Lumber: In accordance with standard under which product is produced.
- D. Framing Lumber: Any commercial softwood species, unless otherwise specified or shown on drawings.
 - 1. Light framing (2 inches to 4 inches thick, 2 inches to 4 inches wide):
 - a. General Framing: Standard Light Framing or Stud grade.
 - b. Plates, Blocking, Bracing, and Nailers: Utility grade.

2.02 PLYWOOD

- A. Conform to PS 1.
- B. Exterior graded plywood where edge or surface is permanently exposed to weather.

2.03 MISCELLANEOUS MATERIALS

- A. Building Paper: Asphalt saturated felt, ASTM D 226, Type I nonperforated.

2.04 PRESERVATIVE TREATED WOOD PRODUCTS

- A. Preservative Pressure Treated Lumber, Alkaline Copper Quat (ACQ): Type D, Amine Copper Quat.
 - 1. Manufacturers:
 - a. Chemical Specialties, Incorporated, Charlotte, NC (800) 421-8661.
 - b. Arch Wood Protection, Inc., Smyrna, GA (770) 801-6600
 - c. Osmose Inc., Griffin, GA, (800) 241-0240
 - 2. Products:
 - a. CSI: "Preserve".
 - b. Arch Wood: "Natural Select"
 - c. Osmose: "Nature Wood"
 - 3. Impregnate lumber with preservative treatment conforming to AWPA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
 - 4. Retention of preservative:
 - a. Moderate service conditions (weather exposure): 0.25 pounds per cubic foot (oxide basis).

- b. Severe conditions (constant contact with ground or water): 0.40 pounds per cubic foot (oxide basis).
- 5. Treatment material shall provide protection against termites and fungal decay and shall be registered for use as a wood preservative by the U. S. Environmental Protection Agency.

2.05 FASTENERS

- A. Type and size necessary for project requirements unless indicated or specified otherwise.
- B. Fasteners of Manufactured Materials: Size, type, and spacing as recommended by product manufacturer unless indicated or specified otherwise.
- C. Exposed to weather or embedded in, or in contact with concrete or masonry: Galvanized.

PART 3 - EXECUTION

3.01 INSPECTION

Verify that surfaces to receive rough carpentry materials are prepared to required grades and dimensions.

3.02 INSTALLATION

- A. Framing:
 - 1. Anchor sills and plates to concrete structure with anchor bolts, expansion sleeves and lag bolts, or power driven fasteners, spaced 4 feet on centers.
 - 2. Blocking: Provide solid wood blocking to facilitate installation of all finishing materials, fixtures, equipment, cabinetry, specialty items such as toilet accessories, toilet partitions and fire extinguishers, and trim, as shown on drawings and as required by manufacturer's published requirements for installation of same; provide blocking for relocated materials such as overhead cabinetry; provide blocking for Owner furnished items such as Toilet Accessories.
- B. Wood Furring:
 - 1. Provide where shown and as necessary for facing materials specified.
 - 2. One inch by 2 inches, continuous; space 24 inches on center unless shown otherwise.
 - 3. Erect vertically or horizontally as required or as shown on drawings.
 - 4. Shim out from wall where necessary to maintain alignment.
 - 5. Anchor securely to walls with power actuated fasteners, case hardened nails, or other approved fasteners.
- C. Pressure Treated Wood Products:
 - 1. Provide pressure treated wood for all framing. Blocking, furring, and nailing strips built into exterior masonry walls, wood in contact with concrete.
 - 2. Apply 2 brush coats of same preservative used in original treatment to all sawed or cut surfaces of treated lumber.

3. Remove excess moisture where shrinkage is a serious fault or where treated lumber will be in contact with plaster, or stucco, and where water-borne treated lumber is to be painted or stained.
 4. Dry lumber to 15 to 19 percent moisture content after treatment.
- D. Plywood and Particleboard Sheathing and Underlayment:
1. Plywood: Comply with printed installation requirements of the APA Design/ Construction Guide, Commercial for plywood application required, unless otherwise indicated.
 2. Particleboard: Install in accordance with National Particleboard Association recommendations for the type of condition, unless otherwise indicated

End of Section

SECTION 06 16 33
WOOD BOARD SHEATHING *Preface*

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

No Change

1.2 SUMMARY

Modify as follows:

- A. This Section includes the following:
 - 1. Wall sheathing
 - 2. Roof sheathing
 - 3. ~~Building wrap~~ (Not found in this Section)
 - 4. Flexible flashing at openings in sheathings
 - 5. ~~Composite nail base insulated roof sheathing~~ (Not found in this Section)

End of Section

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**SECTION 06 16 33
WOOD BOARD SHEATHING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wall sheathing
 - 2. Roof sheathing
 - 3. Building wrap
 - 4. Flexible flashing at openings in sheathings
 - 5. Composite nail base insulated roof sheathing
- B. Related sections include Section 06 10 53 – Rough Carpentry.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. For building wrap, include data on air/moisture-infiltration protection based on testing according to referenced materials.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Building Wrap

1.4 DELIVERY, STORAGE AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 – PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated
- B. Thickness: As needed to comply with requirements specified, but not less than thickness directed
- C. Factory mark panels to indicate compliance with applicable standard

2.2 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior Sheathing
 - 1. Span Rating: Not less than 24/0
 - 2. Nominal Thickness: Not less than ½"

2.3 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, Staples: ASTM F 1667
- C. Power-Driven Fasteners: NES NER-272

- D. Wood Fasteners: NES NER 272
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for materials being fastened.
 - 1. For wall and roof sheathing panels, provide screws with organic polymer or other corrosion protective coating having a salt spray resistance of more than 800 hours according to ASTM B 117.
- F. Screws for fastening sheathing structural panels through rigid insulation to metal roof framing shall comply with current Florida Building Code and State Requirements for Educational Facilities (SREF), current edition.
- G. Screws for Fastening Oriented Strand Board Surfaced, Polyisocyanurate Foam Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosive-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. Provide washers or plates if recommended by plywood sheathing manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
- B. Flexible Flashing: Composite, self-adhesive flashing product consisting of a pliable, rubberized asphalt compound, bonded to a high density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040"
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to:
 - a. Carlisle Coatings and Waterproofing: CCW-705-TWF Thru-Wall Flashing
 - b. Grace Construction Products, a unit of W.R. Grace & Co.: Vycor V40 Weather Barrier Strips.
 - c. MFM Building Products Corp: Window Wrap
 - d. Polyguard Products, Inc.: Polyguard 300
 - e. Protecto Wrap Company: PS-45
- C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of workday when rain is forecasted.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S "Engineered Wood Construction Guide," for types of structural use panels and applications indicated.
- B. Fastening Method: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Screw to cold-formed metal framing
 - b. Space panels as recommended by sheathing manufacturer.

3.3 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4", except that at flashing flanges of other construction, laps need not exceed flange width.
 - 3. Lap flashing over weather resistant building paper at bottom and sides of opening.
 - 4. Lap weather resistant building paper over flashing at heads of openings.
 - 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION

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SECTION 06 40 00
ARCHITECTURAL WOODWORK AND MILLWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
1. Standing and running trim.
 2. Removal, storage, and reinstallation of existing Custom Casework; see drawings for Bookstore work.
 3. Custom Casework, including counter tops solid surfacing material as well as Bid Alternate 3.
- B. Related Work Specified Elsewhere:
1. Blocking: Section – 06 10 00 - Rough Carpentry
 2. Painting and touch-up: Section 09 90 00 - Painting and Coatings.

1.02 QUALITY ASSURANCE

- A. Standards:
1. "Quality Standards" of Architectural Woodwork Institute (AWI) apply and by reference are made a part of this specification.
 2. Any reference to Premium, Custom, or Economy is as defined in AWI "Quality Standards".
 3. Where quality grade of any item is not specified provide Custom grade.
- B. Woodwork Manufacturer shall be certified by the AWI Quality Certification Program as competent to perform the work specified, and have 5-year previous experience of successfully completed comparable work.
- C. References:
1. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.
 2. AWI – Quality Standards.
 3. BHMA A156.9 – Cabinet Hardware.
 4. FS MMM-A-130 – Adhesive, Contact.
 5. NEMA (National Electric Manufacturer's Association) LD3 – High Pressure Decorative Laminates.
 6. PS 1 – Construction and Industrial Hardwood.
 7. PS 20 – American Softwood Lumber Standard
- D. Lumber Grading: Lumber Grading Rules and Wood Species in accordance with Voluntary Product Standards PS 20-70. Grading rules of Southern Pine Inspection Bureau (SPIB) apply to materials furnished.
- E. Fire Hazard Classification: Comply with required NFPA, ANSI and UL surface burning characteristics for plastic laminates, lumber and plywood.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings on all items of architectural woodwork. Include evidence of Woodwork Manufacturer's qualifications.

- B. Wood samples: Submit three 8" long samples illustrating expected range of component finish color and/or grain.
- C. Solid surfacing material and plastic laminate samples: Submit samples of full range of available colors, textures, and patterns of solid surfacing material, plastic laminate, and if used, edge banding.

1.04 FIELD DIMENSIONS

- A. Woodwork Manufacturer is responsible for details and dimensions not controlled by job conditions.
- B. Design and fabricate units based upon field conditions and measurements. Verify field measurements are included in shop drawings.
- C. Cooperate with Contractor to establish and maintain these field dimensions.

1.05 PRODUCT HANDLING

- A. Do not deliver millwork until building and storage areas are sufficiently dry so as to avoid damage by excessive changes in moisture.
- B. Deliver, store and handle millwork in manner to prevent damage and deterioration.

1.06 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference after site inspection and prior to commencement of this work. Discuss any items that may alter fabrications or intended installation and determine acceptable conclusions.

1.07 COORDINATION

- A. Coordinate work with plumbing, mechanical, electrical, and other trades for rough-in work and installation of adjacent and associated components

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Sub-base Materials, Plywood:
 - 1. ¾" thick, 9-ply closed-grain hardwood plywood typical unless noted otherwise.
 - 2. ¼" thick hardwood plywood at cabinet backs and drawer bottoms; preformed wood fiber with smooth, hard, moisture resistant surface.
 - 3. Exterior grade within 4' of any sink edge or in contact with ground.
 - 4. AWI Grade: Custom
- B. Blocking, Edging unless otherwise noted, and Supports
 - 1. Solid wood, kiln dried
 - 2. Species, Fir or Poplar
 - 3. AWI Grade: Custom
- D. Plastic Laminate:
 - 1. High pressure laminate, General Purpose Grade, NEMA LD3, GP-50 by

- Formica, Nevamar or Wilson Art.
- 2. Thickness:
 - a. 0.050 inch: Exposed horizontal surfaces
 - b. 0.030 inch: Exposed vertical surfaces
 - c. BK 20 for Cabinet and drawer linings and concealed backing: 0.020 inch, matte finish, white unless otherwise noted.

- E. Edging at Bid Alt 3: to match veneer or laminate where applicable, color as selected by Architect from manufacturer's full range of standard colors.

- F. Solid Surfacing: equal to Earthstone by Wilsonart

- G. Hardware:
 - 1. Hinges:
 - a. Heavy duty.
 - b. Acceptable:
 - (1) self-closing Stanley HT1592, US28
 - (2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

 - 3. Catches:
 - a. Aluminum, magnetic type.
 - b. Acceptable:
 - (1) Stanley Hardware, 41 series
 - (2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

 - 5. Pulls:
 - a. Brushed stainless steel, ribbon type
 - b. To be selected by Architect.

 - 6. Shelf Supports (recessed in custom casework):
 - a. Shelf standards and supports: to match casework:
 - (1) Aluminum, heavy duty.
 - (2) Acceptable:
 - (a) Knappe and Vogt Mfg. Co., Inc. No. 255 Standards and 256 Supports.
 - (b) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

 - 7. Door Locks, Bid Alt 3 casework:
 - a. Material: brushed stainless steel finish
 - b. Provide 2 keys for each lock.
 - e. Acceptable:
 - (1) Schlage CL 2000, US26D complete with strike plate
 - (2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

 - 8. Silencers: Neoprene type with self-adhesive at all cabinet doors.

- H. Glazing: Provide clear, tempered glass for glazed doors and openings in cabinetwork, ¼" thick unless otherwise indicated or approved.

- I. Accessories: Adhesives, concealed fasteners, nuts, bolts, screws, pins, washers, etc. of type and size to suit application and severity of use. Provide finished grommets for holes and cut-outs.

- J. Miscellaneous: Provide shims, blocking, etc. as required for complete installation.

2.02 MILLWORK FABRICATION

- A. Fabrication Workmanship: AWI Custom grade. See drawings for specific detailing requirements of counter, door, shelf edge, etc.
- B. Pressure Treatment:
 - 1. For materials adjacent to concrete, treat with preservative, using standard 3-minute immersion treatment.
 - 2. Retreat all surfaces exposed by sawing, planing, or boring with a liberal brush application of same solution or by re-immersing.
- C. Seal all millwork items, unless factory finish has been applied, before shipping to job site as follows:
 - 1. Paint Finish: One coat of pigmented type sealer.
 - 2. Transparent Finish: One coat of clear sealer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine surfaces for conditions that would prevent quality installation of millwork. Verify that all grounds, stripping and blocking are secure and in place to support casework and millwork.
- B. Do not install until all defects are corrected; doing so shall indicate acceptance of site conditions and require installer/subcontractor to correct any defects.

3.02 INSTALLATION

- A. Casework including re-installation of existing casework identified above and as shown on drawings:
 - 1. Install casework plumb and level (within 1/16" in 10').
 - 2. Shim as necessary with concealed shims.
 - 3. Accurately scribe and closely fit all face plates, filler strips, and trim strips to irregularities of adjacent surfaces.
 - 4. Securely anchor millwork to substrate with concealed fasteners and blind nailing unless otherwise indicated.
 - 5. Set nail heads, plug and finish to match surrounding finish.
 - 6. Seal all joints around counter tops with sealant; fully bed backsplashes and end splashes to top and each other with Dow Corning #786 mildew resistant silicone sealant.
 - 7. After installation, wipe finished surfaces to remove marks of handling and leave in perfect condition.
- B. Shelving:
 - 1. Support fixed shelves with continuous ledger at sides and back.
 - 2. Install wall-shelving standards on solid backing or with toggle bolts into steel studs or masonry or TEK screws into concrete. Do not install wall-shelving standards into gypsum wallboard only. Space standards as required to support indicated loading but not less than 5-plf based on shelf material provided.

3.03 ADJUSTMENT AND CLEANING

- A. Casework adjustment and cleaning includes re-installation of existing Casework identified above and as shown on drawings in addition to new work as shown on drawings.
- B. Adjust all hardware to center doors and drawers in openings and in line with each other and provide proper operation.
- C. Accurately align drawer and doors to provide even spacing and uniform appearance.
- D. Repair or replace damaged or defective material.
- E. Clean all exposed and semi-exposed surfaces and protect millwork from damage or deterioration until project completion.

End of Section

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**SECTION 07 21 00
BUILDING INSULATION**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Batt and blanket thermal insulation: acoustical, for use at the few locations of stud system exterior walls (stucco on ci on sheathing on mtl studs), such as at rebuilt dormers.
 - 2. Acoustical Batt and blanket mineral wool/rock wool for use in wall between existing restrooms and offices, and above office ceilings where indicated (cut in 2x2 and adhered to ceiling panel).
 - 3. Installation accessories.
- B. Related Work Specified Elsewhere:
 - 1. Div 05, Metal Framing
 - 3. Div 09, Metal studs and Gypsum Board
 - 5. Div 09, Acoustical Ceilings.
- C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
- D. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SUBMITTALS

- A. Certificates: Furnish manufacturer's certification that materials meet or exceed specification requirements.
- B. Submit manufacturer's descriptive data and installation instruction.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in original sealed containers or packages bearing manufacturer's labels intact and legible.
 - 1. Store and handle materials with care to prevent damage.

PART 2 - PRODUCTS

2.01 INSULATION

- A. Batt or Blanket Insulation:
 - 1. Thermal insulation: Preformed glass or mineral fiber, batt or blanket, foil faced, ASTM C 665, Type III, Class A.
 - a. Flame Spread: 25 or less when tested in accordance with ASTM E 84.
 - b. R Value: 11.0 for walls.
 - 2. Acoustical: Unfaced, mineral wool/rock wool, 3" min thickness; tight fitting.

2.02 ACCESSORIES

- A. Adhesive: As recommended by insulation manufacturer.
- B. Tape: Foil faced, as recommended by insulation manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that substrate surfaces and adjacent materials are dry and ready to receive insulation and are compatible.

3.02 INSTALLATION OF INSULATION

- A. General:
 - 1. Maintain integrity of insulation over entire area to be insulated.
 - 2. Carefully cut and fit insulation around pipes, conduits and other obstructions, but completely filling all voids.
 - 3. Where pipes or conduit are located in stud spaces of exterior walls or walls between conditioned and non-conditioned spaces, or spaces to be separated acoustically, place insulation between exterior wall or wall of non-conditioned space and pipe, compressing where necessary.
- B. Batt or Blanket Insulation:
 - 1. Attach flanges of blankets to framing members or friction fit blankets between framing members.
 - 2. Install with integral vapor barrier facing exterior side of wall.
- C. 2x2 Acoustical Batt Insulation to be adhered to top surface of lay-in ceiling panels to facilitate access.

End of Section

SECTION 07 27 20
FLUID APPLIED AIR & WATER RESISTIVE BARRIER

PART I - GENERAL

1.01 DESCRIPTION

- A. Moisture Control: Prevent the accumulation of water into or behind the stucco, either by condensation or leakage into the wall construction:
 - 1. Air Leakage Prevention—prevent excess air leakage in the design and detailing of the wall assembly. Provide continuity between air barrier components in the wall assembly.
 - 2. Provide Air/Moisture Barrier over CMU (& over sheathing at locations of mtl framing).
- B. Scope and requirements for Fluid Applied Air & Water Resistive Barrier is specified within Specification Section 09 24 23 as a part of the overall building envelope.
 - 1. System specified is StoGuard as a part of the total 102 StoPowerall Stucco System.
 - 2. Air/Moisture Barrier approved equal Prosoco R-Guard system including similar fill, tape, etc. identified below under 09 24 23, 2.02, if material compatibility with insulation and submitted and approved Stucco System.

End of Section

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SECTION 073216
CONCRETE ROOF TILE, Preface

PART 1 – GENERAL

Add the following before "Section Includes":

- 1.1 SUMMARY: This Section includes labor, equipment, and materials (some specified under this section, some identified in Related Sections) to install the Concrete Roof Tile System.
As Part of Bid Alternate 03 Arched Walkway Canopy, the entire outer perimeter includes Rake Tile to match existing Arched Walkway Canopy System edge, described as
"Concrete Roof Tiles Set on 1 x 2 x 3" Aluminum Blocking at 16 ½" oc with 1" Dia x 3/8" Bead of Roof Tile Adhesive."

1.2 RELATED SECTIONS

Modify as follows:

- A. ~~Section 00 54 22 – Unit Price Schedule Not Used~~
- B. Section 0616 33 – Wood Board Sheathing (*Roof Sheathing, installed below Mod Bit, over Insulation*)
- C. ~~Section 070150.19 – Preparation for Re-Roofing Not Used~~
- D. ~~Section 0721 00 – Insulation Not Used~~; Required insulation specified in Modified Bitumen Section.
- E. Section 0755 52 - SBS Modified Bituminous Membrane Roofing (including Insulation)
- F. Section 0760 00 – ~~Flashing Sheet Metal~~ Sheet Metal Flashing and Trim
- G. ~~Section 07 72 00 – Roof Accessories Not Used~~

1.3 REFERENCES

Modify as follows:

- N. FRSA/TRI – *Florida High Wind Tile Installation Manual, 5th Edition, 2014*
- R. Florida Building Code, Product Approval – *FL560 No. 120, ~~FL610~~, FL7781, FL7849*

1.4 DESIGN REQUIREMENTS

Modify as follows:

- B. Roofing tile materials shall conform to the requirements of the Miami-Dade County Notice of Acceptance (NOA) as follows
 - 1. ~~NOA 07-1023.09 Villa~~ NOA 18-0509.16 - Villa 900 Concrete Roof Tile
 - 2. NOA 18-0502.03 - Boral TileSeal
 - 3. NOA 14-0416.10 - Wakaflex Flashing
- C. Roofing tile materials and installation shall conform to the ~~SBCCI Standard for Hurricane Resistant Residential Construction, SSTD10-99, and the Florida Building Code (latest edition including any revisions and supplements);~~ *tile materials and installation shall conform to the requirements of the State of Florida Product Approvals as follows:*
 - 1. *FL 7849-R11*
 - 2. *FL 14317-R10*
 - 3. *FL 7804-R10*
 - 4. *FL 601-R13*

PART 2 – PRODUCTS

Modify as follows:

2.2 RELATED MATERIALS

- A. Underlayment
 - 1. Base Membrane: The new roofing base membrane assembly shall consist of one-ply SBS modified bitumen smooth surface membrane, mechanically fastened.

Add the following

- a. Roofing base membrane also includes the two layers of insulation specified under 07 55 52 Modified Bitumen Membrane Roofing plus Sheathing specified under Section 06 16 33 Wood Board Sheathing.

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SECTION 073216 CONCRETE ROOF TILE

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Concrete roof tiles and roof system components
- B. Metal roof flashing
- C. Underlayments and self seal membranes
- D. Related roof accessories

1.2 RELATED SECTIONS

- A. Section 00 54 22 – Unit Price Schedule
- B. Section 0616 33 – Wood Board Sheathing
- C. Section 070150.19 – Preparation for Re-Roofing
- D. Section 0721 00 – Insulation
- E. Section 0755 52 - SBS Modified Bituminous Membrane Roofing
- F. Section 0760 00 – Flashing Sheet Metal
- G. Section 0772 00 – Roof Accessories

1.3 REFERENCES

- A. ASTM A 90 – Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- B. ASTM A 525 – Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- C. ASTM A 641 – Standard Specification for Zinc-Coated (galvanized) Carbon Steel Wire
- D. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Inron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- E. ASTM C 1492 – Standard Specification for Concrete Roof Tile
- F. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- G. ASTM D 249 – Standard Specification for Asphalt Roll Roofing (Organic Felt) Surfaced with Mineral Granules
- H. ASTM C 270 – Mortar for Unit Masonry
- I. ASTM D 2178 – Asphalt Glass Felt Used in Roofing and Waterproofing
- J. ASTM D 4586 – Asphalt Roof Cement, Asbestos-Free
- K. ASTM D 2626 – Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing
- L. AWPA C2 – Lumber, Timber Bridge Ties and Mine Ties - - Preservative Treatment by Pressure Processes
- M. Tile Roofing Institute (TRI) – Concrete and Clay Design Criteria for Cold and Snow Regions

- N. FRSA/TRI – Concrete and Clay Roof Tile Installation Manual Fourth Edition (For Florida High Wind Applications)
- O. ICC ESR 1647 (ICC-ES) – International Code Council Evaluation Services
- P. ICBO ESR-2015P Concrete and Clay Roof Tile Installation Manual for Moderate Climate Regions
- Q. ICC AC 180 – Acceptance Criteria for Clay and Concrete Roof Tiles
- R. Florida Building Code, Product Approval – FL560, FL610, FL7781, FL7849
- S. NRCA SRM – The NRCA Steep Roofing Manual, Latest Edition
- T. FS FF-N-105 Nails, Brads, Staples and Spikes: Wire, Cut and Wrought.

1.4 DESIGN REQUIREMENTS

- A. Roofing tile materials and installation shall conform to the requirements of ICC ESR 1647 and LA RR 23700
- B. Roofing tile materials shall conform to the requirements of the Miami-Dade County Notice of Acceptance (NOA) as follows:
 - 1. NOA 07-1023.09 Villa
- C. Roofing tile materials and installation shall conform to the SBCCI Standard for Hurricane Resistant Residential Construction, SSTD10-99, and the Florida Building Code (latest edition including any revisions and supplements).

1.5 SUBMITTALS – Submit the following in accordance with Section 01330 Submittal Procedures

- A. Manufacturer’s data on concrete tile and membrane underlayment including:
 - 1. Preparation instructions and recommendations
 - 2. Storage and handling requirements and recommendations
 - 3. Installation methods
- B. Shop Drawings: Indicate metal flashing profiles, joint locations, fastening locations, and installation details. Indicate tile layout with location of cut and special shaped tiles identified.
- C. Selection Samples: For the product specified, submit samples indicating manufacturer’s available colors which in the Architect’s and Owner’s opinion will match as closely as possible the color of the salvaged tile which is to be removed.
- D. Verification Samples: Submit three representative samples of the material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- E. Certificates of Compliance: Submit to certify compliance with referenced standards.

1.6 QUALITY ASSURANCE

- A. Product Requirements: Comply with governing codes and regulations. Provide products of manufacturers which have in satisfactory use in similar services for five years.
- B. Manufacturer Qualifications: Minimum five years documented experience producing concrete roof tile and member of Tile Roof Institute.
- C. Installer Qualifications: Minimum five years documented installing products specified in this section and/or supervision by a manufacturer’s authorized installation representative.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship
 - 1. Finish areas designated by Architect
 - 2. Mock-up shall be a minimum of a 6’ by 6’; area and include the edge, ridge, valley and other typical transition conditions anticipated.

3. Do not proceed with remaining work until installation workmanship and appearance is approved by Architect.
4. Accepted mock-up may remain as part of Work.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Deliver products to project site in manufacturer's unopened pallets, labeled with data indicating compliance with specified requirements.
- C. Maintain dry storage area for products of this section until installation of products.

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.
- B. Do not overload the roof. Distribute stacks of tile uniformly on roof at not greater than 12" in height

1.9 WARRANTY

- A. Roof Tile: Manufacturer's Limited Lifetime, Fully Transferrable, Non-Prorated Product Warranty against defects in roof tile for the life of the structure.
- B. Installation Warranty: Contractor shall warrant for five (5) years that the concrete tile roofing system, as installed, is free from defects in workmanship. When repairs are required due to defective workmanship during the Contractor's warranty period, the Contractor shall make the required repairs within seventy-two (72) hours of notification. When required repairs are not performed within the specified time period, emergency repairs performed by others will not void the warranty. Products of this section, as installed, shall be installed in accordance with all of the Contract Documents and shall be free from faults and defects in workmanship for a period of five (5) years after Substantial Completion.

1.10 EXTRA MATERIALS

- A. Provide additional 1% of installed roof tiles, but not less than one full square, for Owner's use in roof maintenance.
- B. Furnish extra materials packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Boral Roofing (formerly MonierLifetile), Irvine, CA – NO EXCEPTIONS
- B. Requests for substitutions will not be considered.
- C. Concrete Roof Tile: This section is based on the products of Boral Roofing, Irvine, CA.
 1. Standard Weight Tile: Villa 900 profile, NO EXCEPTIONS
 2. Finish Tile: Manufacturer's ridge and hip starter
 3. Size: 17"x13", nominal
 4. Coverage: 85 roof tiles per 100 ft² of roof area
 5. Installed weight per square: Approximately 920 pounds
 6. Color and Finish: "Gold Dust"

2.2 RELATED MATERIALS

- A. Underlayment
 1. Base Membrane: The new roofing base membrane assembly shall consist of one-ply SBS modified bitumen smooth surface membrane, mechanically fastened.

2. Self-adhering Membrane Underlayment: ASTM D 412, polyethylene-sheet backed, rubberized asphalt membrane, 40 mil thickness.
 3. Flexible Hip and Ridge Flashing: SBS modified rubberized asphalt adhesive on a lineal, low density polyethylene membrane with a 60 mil total thickness.
- B. Horizontal Battens – Elevated Batten System
1. Material: Boral Elevated Batten system.
 2. Size: Nominal 1"x2"x8'0" or 1"x2"x4'0"
 3. Do not use bowed or twisted battens
 4. Provide manufacturer's standard shims as for elevating battens off the roof deck
- C. Eave/Closure/Riser/Bird Stop: Comply with the 4th Edition Installation Guide (ICC-ES ESR2015P)
1. Prefabricated metal eave closure, profile to match tile, fastened at a minimum 18" on center along eave.
 - a. Formed 26 gauge galvanized steel "L" section with 3" wide horizontal leg and vertical leg cut to conform with bottom profile of tile. Provide pre-finished to match tile color with drain holes punched in vertical leg prior to application of finish.
- D. Mortar: ASTM C 270, proportion specification for Type M mortar mix.
- E. Asphaltic Plastic Cement: ASTM D 4586, Type I
- F. Profile Flashing
1. Wakaflex Universal Flashing – NO EXCEPTIONS
 - a. Color to match roofing tiles (terracotta)
- G. Steep Slope Roof Sheet Metal
1. See Section 07 60 00 – Flashing and Sheet Metal, Paragraph 2.7
- H. Tile Fasteners:
1. Corrosive resistant fastener meeting ASTM A641 Class I or approved equal. Number 11 gauge diameter and of sufficient length to penetrate $\frac{3}{4}$ " into or through the thickness of the batten. Comply with FRSA/TRI 07320/8-05 4th Edition Installation Guide.
 2. Screw Fasteners: Corrosion resistant meeting ASTM A 641 Class 1 and/or corrosion resistance equal (according to ASTM B 117). Screws shall be 2 $\frac{1}{2}$ " in length or penetrate a minimum $\frac{3}{4}$ " into the batten. ASTM A 641 Class 1 is a nail specification that can be converted to screw fasteners through performance testing (ASTM B 117). Each fastener manufacturer is responsible for supplying this support data. Minimum #8 course thread.

2.3 FASTENERS

- A. Nails for Applying Underlayment: FS FF N 105, hot-dip galvanized steel, 11 gauge, sharp pointed, conventional roofing nails with barbed shanks, minimum $\frac{3}{8}$ " diameter head, and of sufficient length to penetrate through sheathing. Verify that nails are compatible with flashing materials to prevent galvanic action.
- B. Screw Fasteners for Installation of Roof Tile: Sized to penetrate deck minimum $\frac{3}{4}$ " or through thickness of deck batten
1. Manufacturer's Roof System Components: Quik-Drive 2 $\frac{1}{2}$ " or 3" screws, roofing specific, Miami-Dade approved.
 2. Fastener Type: Corrosion resistant fasteners formed from stainless steel.
- C. Wind Locks: 12 gauge galvanized steel formed wire clips. Select material type as recommended by manufacturer for specific locations.
- D. Hurricane Clips: Tile edge clips fabricated from 19 gauge galvanized steel strips, $\frac{1}{2}$ " wide. Provide with two nail holes in horizontal leg for anchorage to deck substrate. Select material typw as recommended by manufacturer for specific locations.
- E. Preservative Treated Lumber: AWPA C1, provide treated ridge and hip boards, eave starter, and battens.

3.1 EXAMINATION

- A. Examine areas to receive tile to verify conditions. Do not commence tile installation until unsatisfactory conditions are corrected.
- B. Do not begin installation until substrates have been properly prepared.
- C. Verify surfaces are uniform, smooth, clean and dry
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.

3.3 INSTALLATION – GENERAL

- A. Install in accordance with manufacturer's instructions and the following:
 - 1. ICBO ESR-2015P Concrete and Clay Roof Tile Installation Manual for Moderate Climate Regions
 - 2. FRSA/TRI 07320/8-05 4th Edition Installation Guide. ICC-ES ESR 2015P
 - 3. FRSA/TRI Concrete and Clay Roof Tile Installation Manual, 4th Edition
- B. Roof Layout: Layout according to FRSA/TRI 07320/8-05, 4th Edition.
- C. Battens, Vent Pipes, Eave/Gable, Valleys, and Side Wall Flashing: Install according to FRSA/TRI 07320/8-05, 4th Edition.
- D. Underlayment: Install according to FRSA/TRI 07320/8-05, 4th Edition and manufacturer's instructions.
- E. Venting: Install according to manufacturer's instructions and local code requirements
- F. Hip and Ridge: Install according to Hip and Ridge Attachment sections of the FRSA/TRI 07320/8-15 Concrete and Clay Roof Tile Installation Manual, 4th Edition.
- G. Head and Apron Flashing: Install according to FRSA/TRI 07320/8-05, 4th Edition. Allow ½" space between batten ends and between batten and metal edge return.

3.4 CONCRETE ROOFING TILE INSTALLATION

- A. Beginning at eaves, install roofing tiles as indicated and in accordance with manufacturer's recommendations. Hook mounting lugs over wood battens and fasten through each tile into batten. Sawcut tiles at valleys to form a straight border. Taper valleys from a 2" exposure on each side of valley at the top and increase exposure by 1" each side, per 8'0" of valley length. Apply flexible hip and ridge flashing over ridge and hip boards and top edge of tile. Apply asphalt plastic cement between tiles at hip and ridge. Screw hip and ridge tiles to hip and ridge boards.

3.5 TILE INSTALLATION

- A. Layout:
 - 1. Overhang at Eave: ¾" (19 mm) past drip edge, uniformly aligned
 - 2. Minimum Head Lap: 3" (76 mm)
 - 3. Coursing: Straight bond. Match bond on adjacent new concrete tile, Building 'L'.
- B. Set perimeter tiles in mortar; apply sealer to exposed mortar.
- C. Secure field and perimeter tile in accordance with UBC Table 15-D-2.
- D. Cut field tile to form straight edge at center of hip, ridge and valley.
- E. Install eave closures

- F. Hips: Use prefabricated hip starter
 - 1. Hips: Use standard hip tiles as starter
 - 2. Miter tile as hip starter to match eave lines
 - 3. Form end with color coordinated mortar
- G. Hips and Ridges, Mechanically fastened:
 - 1. Install nailer board of sufficient height to support trim tile
 - 2. Protect nailer board with pressure sensitive adhesive, mortar, or preformed metal closure
 - 3. Mechanically fasten trim to nailer board with minimum $\frac{3}{4}$ " (19 mm) penetration
 - 4. Use approved sealant or clips
 - 5. Point mortar and finish to match tile surfaces

3.6 CLEANING

- A. Remove all broken tile, debris and excess tile from roof
- B. Sweep cut tiles clean

3.7 REPAIR AND REPLACEMENT

- A. Damaged Tile:
 - 1. Break out damaged roof tile
 - 2. Repair torn underlayment
 - 3. Drive fastener flush
 - 4. Apply minimum $\frac{3}{8}$ " (10 mm) by 2" (51 mm) bead of approved adhesive at head of cut tile
 - 5. Immediately set replacement tile in position assuring proper contact
- B. Damaged Small Valley and Hip Cuts:
 - 1. Apply a minimum of $\frac{3}{8}$ " (10 mm) bead of approved adhesive at head of cut tile
 - 2. Immediately set tile in course above position assuring proper contact

3.8 PROTECTION

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

END OF SECTION

**SECTION 07 55 52
MODIFIED BITUMEN MEMBRANE ROOFING**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes labor, materials and equipment to install the following roof system:
 - 1. Insulation
 - 2. Bottom layer of polyisocyanurate, loose laid
 - 3. Top layer of asphalt emulsion coated perlite coverboard mechanically fastened
 - 4. Roofing membrane
 - 5. Two ply SBS modified bitumen roof system
 - 6. Base layer of fiberglass reinforced SBS membrane, torched applied
 - 7. Granulated cap layer of fiberglass reinforced SBS membrane, torched applied

1.2 REFERENCE STANDARDS

- A. Reference Standards: References in these specifications to standards, test methods, codes, etc., are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which are used as references throughout these specifications.
 - 1. ASTM American Society for Testing and Materials, Philadelphia, PA
 - 2. NRCA National Roofing Contractors Association, Rosemont, IL
 - 3. OSHA Occupational Safety and Health Administration, Washington, D.C.
 - 4. FM Factory Mutual Engineering and Research, Norwood, MA
 - 5. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Merrifield, MA
 - 6. UL Underwriters Laboratories Northbrook, IL
 - 7. PIMA Polyisocyanurate Insulation Manufacturers Association, Bethesda, MD
 - 8. SPRI Single Ply Roofing Industry, Waltham, MA

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to SATM D 1079 "Terminology Relating to Roofing and Waterproofing"; glossary of NRCA's "The NRCA Roofing and Waterproofing Manual"; and the Roofing Consultants Institute Glossary of Roofing Terms for the definition of terms related to roofing work in this Section.
- B. Sheet Metal Terminology and Techniques: SMACNA Architectural Sheet Metal Manual

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; that will not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. Jobsite Safety: Execute all operations and provide a safe work environment in accordance to OSHA standards and regulations. This requirement applies to all contractor personnel, associated subcontractors, workers in other trades, and jobsite visitors.
 - 1. Follow all industry fire prevention guidelines for storage of materials, staging areas, roof access, and application means and methods.
 - 2. Any applicable local fire codes supersede industry guidelines.
- D. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7-10.
- E. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and/or FMG 4470 as part of a membrane roofing system and that are listed in FMG's "RoofNav" for Class 1 for noncombustible construction and Class A for exterior fire rating, as applicable. Identify materials with FMG markings.
- F. UL Listing: Provide membrane roofing materials with the fire-test-response characteristics indicated

as determined by testing identical products per test methods mandated by UL. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.5 SUBMITTALS

- A. Submittals Package – General
 - 1. Submit the Shop Drawings, Product Data, Samples, and Quality Control Submittals specified below at the same time as a package.
 - 2. All submittal packages must be submitted prior to the Pre-Installation conference.
- B. Product data
 - 1. Catalog sheets, Specifications and installation instructions for each material specified
 - 2. Submit an intent to warrant, executed by authorized representative of system manufacturer, indicating that manufacturer has reviewed drawings, specifications and conditions affecting the work and, and proposes to provide warranties as referenced herein without further stipulation.
 - 3. Manufacturer's Warranty: Submit a sample copy of the membrane manufacturer's warranty covering workmanship and materials.
- C. Shop Drawings
 - 1. When there is a proposed deviation from the Contract Documents, submit the revised detail labeled as such for approval. On the revised detail show existing conditions and referenced directly to the related details on the Contract Drawings.
- D. Samples
 - 1. All submitted samples must be labeled and supplied by manufacturer
 - a. Roofing Membrane: One each type
 - b. Insulation: One each type
 - c. Coverboard: One each type
 - d. Fasteners: Three each type

1.6 QUALITY ASSURANCE

- A. Certifications
 - 1. Provide letter from the roofing membrane manufacturer certifying the proposed roofing assembly, compatibility of materials and total R-value of the insulation system.
- B. Membrane Manufacturers Certifications
 - 1. Submit a letter certifying that the manufacturer has been actively marketing the submitted system for a minimum of five years.
 - 2. Submit written certification that the manufacturer subscribes to a quality assurance process, or equivalent, in order to optimize product quality. Manufacturer must demonstrate and verify a defined Process Capability Potential (Cpk) program designed to ensure continuous improvement. A certificate of analysis of the quality assurance process will be mandatory upon the written request to the manufacturer from the owner's representative.
 - 3. Roofing system manufacturer must provide inspection of guaranteed roofing systems by company employed, salaried, personnel dedicated to Technical Services.
 - 4. Sales representatives or sales agents will not be permitted to conduct quality assurance inspections or grant final manufacturer's acceptance.
- C. Contractor's Certification
 - 1. Provide a letter from the membrane manufacturer certifying that the applicator is licensed or approved to install the roof system.
 - 2. Provide names, address, and telephone numbers of five buildings where the applicator has installed similar roof systems that have the manufacturer's guarantee issued. Include the types of systems installed, the manufacturer's name, and the guarantee numbers.
 - 3. Letter certifying that the job foreman or crew chief and at least one other member of the roofing crew have installed at least similar systems and are thoroughly familiar with all aspects of the installation.
 - 4. The Contractor shall provide a "final statement of compliance" to the Architect, which states that the finished roof membrane complies with the approved contractual documents per FBC Section 423.12.3"
 - 5. The roof membrane shall be inspected by the manufacturer's representative within one year of roof acceptance by the Board per FBC Section 423.12.4
- D. Contractor's Qualifications

1. Roofing Firm Qualifications
 - a. Installation of a minimum of three roofs of comparable size, scope, and complexity as the roofing system specified in the Contract Documents, including all related sheet metal work, if applicable. (List two such jobs within 50 miles of the job site, including address, type of system and number of plies, if applicable, square footage, date installed and owner/agent with whom contracted).
 - b. In continuous operation of installing such roofing systems for five years or more.

- E. Contract Closeout Submittals
 1. Final invoice for project
 2. Close-out of any change orders
 3. Final waivers of lien from all material suppliers and subcontractors
 4. Completed punch list certification by Contractor and Owner's Representative

- F. Preliminary Roofing Conference
 1. Before starting roof deck construction, conduct conference at Project site. Comply with requirements for pre-installation conferences in AIA Standard Division 1 Section "Project Management and Coordination." Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:
 - a. Meet with Owner, Owner's Representative, Owner's insurer (if applicable), testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - b. Review means, methods, and procedures related to roofing installation, including manufacturer's written instructions.
 - c. Review Project Safety Plan for site conditions, enforcement, compliance, or Owner imposed restrictions that may be required.
 - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - e. Examine site for approved staging areas, disposal sites, and document existing conditions prior to contractor mobilization. Establish scope of work for site restoration and responsibilities.
 - f. Examine site for condition and completion of areas adjacent to work area. Establish protection required for existing surfaces.
 - g. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - h. Review structural loading limitations of roof deck during and after roofing operations.
 - i. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - j. Review governing regulations and requirements for insurance and certificates if applicable.
 - k. Review temporary protection requirements for roofing system during and after installation.
 - l. Review work limitation by contractor including; start times, end times, days of the week, noise mitigation, fume control and any part of the work that would effect normal building operations.
 - m. Review trade coordination necessary for job completion.
 - n. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, HANDLING & DISPOSAL

- A. Delivery
 1. Deliver roofing materials to the site in the manufacturer's unbroken containers bearing the manufacturer's printed labels.

- B. Storage and Handling
 1. Rooftop storage will be permitted only with the authorization of architect
 2. Do not point load roof.
 3. Do not store any flammables on roof.
 4. Store materials a minimum of 6" off the ground, in a dry, well ventilated place protected from the weather.
 5. Temperature conditioned storage is required for temperature sensitive items.
 6. Handle roll goods with care.
 7. Do not use roll goods which have been damaged.

8. Leave materials in their packaging until ready for use.
9. Allow no unlabeled materials on site.
10. In event of damage, immediately make all repairs and replacements required by Owner's Representative.

C. Disposal

1. All removed materials become the property of the contractor.
2. Inspect ground areas surrounding roof on a daily basis for loose debris.
3. Immediately move all debris off roof and into approved dumpster.
4. Dumpster staging areas must be kept neat and tidy.
5. Do not allow to overflow.
6. All debris must be transported to a legal dumpsite or recycling facility and documentation of each load must be maintained by the Contractor.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to Manufacturer's written instructions and guarantee requirements.

1. Do not start roofing if rain is imminent, or ambient temperature is below 45°F.
2. If rain occurs during roof membrane application, cease operations and protect deck, insulation, penetrations and membrane from water damage and intrusion.

B. Flame-heated Equipment

1. Locate and use flame-heated equipment so as not to endanger the structure or other materials on the site or adjacent property.
2. Provide and maintain fire extinguisher.

C. Comply with all fire regulations. Ensure properly rated, charged, and inspected fire extinguishers are on the roof and staging area.

1.9 SUBSTITUTION

A. When a particular make or trade name is specified, it is indicative the standard required. The basis of this specification is a Johns Manville 2FID-HW.

B. For bidders proposing substitutes, submit the following ten (10) days prior to bid date to Owner's Representative:

1. Written request with explanation of why substitute product should be considered.
2. Manufacturer's literature and samples of requested substitutions.
3. Three (3) job references available for inspections within fifty (50) miles of Owner's Representative where substitutes were used under similar conditions.
4. Any methods or procedures that differ from this specification.

C. Only substitutes approved in writing by Owner/Owner's Representative prior to scheduled bid date will be considered.

1.10 WARRANTY

A. Manufacturer's Guarantee, without monetary limitation, includes materials and workmanship to maintain roof in a watertight condition.

1. Provide guarantee including membrane, insulation, fasteners, membrane flashings, and walkway pads.
2. Include expansion joint covers, liquid applied flashing, and metal edge products supplied by the manufacturer.

B. Provide manufacturer's system guarantee equal to Johns Manville's Fifteen (15) Year Peak Advantage No Dollar Limit Roofing System Guarantee. Guarantee to run from date of substantial completion. Manufacturer shall have a minimum AAA credit rating.

C. Applicator's guarantee

1. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering

Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, and walkway products, for a period of 2 years from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection

1. Products: Subject to compliance with requirements, provide one of the products specified

2.2 MATERIALS

A. Thermal Layer

1. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
2. Polyisocyanurate
3. Rigid roof insulation board composed of a closed cell polyisocyanurate foam core bonded in the foaming process to universal fiber glass reinforced facers. Provide to promote positive drainage.
4. Reference Standard: ASTM C 1289
5. Federal Specification HH-I-1972/Gen and HH-I-1972/2
6. CAN/ULC-S704-01, Type 3, Class 2 (See CCMC Evaluation Report 13058-L)
7. Product: ENRGY 3 – 3"
 - a. Typical Physical Properties
 - (1) ASTM C 209, Water Absorption (% by Volume – 2 hours): 1 maximum
 - (2) ASTM D 2126, Dimensional Stability Change (7 days @ 158°F (70°C), 90-100% RH)
 - (3) Lengthwise: <2%
 - (4) Crosswise: <2%
 - (5) ASTM D 1621, Compression Resistance (10% Consolidation): 20 psi (138 kPa) nominal
 - (6) ASTM C 209, Product Density – 2.0 pcf (32 kg/m³)
 - (7) ASTM E 96, Moisture Vapor Transmission: <1 perm (57.5 ng/[Pa•s•m²])
 - (8) Service Temperature: -100° to 250°F (-73° to 121°C)

B. Thermal Protective Layer: Perlite

1. A high density, low thermal rigid insulation board, composed primarily of expanded perlite with reinforcing cellulosic fibers and selected binders. The top surface is sealed with a special polymerized asphalt emulsion coating which allows for direct application of SBS or APP membranes using torch application techniques.
2. Reference Standard: ASTM C 728
3. Product: DuraBoard
 - a. Typical Physical Properties
 - (1) Nominal Thickness ½"
 - (2) ASTM C209, Water Absorption (% Volume-2 hours): 3.5%
 - (3) ASTM C 165, Compression Resistance: 5% Consolidation: 50 psi (345 kPa) 10% Consolidation: 85 psi (586 kPa)
 - (4) ASTM C 209, Laminar Tensile Strength: 7 psi (48 kPa)
 - (5) ASTM C 203, Flexural Strength: 90 psi (620 kPa)
 - (6) ASTM C 209, Product Density: 10.0 pcf (160 kgs./m³) nominal
 - (7) ASTM C 209, Linear Expansion: 0.5 % maximum
 - (8) Thermal Protective Layer Securement
 - b. Mechanical
 - (1) #12 Phillips or hex head fasteners with an engineered thread and corrosion-resistant coating, exceeding FM Global Approval Standard #4470 corrosion requirements. Provide with either a #3 Phillips head or a 1/4" hex head, a point designed for quick installation and 3" round, Galvalume metal plates.
 - (2) Reference Standard: FM ZGlobal Approval Standard #4470
 - (3) Product: UltraFast Fasteners and Plates

C. Membrane Layer

1. Base, Heat Weldable
2. A modified bitumen sheet incorporating a fiber glass mat with a blend of Styrene- Butadiene-Styrene rubber and asphalt with polyolefin burn-off film for heat welding on the back of the sheet.
3. Reference Standards: ASTM D6163, Type I, Grade S
4. Product: DynaWeld 180 S Base
 - a. Typical Physical Properties
 - (1) Thickness: 120 ,ils (3 mm)
 - (2) Tensile Strength @ 0°F (-18°C)
 - (3) Machine Direction: 100 lbs. force/in. width (17.5 kN/m)
 - (4) Cross Machine Direction: 80 lbs. force/in. width (14.0 kN/m)
 - (5) Elongation @ 0°F (-18°C)
 - (6) Machine Direction: 45%
 - (7) Cross Machine Direction: 45%
 - b. Tensile-Tear
 - (1) Machine Direction: 100 Ibs./in. (18.4 kN/m)
 - (2) Cross Machine Direction: 80 Ibs./in. (16.6 kN/m)
 - (3) Low Temperature Flexibility : -10°F (-21°C)
 - c. Dimensional Stability
 - (1) Machine Direction: 0.20% change
 - (2) Cross Machine Direction: 0.20% change
 - (3) Cap, Heat Weldable
 - (4) A fire-resistant modified bitumen sheet incorporating a fiber glass mat with a blend of Styrene-Butadiene-Styrene rubber, asphalt and fire-retardant additives. Provide with a covering layer of ceramic-coated roofing granules and a back of the sheet that has a polyolefin burn-off film specifically for heat welding.
 - (17) Reference Standard: ASTM D 6163, Type I, Grade G
5. Product: DynaWeld Cap FR
 - a. Typical Physical Properties
 - (1) Thickness: 160 mils (4.0 mm)
 - (2) Tensile Strength @ 0°F(-18°C)
 - (3) Machine Direction: 135 lbs. force/in. width (23.6 kN/m)
 - (4) Cross Machine Direction: 95 lbs. force/in. width (16.6 kN/m)
 - (5) Elongation @ -0°F (-18°C)
 - (6) Machine Direction: 4%
 - (7) Cross Machine Direction: 4%
 - b. Tensile-Tear
 - (1) Machine Direction: 125 lbs./in. (21.9 kN/m)
 - (2) Cross Machine Direction: 100 lbs./in. (17.5 kN/m)
 - (3) Low Temperature Flexibility: -10°F (-23°C)
 - c. Dimensional Stability
 - (1) Machine Direction: 0.20% change
 - (2) Cross Machine Direction: 0.20% change

D. Flashings

1. Modified Base Flashing Sheet
 - a. A modified bitumen sheet incorporating a fiber glass mat with a blend of Styrene- Butadiene-Styrene rubber and asphalt with polyolefin burn-off film for heat welding on the back of the sheet.
2. Reference Standards: ASTM D 6163, Type I, Grade S
3. Product: DynaWeld Base
 - a. Typical Physical Properties
 - (1) Thickness: 120 mils (3 mm)
 - (2) Tensile Strength @ 0°F (-18°C)
 - (3) Machine Direction: 95 lbs. force/in. width (16.6 kN/m)
 - (4) Cross Machine Direction: 85 lbs. force/in. width (14.9 kN/m)
 - (5) Elongation @ 0°F (-18°C)
 - (6) Machine Direction: 3.0%
 - (7) Cross Machine Direction: 3.0%
 - b. Tensile-Tear
 - (1) Machine Direction: 105 Ibs./in. (18.4 kN/m)
 - (2) Cross Machine Direction: 95 Ibs./in. (16.6 kN/m)
 - (3) Low Temperature Flexibility : -10°F (-21°C)
 - c. Dimensional Stability

- (1) Machine Direction: 0.20% change
- (2) Cross Machine Direction: 0.20% change
- 4. Modified Cap Flashing Sheet: A fire-resistant modified bitumen sheet incorporating a fiber glass mat with a blend of Styrene-Butadiene-Styrene rubber, asphalt and fire-retardant additives. Provide with a covering layer of ceramic-coated roofing granules and a back of the sheet that has a polyolefin burn-off film specifically for heat welding.
- 5. Reference Standard: ASTM D 6163, Type I, Grade G
- 6. Product: DynaWeld Cap FR - Paradiene 30 CR FR TG Cap Sheet by Siplast Roofing has been approved provided the insulation used meets what has been specified.
 - a. Typical Physical Properties
 - (1) Thickness: 160 mils (4.0 mm)
 - (2) Cross Machine Direction: 95 lbs. force/in. width (16.6 kN/m)
 - (3) Machine Direction: 135 lbs. force/in. width (23.6 kN/m)
 - (4) Tensile Strength @ 0°F (-18°C)
 - (5) Elongation @ -0°F (-18°C)
 - (6) Machine Direction: 4%
 - (7) Cross Machine Direction: 125 lbs./in. (21.9 kN/m)
 - b. Tensile-Tear
 - (1) Machine Direction: 125 lbs./in. (21.9 kN/m)
 - (2) Cross Machine Direction: 100 lbs./in. (17.5 kN/m)
 - (3) Low Temperature Flexibility: -10°F (-23°C)
 - c. Dimensional Stability
 - (1) Machine Direction: 0.20% change
 - (2) Cross Machine Direction: 0.20% change
- 7. Cant: Provide strip manufactured from a high density, laminated board made of high strength fibers and expanded perlite.
- 8. Reference Standard: ASTM C 728
- 9. Product: FesCant Plus
 - a. Typical Physical Properties
 - (1) ASTM C 209, Dimensional Stability: 0.5% maximum
 - (2) ASTM C 165, Compression Resistance:
 - (3) 5% Consolidation: 30 psi (207 kPa)
 - (4) 10% Consolidation: 40 psi (276 kPa)
 - (5) ASTM C 209, Laminar Strength: 7 psi (48 kPa)
 - (6) ASTM C 203, Flexural Strength: 65 psi (448 kPa)
 - (7) ASTM C 209, Product Density: 9 pcf (144 kgs./m³)
 - (8) ASTM C 209, Water Absorption (% by Volume – 2 hours): 1.5 maximum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that Work of other trades which penetrates the roof deck or requires personnel and equipment to traverse the roof deck has been completed.
- B. Examine surfaces for inadequate anchorage, foreign material, moisture, and unevenness that would prevent the execution, and quality of application, or the roofing system as specified.
- C. Do not proceed with application of roofing system until defects are corrected.

3.2 PREPARATION

- A. Surface Preparation
 - 1. Inspect metal closely for:
 - a. Proper securement of panels to joists with no loose decking,
 - b. Differential deflection at side or end laps,
 - c. Side lap fasteners in place,
 - d. Damaged Panels
 - e. Corrosion
 - 2. Unacceptable panels should be brought to the attention of the General Contractor and Project Owner's Representative and must be corrected prior to installation of roofing system.
 - 3. Ensure that wood blocking has been installed as detailed in the plans and specifications.
 - 4. Make sure that all counterflashing receivers, curbs, etc., are constructed in such a manner as

to provide a minimum 8-inch base flashing height measured from the finished roof's surface to the top of the base flashing membrane.

3.3 INSTALLING THERMAL LAYER

- A. Starting at the low edge of the roof, loose lay thermal layer board.
 - 1. Install boards with long joints continuous.
 - 2. Install with long joints running parallel to the decking.
 - 3. Stagger short joints.
 - 4. Butt joints tightly
 - 5. "Occasional" joint widths up to 1/4" will be allowed. Fill all any widths greater than 1/4" with scrap thermal layer to achieve consistent surface.
 - 6. Use tapered insulation panels in areas requiring slope to achieve a minimum slope of 1/4" per foot, and where required to redirect drainage.
 - 7. Use 1" thick boards to build-up the required thermal layer at the curved roof.
- B. Keep insulation absolutely dry at all times. Discard insulation that contains moisture.
 - 1. Install only as much insulation as can be covered with roofing membrane the same day.
- C. Repair any defects or installation errors prior to next phase of roof system installation

3.4 INSTALLING THERMAL PROTECTIVE LAYER

- A. Starting at the low edge of the roof, mechanically attach using fasteners approved for the specific project.
- B. Starting at the low edge of the roof, mechanical fasten thermal layer board.
 - 1. Install boards with long joints continuous.
 - 2. Install with long joints running parallel to the decking.
 - 3. Stagger short joints.
 - 4. Butt joints tightly.
 - 5. "Occasional" joint widths up to 1/4" will be allowed. Fill all any widths greater than 1/4" with scrap thermal layer to achieve consistent surface.
 - 6. Use tapered insulation panels in areas requiring slope to achieve a minimum slope of 1/4 inch per foot, and where required to redirect drainage.
- C. Fasten at density required to resist expected uplift pressures.
 - 1. Increase fastener density at perimeters and corners in accordance with FM Global Property Loss Prevention Data Sheet 1-29.
 - 2. Install fasteners no closer than 6" to the board edge.
 - 3. Size fasteners for adequate penetration.
- D. Keep insulation absolutely dry at all times. Discard insulation that contains moisture.
 - 1. Install only as much insulation as can be covered with roofing membrane the same day.
- E. Repair any defects or installation errors prior to next phase of roof system installation.

3.5 INSTALLING ROOFING MEMBRANE

- A. Installation Summary
 - 1. Membrane Installation Sequencing (from substrate to uppermost ply)
 - 2. SBS modified, fiberglass, torchable base layer
 - 3. SBS modified, fiberglass, granule surfaced torchable cap layer
 - 4. Securement
 - 5. Thermally activated adhesion, both layers
 - 6. Install the membrane roofing strictly per the manufacturer's printed technical instructions
- B. Substrate
 - 1. Verify that all requirements for examination and preparation have been met before commencing installation
- C. Placing Membrane Layers
 - 1. Start at low edge of the roof deck
 - 2. Apply 1/2 width modified bitumen membrane
 - 3. Apply all subsequent membrane sheets full width

4. End Laps: 6" minimum
 5. Stagger end laps a minimum of 3 feet
 6. Side Laps: 4" minimum
- D. Securing Membrane
1. Install each layer of membrane so that it is firmly and uniformly set, without voids
 2. Installation Precautions
 - a. Ensure even heating and application of membrane as not to damage inner reinforcements. Do not heat substrate under any circumstances.
 3. Equipment
 - a. Accepted torch installation methods are with single-flame hand-held torch or multi-headed "dragon wagon".
 4. Fire Prevention
 - a. Fuel torches from acceptable propane tanks that are fueled and maintained by approved and licensed supplier of industrial gasses.
 - b. Observe all fire regulations and industry precautions. Provide one-hour fire watch at the end of each working session. Fire watch personnel may not be assigned to any other tasks during the one-hour period.
 - c. Provide CERTA training for all torch operators. Have training certificates available for inspection at any time during torch operations.
 5. Installation Procedures
 - a. Keeping membrane in rolled form, position roll with side laps aligned
 - b. Using a propane torch, apply the flame to the surface of the coiled portion of the roll
 - c. Keep the flame directed at the adhered ply and in front of the roll
 - d. Torch across the full width of the roll and along the lap area
 - e. As the surface is heated, it will develop a sheen and the burn-off will disappear. (The generation of smoke is an indication that the material is being overheated)
 - f. Asphalt compound must bleed out past the edge of the sheet by a minimum ¼"
 - g. When membrane compound is prepared for adhesion, roll into position and ensure firm and uniform bearing
 - h. Repeat the operation with subsequent rolls, maintaining proper side laps and end laps
 6. End Laps
 - a. Preparation of the end lap of the cap membrane layer requires scuffing away all loose granules.
 - b. Apply heat to the roll being seamed while making sure both have a good compound flow to adhere the two surfaces
 - c. Check end laps for proper adhesion
 - d. All new installed materials shall be sealed from moisture intrusion at the end of the day.
 7. Quality Control
 - a. All laps must be checked with a round nose trowel to verify proper adhesion.
 - b. Entire roofing membrane must be installed at one time.
- E. Cold Weather (below 50oF) application of Modified Bitumen
1. Modified bitumens require special application techniques when they are being installed in cold weather. The following precautions should be taken when the ambient temperature drops below 50°F (10°C), and are mandatory below 40°F (4°C):
 2. Keep modified bitumen products warm, or warm prior to installation.
 3. Store these materials indoors or in heated storage units or warming boxes. If these facilities are not available, placing the materials in direct sunlight may help.
 4. Make certain that modified bitumen rolls are stored on end only; do not store rolls on their side.
 5. When the conditions are extreme (below 40°F [4°C]):
 - a. Heat the rolls or completely unwind and allow to warm on the roof for 15 to 20 minutes.
 - b. Expose darker side of the sheet to the sunlight to allow to warm.
 - c. The sheet may then be installed using conventional application techniques.

3.6 INSTALLING FLASHING, ACCESSORIES

- A. Temporary Flashings
1. Provide a temporary waterproof seal at all membrane edges, penetrations, drains, etc. Unless complete flashings are installed immediately (same working day) following the membrane application.
- B. Preparation

1. Inspect walls, curb heights, counterflashings, etc., and check for conformance with minimum base flashing height of eight (8").
2. Bring non-conforming areas to the attention of the Owner's Representative for correction.

C. Primer

1. Prepare and prime substrate surfaces per manufacturer's instructions.
2. Follow manufacturer's recommendations for required temperature of substrate and materials, and for filling of voids.
3. Prime all masonry, metal, or concrete surfaces from the top of the roof membrane to the termination of the flashing level with asphalt primer at the rate of one (1) gallon per 100 square feet or as recommended by the manufacturer.
4. Allow the primer to dry thoroughly.
5. Ensure that bonding surfaces to which the seal or flashing are to be placed are clean and free of moisture, dirt, grease, oil, loose material, foreign material, and debris.

D. Installing Flashings

1. Flashings are critical to the success of the roofing system and flashing conditions vary. In addition to guidelines below, consult manufacturer for general flashing guidelines and project specific flashing design.
2. Provide seals or flashing at penetrations of the roof membrane as required for a watertight roof system, and as indicated on the Drawings, and as approved by the roof system manufacturer for inclusion in the roofing warranty.
3. Install two ply base flashing system using specified modified bitumen sheets at all intersections formed by changes of plane, and wherever curbed roof openings, wall, parapets, or other structure joint penetrates the roof.
4. Install flashing system using thermally activated adhesive.
5. Torch the back coating of each flashing sheet until the backer film disappears and the compound attains a sheen.
6. Place flashing with a firm and uniform bearing. Asphalt compound must bleed out past the edge of the sheet by a minimum 1/4".
7. Use measures to prevent movement or migration of the flashing system while asphalt cures.
8. Add extra mechanical securement, where required.

E. Fluid-Applied Flashing System

1. Based on PermaFlash System. Follow manufacturer's instructions.
2. Lay out reinforcement fabric around penetration and cut to fit. Wrap fabric around penetration and bridge all vertical to horizontal transitions.
3. Apply fluid-applied flashing directly to prepared substrate. Adhere fabric by pressing into the fluid-applied flashing while still wet.
4. Completely cover fabric with at least 60 mil coat wet film thickness of fluid-applied flashing, and as required by the manufacturer.
5. Extend top coat of fluid-applied flashing system 2" beyond edges of reinforcement fabric.

3.7 FIELD QUALITY CONTROL

A. Test Strip (If requested by the Owner)

1. When and where directed by the Owner's Representative, and before surfacing is applied to the completed membrane:
 - a. Cut a strip 3" wide by 40" long thru all plies of the roofing system. Number of such test strips may be as required by the Representative.
 - b. After removal of the strip, immediately repair the area by applying the same number of plies to the same kind of felt and bitumen over the filled strip with the first ply.
 - c. Lap each edge 12" and each succeeding ply lapping the preceding ply by at least 3" on all edges.
 - d. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
 - e. Turn the test strips over to the Authority's Representative for examination.

B. Non-Compliance

1. After all roofing system work is completed, provide an inspection by the roofing system manufacturer's representative. Representative must be employed expressly as a technical employee and not concurrently function in a sales role. Provide, via the representative, documentation verifying that the roofing system has been installed according to the specifications.

3.8 INSPECTION

- A. After all roofing system Work is completed, provide an inspection by the roofing system manufacturer's representative. Representative must be employed expressly as a technical employee and not concurrently function in a sales role. Provide, via the representative, documentation verifying that the roofing system has been installed according to the Specifications.

3.9 CLEANING

- A. Keep newly installed roofing membrane clean and new in appearance under the assumption that all areas of roofing are aesthetically essential. Contractor may be directed to remedy – and if no remedy available – replace, newly roofed areas that are not maintained as such during the balance of installation.
- B. Restore all other building surfaces and areas affected by roofing application to same condition of aforementioned on day of job start.
- C. Remove all debris from roof and staging areas.

END OF SECTION

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

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes flashings and counterflashings, soffits, gutters and downspouts and fabricated sheet metal items, as indicated in Schedule.

1.2 SYSTEM DESCRIPTION

- A. Sheet Metal System: Conform to criteria of SMACNA "Architectural Sheet Metal Manual."
 - 1. Gutters: SMACNA Details.
 - 2. Downspouts: SMACNA Details.
 - 3. Flashings: SMACNA Details.
- B. Gutters and Downspouts: Size components for rainfall intensity determined by storm occurrence of 1 in 10 years in accordance with SMACNA recommendations.
- C. Soffit Panel Systems

1.3 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, termination, and installation details.
- B. Samples: Submit two samples, 1" in size of each type of formed metal flashing illustrating typical seam, external corner, internal corner, material, color, and finish.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 – Sustainable Design Requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with 2017 Florida Building Code.
- B. Maintain one copy of each document on site.

1.6 WARRANTY

- A. Furnish five year manufacturer warranty for finishes.

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

- A. Product Description: Flashing and sheet metal; unfinished or prefinished, including gutters, downspouts, splash pads pans, and accessories. Match existing where applicable.

2.2 COMPONENTS

- A. Lead Sheet: ASTM B749, 2.5 lb/sq ft thick.
- B. Stainless Steel: ASTM A240/240M; Type 304, dead soft fully annealed, 0.050" thick; smooth surface, smooth surface.
- C. Aluminum Sheet Metal: ASTM B209, 5005 or 3003-H14 aluminum alloy as appropriate, 0.050" thick, epoxy coated.

2.3 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.

- B. Gutter and Downspout Anchorage Devices: In accordance with SMACNA requirements.
- C. Gutter Supports: Brackets. Straps.
- D. Downspout Supports: Straps.
- E. Underlayment: ASTM D226; Type II, No. 30 un-perforated asphalt felt.
- F. Protective Backing Paint: Zinc molybdate alkyd. Bituminous.
- G. Slip Sheet: Rosin sized building paper.
- H. Sealant: Exterior metal lap joint butyl or polyisobutylene sealant as specified in Section 07 90 00.

2.4 FABRICATION

- A. Gutter Accessories: Profiled to suit gutters and downspouts.
- B. Gutters and downspouts: Aluminum 0.032
- C. Form components to shape indicated on Drawings, accurate in size, square, and free from distortion or defects. Form pieces in longest practical lengths.
- D. Fabricate cleats and starter strips of same material as sheet, to interlock with sheet.
- E. Hem exposed edges on underside 1/2"; miter and seam corners. Fabricate vertical faces with bottom edge formed outward 1/4" and hemmed to form drip.
- F. Fabricate flashings to allow toe to extend 2" min over roofing material. Return and brake edges.
- G. Form material flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate corners in one piece, 18" long legs; seam for rigidity, seal with sealant.

2.5 SOFFIT PANELS

- A. Basis of Design: Berridge Manufacturing Co. – Berridge L-Panel
- B. Approved Manufacturers
 1. Architectural Metal System
 2. Metal Roof and Wall Systems
 3. Bridgesteel
- C. Panels shall have 11 5/8" exposure with vee groves, 1" deep with concealed fasteners and interlocking sidelap
- D. Panels shall be factory roll formed in continuous lengths and shall have no exposed fasteners.
- E. Attachment to metals supports with #8 x 12" TEKS screws at maximum spacing of 2'-0" on center or per local building code, whichever is greater.
- F. Prefinished metal shall be hot-dipped galvanized ASTM A653-94 Grade C G90 Coating A924-94 24 gauge core steel or prefinished Galvalume 24 gauge core steel ASTM 792-86 AZ-55.
- G. Finish shall be full strength Kynar 500 or Hylar 5000, applied by manufacturer.
- H. Paint finish shall have a twenty (20) year guarantee against cracking, peeling and fade (not to exceed 5 N.B.S. units)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Install starter and edge strips, and cleats.
- B. Install surface mounted reglets. Seal top of reglets with sealant. Insert flashings to form tight fit. Seal flashings into reglets with sealant.
- C. Secure flashings, gutters and downspouts in place using concealed fasteners.
- D. Apply plastic cement compound between metal work and felt flashings.
- E. Fit components tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Slope gutters 1/8" per foot minimum.

END OF SECTION

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**SECTION 07 70 00
FASTENER SCHEDULE**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section is designed to account for most fastening requirements on this project. Where a condition is not covered by this list, the Contractor shall be required to make suitable connections which comply with all codes, recommendations of established agencies (e.g. American Plywood Association) and as otherwise directed by the Architect. The following recommendations shall be adhered to except as otherwise noted in these specifications or drawings. (NOTE: All conditions noted below may not be included on this project.)
- B. Related Sections:
 - 1. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, and Division 1, apply to the work specified in this section.

1.2 GENERAL REQUIREMENTS

- A. All fasteners connecting and/or in contact with pressure treated wood or dissimilar metals shall be stainless steel. No exceptions.

PART 2 - PRODUCTS

2.1 STRUCTURAL FASTENERS

- A. Manufacturers:
 - 1. Tapcon.
 - 2. Hilti.
 - 3. Substitutions: Approved equal permitted prior to bid.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. For fastening wood to:
 - 1. Structural concrete and precast concrete: Countersunk, flat head, threaded, selftapping masonry screws (Design basis is Tapcon), at 4" o.c., staggered.
 - 2. Metal: Countersunk, flat head, No. 10 self tapping, self drilling, metal screws, at 4" o.c., staggered. (Utilize appropriate size bolt and nut where possible).
 - 3. Wood: Annular thread nails, 3/8" round heads at 4" o.c., staggered.
 - 4. For anchorage of wood sleepers at HVAC units to wood: 1/2" lag bolts, countersunk at 12" o.c.
 - 5. Plywood: Annular thread nails, 3/8" round heads at 8" o.c. staggered.
(NOTE: All fasteners and anchorages to be non-corrosive metal (galvanized, aluminum or stainless steel) or with a hot-dip zinc coating (ASTM A 153), and penetrate the substrate 1" minimum).
- B. For fastening plywood to:
 - 1. Masonry: Self-tapping flat head, countersunk 1/4" masonry screws (Tapcon) at 8" o.c. on 24" vertical row centers, 12" o.c. at perimeters.
 - 2. Tectum: 1/4" stainless steel toggle bolts with countersunk heads and 2" washers, 1 fastener per 4 s.f.
 - 3. Wood Blocking: Annular thread nails, 3/8" round heads at 8" o.c. staggered.
 - 4. All plywood shall be secured in conformance with APA requirements.
- C. For fastening termination bars and surface mounted metal counterflashing to:
 - 1. Concrete, masonry or brick: 3/16" diameter "Tapcons" with hex head 8" o.c.
 - 2. Wood: #10 stainless steel round head wood screws at 8" o.c.
 - 3. Metal: #10 stainless steel self drilling, self tapping, sheet metal screws at 8" o.c. (Fastener of same basic metal as the fastened metal).
(NOTE: Use fasteners made of same basic metal as the fastened metal, or other non corrosive metal as recommended by SMACNA manual. Match finish of exposed heads with material being fastened. All fasteners shall penetrate substrate 1" minimum and have metal backed neoprene washers where exposed).

- D. For fastening sheet metal to:
1. Concrete, masonry or brick (unexposed): Drive pins at 4" o.c. staggered.
 2. Concrete, masonry or brick (exposed): 3/16" Tapcons at 4" o.c.
 3. Wood Blocking: 6d annular ring nails with 3/8" diameter heads, 4" o.c., staggered.
 4. Metal: Stainless steel, self tapping, self drilling, sheet metal screws at 4" o.c., staggered.
(NOTE: Use fasteners made of same basic metal as the fastened metal, or other noncorrosive metal as recommended by SMACNA Manual. Match finish of exposed heads with material being fastened. All fasteners shall penetrate substrate 1" minimum and have metal backed neoprene washers where exposed).
- E. For fastening existing vents, exhaust fans, skylights to:
1. Wood Curbs: #10 stainless steel round head wood screws with metal backed neoprene washer through the existing hole.
- F. For fastening elastic sheet roofing and/or flashing to:
1. Metal Deck: Fasteners as approved by the elastic sheet roofing manufacturer. Include 2" diameter, 22 gauge stainless steel plates.
 2. Wood Blocking: 6d common nail through 1" diameter metal disc (Except as otherwise prescribed by the elastic sheet roofing manufacturer). Nails and discs to be of non-corrosive material (galvanized, aluminum, copper, or stainless steel).
- G. For fastening insulation to metal deck:
1. Fasteners as approved by elastic sheet roofing manufacturer. Minimum holding power: 200 lbs. per fastener; fasteners to have anticorrosive coating.
- H. For fastening blocking to existing fan curbs:
1. #10 common finish, flat head, sheet metal screws, countersunk at 8" o.c.
 2. Wood Curbs: Nail at 8" o.c. to penetrate curb 1".

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.

1.2 SUBMITTALS

- A. Product Data: Submit data on product characteristics, performance and limitation criteria.
- B. Design Data: Provide schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 – Sustainable Design Requirements.

1.4 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10" water gage minimum positive water 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 and Roof 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.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof 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.
- C. 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" water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- D. Fire Resistant Joint Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10" water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Perform Work in accordance with all Local, State and Federal Requirements.
- G. Installer Qualifications:
 - 1. Completed through-penetration firestop systems similar in material and design.
 - 2. Established a record of successful in-service construction performance.
 - 3. Possess necessary experience, staff and training to install manufacturer's products.
 - 4. Qualification is not implied by manufacturer willingness to sell products to the Contractor.
- H. Maintain one copy of each document on site.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when temperature of substrate material and ambient air is below 60°F.
- B. Maintain this minimum temperature before, during, and minimum 3 days after installation of materials.
- C. Provide ventilation in areas to receive solvent cured materials.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver through-penetration firestop system products to the Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.
- B. Store and handle material for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.

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: Approved equal permitted prior to bid.
- 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. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
 - a. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
 - 2. Foam Firestopping Compounds: Single or Multiple component foam compound.
 - 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 - 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
 - 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fibers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 - 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 - 7. Firestop Pillows: Formed mineral fiber pillows.
- C. Color: As selected from manufacturer's full range of colors.

2.2 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces.
- B. Dam Material: Permanent:
 - 1. Mineral fiberboard
 - 2. Mineral fiber matting
 - 3. Sheet metal
 - 4. Plywood or particle board

- a. Interior Composite Wood and Agrifiber Products: Contain no added urea-formaldehyde resins.
- 5. Alumina silicate fire board
- C. Installation Accessories: 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. Verify openings are ready to receive work of this section.

3.2 PREPARATION

- A. Clean substrate surfaces of matter effecting bond of firestopping material.
- B. Install backing materials to arrest liquid material leakage.

3.3 APPLICATION

- A. Apply primer where recommended by manufacturer for specific material and substrate.
- B. Apply firestopping material in sufficient thickness to achieve required fire rating, to uniform density and texture.
- C. Install material at walls or partition openings containing penetrating sleeves, piping, duct work, conduit and other items, requiring firestopping.
- D. Remove dam material after firestopping material has cured.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. The word: "Warning-Through-Penetration Firestop System – Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION

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**SECTION 07 90 00
JOINT PROTECTION**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes sealants and joint backing.

1.2 SUBMITTALS

- A. Product Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 – Sustainable Design Requirements.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications:

1. Sealant/caulking contractor and job foreman shall have a minimum of 5 years experience installing sealants and caulking.

B. Compatibility with Substrate:

1. Applicator shall be responsible for verifying that sealants and caulking used are compatible with joint substances.

C. Mock-Ups:

1. The contractor may be required, at the owner's option, to install sealants and caulking in mock-ups prepared by other trades in order to demonstrate appearance and workmanship technique. Any mock-ups shall be done by those personnel who will be assigned to the project, using materials and techniques which will be used on the project.

D. Joint Tolerance:

1. Joint width/depth ratios are critical to sealant and caulking performance. Compliance with the manufacturer's limitation is required.

E. Manufacturer:

1. The manufacturer of the sealant and caulking used shall have been in the business of manufacturing the specified types of such sealants and caulking for not less than 10 years.

F. Preconstruction Field-Adhesion Testing: Before installing sealant, field test the sealant adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct a minimum of two (2) field tests for each type of sealant and joint substrate indicated. Perform additional tests as necessary If required by the sealant manufacturer.
 - a. For window and door metal that is not yet installed, a sample of the product may be acquired to test for adhesion with the sealants and/or waterproofing materials that will be used in construction.
3. Notify Owner and Architect seven days in advance of dates and times when sealant joint tests will be performed. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
4. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - b. Install joint sealants in 5-foot joint lengths using same materials and methods required for joint preparation and joint sealant installation required for completed work. Allow sealants to cure fully before testing.
 - c. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed 2 vertical cuts approximately 2" long at side of joint and meeting horizontal cut at of 2" cuts. Place a mark 1" from top of 2" piece.

- d. Use fingers to grasp 2" piece of sealant just above 1" mark; pull firmly down at a 90° angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive compatibility, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
- 5. Provide a written report to document whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
- 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.6 PRODUCT DELIVERY AND STORAGE:

- A. Delivery shall be in the manufacturer's original unopened container, clearly identifying each product specified, relating it to the product literature submitted. Storage shall be in accord with manufacturer's recommendation, with proper precautions concerning shelf life, temperature, humidity and similar factors ensuring the fitness of the material when installed.

1.7 GUARANTEE:

- A. Sealant joints shall be guaranteed against adhesive and cohesive failure of the sealant and against water penetration through the sealed joint for 5 years. Both the contractor and the sealant/caulking contractor shall sign the guarantee. Manufacturer shall warrant the joint sealer materials and shall furnish such warranty to the architect.

PART 2 - PRODUCTS

2.1 JOINT SEALERS

- A. Manufacturers:
 - 1. Dow Corning Corp.
 - 2. GE Silicones.
 - 3. Pecora Corp.
 - 4. Sika Corp.
 - 5. Tremco Sealants & Waterproofing.
 - 6. Substitutions: Approved equal permitted prior to bid.

2.2 MATERIALS, GENERAL

- A. Compatibility:
 - 1. Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors
 - 1. Provide color of exposed joint sealers as selected by Architect from manufacturer's standard colors.

2.3 MATERIALS

- A. Exterior Sealant:
 - 1. Type: Low dirt pick-up, non-staining, medium-modulus, one-component, pre-pigmented, neutral-cure elastomeric silicone sealant;
 - a. Compliance:
 - 1) Sealant shall meet or exceed requirements of ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A and O.
 - b. Acceptable Products:

- 1) Dow Corning 756 SMS Building Sealant (20 yr non-stain warranty.)
2. Type: Medium-modulus, one-component, pre-pigmented, neutral-cure elastomeric silicone sealant;
 - a. Compliance: Sealant shall meet or exceed requirements of ASTM C920, Type S, Grade NS, Class 50, Use NT G, M, A, and O.
 - b. Acceptable Products:
 - 1) Dow Corning® 795 Silicone Building Sealant (20 yr warranty)
 - 2) Dow Corning® 790 Silicone Building Sealant (20 yr warranty)
 - 3) Dow Corning® 791 Silicone Weatherproofing Sealant (20 yr warranty)
 - 4) Pecora 890/895
 - 5) Tremco, Spectrem 1/2.
- B. Floor Joint Sealant:
 1. ASTM C-920-79, Type S, Class 25, Grade P; TT-S-230(c), Class A, Type I; one component, self-leveling, polyurethane or polysulfide sealant, Shore A hardness greater than 35, joint movement range of $\leq 25\%$:
 - a. Acceptable Products:
 - 1) Pecora - NR 200
 - 2) Mameco - Vulkem 245
 - 3) Sika - Sikaflex 2CSL
 - 4) Architect approved equal prior to bid.
- C. Sealants in Wet Areas:
 1. ASTM C-920-TS, Type S, Class 25, Grade NS; TT-S-1543 (a), Class A; one component, non-sag, mildew resistant, silicone sealant, Shore A hardness of 25-30.
 - a. Acceptable Product:
 - 1) Dow Corning - 786
 - 2) General Electric - Sanitary Sealant 1700
 - 3) Architect approved equal prior to bid.
- D. Caulking:
 1. ASTM C-834-76 one component acrylic latex caulking, minimum 75% recovery per ASTM C-736-82. (For interior, non-structural applications not subject to any moisture contact and not used to separate conditioned environments from non-conditioned atmospheres.)
 - a. Acceptable Products:
 - 1) Pecora - AC-20
 - 2) Sonneborn - Sonolac
 - 3) Tremco - Acrylic-Latex
 - 4) Architect approved equal prior to bid.
- E. Primer:
 1. Primer shall be used in accord with manufacturer's instructions, with all primers being applied prior to the installation of any backer rod or bond breaker tape. Manufacturer shall be consulted for all surfaces not specifically covered in submittal application instructions. If a stain-type primer is used, apply material in a manner that will prevent exposed stain residue related to application procedures.
- F. Backer Rod:
 1. Shall be open or closed cell polyethylene or polyurethane as recommended by the sealant manufacturer.
 - a. Acceptable Manufacturers:
 - 1) ITP
 - 2) Dow-Ethnafoam
 - 3) Hercules
 - 4) Nomaco
 - 5) Architect approved equal prior to bid.
- G. Bond Breaker Tape:
 1. An acceptable polyethylene or similar type bond breaker tape shall be used to prevent three-sided adhesion in locations where backer rod cannot be used.

2.4 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

1. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
- 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 D1565, open cell PVC D1667, closed cell PVC; oversized 30 to 50 percent larger than joint width; manufactured by.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate surfaces and joint openings are ready to receive work.
- B. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C1193.

3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C1193.
- B. Perform acoustical sealant application work in accordance with ASTM C919.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

END OF SECTION

**SECTION 08 11 00
STEEL DOORS AND FRAMES**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Standard steel doors.
 - 2. Steel door frames.
 - 3. Sidelight frames with glass stops.
 - 4. Frames with glass stops.
 - 5. Stick component assemblies.

- B. Related Work Specified Elsewhere:
 - 1. Grouting: Section 04 81 00 - Unit Masonry Assemblies.
 - 2. Steel lintels: Section 05 12 00 – Structural Steel
 - 3. Metal Framing: Section 05 40 00 Cold Formed Metal Framing.
 - 3. Caulking: Section 07 90 00 - Joint Sealers.
 - 4. Wood doors: Section 08 21 00 - Wood Doors.
 - 5. Finish hardware: Section 08 71 00 - Door Hardware.
 - 6. Glass and glazing: Section 08 80 00 - Glazing.
 - 7. Field painting: Section 09 90 00 - Paints and Coatings.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - A 366/A 366M -Steel, Carbon, Cold-Rolled Sheet, Commercial Quality
 - A 525 -General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural
 - E 152 -Fire Tests of Door Assemblies

- B. National Fire Protection Association (NFPA)
 - 80 -Fire Doors and Windows
 - 101 -Safety to Life from Fire in Buildings and Structures

- C. Steel Door Institute (SDI)
 - ANSI /SDI-100 -Recommended Specifications Standard Steel Doors and Frames

- D. American Society of Civil Engineers (ASCE)
 - ASCE 7-98

1.03 SUBMITTALS

- A. Shop Drawings: Include following:
 - 1. Each type of door and frame.
 - 2. Frame conditions.
 - 3. Anchorage details.
 - 4. Suitable schedules covering doors and frames.
 - 5. Show glass opening sizes and locations in doors.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver to site in manufacturer's original packaging.
 - 2. Tag or mark each unit indicating exact location where unit is to be installed.

- B. Storage:
 - 1. Store doors and frames under cover, off floor, in dry space.
 - 2. Store doors upright with 1/4-inch minimum air space between.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Equal to Curries, 707 Series interior doors, 747 Series exterior doors as applicable. Acceptable alternate Manufacture CECO Legion & Medallion as applicable.

2.02 MATERIALS

- A. Interior: Cold rolled, stretcher level steel, conforming to ASTM A 366.
- B. Exterior: Galvanized steel conforming to ASTM A 525.
- C. Coating Materials: Manufacturer's standard rust inhibitive primer.
- D. Core Filler Material: Manufacturer's standard material.
- E. Anchors, Fasteners and Accessories: Manufacturer's standard.

2.03 FABRICATION

- A. General:
 - 1. Fabricate doors and frames to be rigid, neat in appearance and free from defects, warp, or buckle.
 - 2. Accurately form metal to required sizes and profiles, including astragals.
 - 3. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site.
 - 4. Grind and dress exposed welds to form smooth, flush surfaces.
 - 5. Do not use metallic filler to conceal manufacturing defects.
- B. Doors:
 - 1. Interior Doors: Form face sheets of 18 gauge steel.
 - 2. Exterior Doors: Form face sheets of 16 gauge steel, A60 galvanized.
 - 3. Type: Flush type with smooth flush surfaces without any visible joints or seams on exposed faces.
 - a. Exterior: Seamless- continuous weld, grind smooth, fill and touch-up paint.
 - b. Interior: Seamless- tack-weld, grind smooth, fill and touch-up paint.
 - 4. Core:
 - a. Interior Doors: One of following:
 - (1) Stiffen face sheet with continuous formed vertical steel sections over full thickness of interior space between door faces.
 - (2) Fill spaces between stiffeners with core material.
 - b. Exterior Doors:
 - (1) Internally reinforced for surface mounted hardware and cut-out, drilled and tapped to receive mortised hardware. Insulate, and stiffen with polyurethane core laminated to inside faces of panels.
 - (2) R Value: 10.0 minimum.

5. Join door faces at vertical edge by mechanically interlocking.
 6. Leave seams invisible or weld, fill and grind smooth.
 7. Treat interior surfaces with sound deadening material to eliminate metallic ring.
 8. Close top and bottom edges of doors with steel channel, minimum 16 gauge, extending full width of door and spot welded to both faces.
 9. Provide flush top condition for exterior doors to form weather seal.
 10. Glazing Beads:
 - a. Manufacturer's standard snap on type with mitered corners.
 - b. Form beads of minimum 20 gauge metal, pre-fitted for field glazing.
 - c. Locate beads on inside of opening.
 - d. Locate screws within 1 inch of end of beads and spaced not more than 8 inches apart.
- C. Frames:
1. Provide frames for doors, transoms, sidelights, interior glazed panels and other openings.
 2. Type: Welded.
 - a. Exterior frames: 14-gauge minimum.
 - b. Interior frames: 16-gauge minimum.
 - c. Weld frames to form rigid, neat, square, and true units, free of defects, warp, or buckle.
 - d. Close corner joints tight with trim faces mitered and continuously welded and ground smooth, or weld mitered joints on interior side.
 - e. Weld temporary steel brace to both feet of jambs to serve as brace during shipping and handling or strap frames of welded units in pairs with heads inverted for bracing during shipping.
 - f. Integrally reinforce head assemblies of frames wider than 4 feet with 18-gauge channel section.
 3. Type of Stops:
 - a. Integral stops at door frames.
 - b. Applied stops for glazing.
 4. Anchors:
 - a. Jamb Anchors: Manufacturer's standard for type of wall construction and/or as shown on drawings.
 - b. Secure a metal clip angle at bottom of each jamb member for anchoring to floor.
 5. Dust Cover Boxes: Minimum 26 gauge at hardware mortises.
- D. Edge Clearances:
1. Between doors and frames at head and jamb: One-eighth inch.
 2. Sills without thresholds: Three-fourths inch maximum.
 3. Sill with thresholds: One-fourth inch maximum between threshold and door.
 4. Between meeting edges of pairs of doors: One-eighth inch.
- E. Preparation for Hardware:
1. Reinforce, drill, and tap doors and frames for fully templated mortised hardware.
 2. Reinforce doors and frames with plates for surface mounted hardware.
 3. Prepare at point of manufacture for installation of template hardware.
 4. Minimum gauge for hardware reinforcement: Twelve gauge.

2.04 FINISHES

- A. Dress tool marks and surface imperfections to smooth surfaces and remove irregularities.

- B. Chemically treat and clean doors and frames.
- C. Interior: Apply manufacturer's standard prime coating.
- D. Exterior: Galvanized, 1.25 ounce per square foot.

2.05 MISCELLANEOUS

- A. Glazing Stops: Manufacturer's standard, 20-gage steel.
- B. Fixed Windows: Same construction as door frame and glazing stop.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Check that surfaces to contact frames are free of debris.
- B. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Exercise care in setting of frames to maintain scheduled dimensions, hold head level, and maintain jambs plumb and square.
- B. Anchorage:
 - 1. Secure anchorages to adjacent construction.
 - 2. Minimum Number of Anchors: Three anchors per jamb.
- C. Frames:
 - 1. Attach frames square, plumb, and true to line with adjacent construction.
 - 2. Leave frame spreader intact until frames are set.
- D. Doors:
 - 1. Conform to Steel Door Institute specification SDI - 100.
 - 2. Apply hardware prior to finish painting, with exception of prime coated items; tag, box, and reinstall after finish painting is completed.

3.03 TOUCH UP, ADJUSTMENT, CLEANING AND PROTECTION

- A. After erection sand areas smooth where prime coat has been damaged and touch up with same primer as applied at shop.
- B. Remove rust before touch up paint is applied. Remove dirt and excess sealants or glazing compound from exposed surfaces.
- C. Adjust moving parts for smooth operation.
- D. Protect installed work against damage.

End of Section

**SECTION 08 14 16
FLUSH WOOD DOORS**

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes factory finished flush wood doors and transom panels; flush and flush glazed configuration with louvers; fire rated and non-rated.
- B. Related Requirements:
 - 1. Section 08 12 14 - Standard Steel Frames.
 - 2. Section 08 71 00 - Door Hardware.
 - 3. Section 08 80 00 - Glazing.
 - 4. Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A135.4 - Basic Hardboard.
- B. ASTM International:
 - 1. ASTM E413 - Classification for Rating Sound Insulation.
- C. Architectural Woodwork Institute:
 - 1. AWI - Quality Standards Illustrated.
- D. Forest Stewardship Council:
 - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- E. Hardwood Plywood and Veneer Association:
 - 1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- F. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.
- G. National Electrical Manufacturers Association:
 - 1. NEMA LD 3 - High Pressure Decorative Laminates.
- H. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.
 - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- I. South Coast Air Quality Management District:
 - 1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.
- J. Underwriters Laboratories Inc.:
 - 1. UL - Building Materials Directory.
 - 2. UL 10B - Fire Tests of Door Assemblies.
 - 3. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 - 4. UL 1784 - Air Leakage Tests of Door Assemblies.

1.3 COORDINATION

- A. Coordinate Work with door opening construction, door frame and door hardware installation.
- B. Contractor shall prep doors to receive Access Control wiring and/or hardware per Section 08 71 00 – Door Hardware and Section 28 13 00 – Security Access Control.

1.4 SUBMITTALS

- A. Section 01 33 00 – SUBMITTALS

- B. 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.
- C. Product Data: Submit information on door core materials and construction, and on veneer species, type and characteristics.
- D. Samples:
 - 1. Submit two samples of factory finished door veneer, 6x6 inch in size illustrating full range of wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Submit special installation instructions.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with AWI Quality Standard Section 1300, Premium.
- B. Finish doors in accordance with AWI Quality Standard Section 1500.
- C. Fire Rated Door Construction: Conform to NFPA 252.
- D. Installed Fire Rated Door and Panel Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.
- E. Smoke and Draft Control Doors: Tested in accordance with UL 1784 and installed in accordance with NFPA 105.
 - 1. Air Leakage: Maximum 3.0 cfm/sf of door opening with 0.10" water gage pressure differential.
- F. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
 - 1. Indicate temperature rise rating for stair doors.
 - 2. Attach smoke label to smoke and draft control doors.
- G. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

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

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer when stored more than one week.
 - 1. Break seal on site to permit ventilation.

1.9 WARRANTY

- A. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
- B. Furnish manufacturer's "Life of Installation" warranty for interior doors.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS

- A. Manufacturers:
 - 1. Algoma Hardwoods Inc.
 - 2. Eggers Industries
 - 3. Marshfield Door Systems
 - 4. Mohawk Flush Doors, Inc.

5. Graham Doors
6. Substitutions: Approved equal permitted prior to bid.

- B. Product Description: Solid core flush wood doors; wood veneer facing material; fire rated and non-rated types; flush glazed design; without louvers; factory pre-fit; shop finished; wood doors.
1. Flush Interior Doors: 1-3/4" thick; solid hollow core, five ply construction, fire rated as indicated on Drawings.
 2. Transom Panels: To match door, face veneer to end match, fire rated, as indicated on Drawings.

2.2 COMPONENTS

- A. Solid Core, Non-Rated: AWI Section 1300, Type PC – Particleboard.
1. Interior Composite Wood Products: Contain no added urea-formaldehyde resins.
- B. Solid Core, Fire Rated: AWI Section 1300.
- C. Interior Veneer Facing: AWI Premium quality wood, plain sliced with balanced match finish. Pair match multiple door leaves in single opening.
1. Wood: Cherry.

2.3 ACCESSORIES

- A. Glazing Stops: Wood, of same species as door facing wood.

2.4 FABRICATION

- A. Fabricate doors in accordance with AWI Quality Standards requirements.
- B. Astragals for Fire Rated Double Doors: Steel, Treated wood, T shaped, overlapping and recessed at face edge at mid-door thickness, specifically for double doors.
- C. Furnish lock blocks at lock edge and top of door for closer for hardware reinforcement.
- D. Vertical Exposed Edge of Stiles: Of same species as veneer facing for paint transparent finish.
- E. Fit door edge trim to edge of stiles after applying veneer facing.
- F. Bond edge banding to cores.
- G. 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.
- H. Factory fit doors for frame opening dimensions identified on shop drawings.
- I. Provide edge clearances in accordance with AWI 1300.

2.5 FACTORY FINISHING

- A. Factory finish doors in accordance with Architect approved sample. Provide the complete line of pre-finished stain samples.
- B. Seal door top and bottom edge with color sealer to match door facing.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install doors in accordance with AWI Quality Standards requirements.
- B. Trim non-rated door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to maximum of $\frac{3}{4}$ ".
 - 1. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- D. Machine cut doors for hardware installation.
- E. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.
- F. Install door louvers plumb and level.
- G. Coordinate installation of glass and glazing specified in Section 08 80 00.

3.3 INSTALLATION TOLERANCES

- A. Maximum Diagonal Distortion (Warp): $\frac{1}{8}$ " measured with straight edge or taut string, corner to corner, over imaginary 36 x 84" surface area.
- B. Maximum Vertical Distortion (Bow): $\frac{1}{8}$ " measured with straight edge or taut string, top to bottom, over imaginary 36 x 84" surface area.
- C. Maximum Width Distortion (Cup): $\frac{1}{8}$ " measured with straight edge or taut string, edge to edge, over imaginary 36 x 84" surface area.

3.4 ADJUSTING

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

END OF SECTION

**SECTION 08 31 13
ACCESS DOORS AND PANELS**

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes fire resistive rated and 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 Sections:
 - 1. Section 09 90 00 - Painting and Coating: Field paint finish.
 - 2. Division 23 - Access doors in ductwork.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.
- C. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
 - 3. NFPA 288 - NFPA 288: Standard Method of Fire Tests of Floor Fire Door Assemblies Installed Horizontally in Fire Resistance-Rated Floor Systems.
- D. Underwriters Laboratories Inc.:
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 263 - Standard for Safety for Fire Tests of Building Construction and Materials.

1.3 SUBMITTALS

- A. Section 01 33 00 – Submittals
- B. Shop Drawings: Indicate exact position of access door units.
- C. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.
- D. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of access units.

1.6 QUALITY ASSURANCE

- A. Fire Rated Access Door Construction: Conform to one of the following:
 - 1. Wall Access Doors: NFPA 252 or UL 10B.
 - 2. Ceiling Access Doors: ASTM E119 or UL 263.
- B. Installed Fire Rated Access Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.
- C. Attach label from agency approved by authority having jurisdiction to identify each fire rated access door.

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

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified with minimum three years documented experience, and with service facilities within 100 miles of Project.

1.8 COORDINATION

- A. 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. J. L. Industries. Model.
 2. Karp Associates, Inc. Model.
 3. Milcor LTD, Partnership. Model.
 4. Nystrom Products Co. Model.
 5. Substitutions: Approved equal permitted prior to bid.
- B. Stainless Steel Flush Framed, Gasketed Access Doors (Type 1): Frames and nominal 1" wide exposed flanges of 16 gage steel and door panels of 14 gage steel. For fire rated assemblies, provide self closing and latching doors with keyed lock to match cylinders specified in Section 08 71 00.

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° steel hinges.
 2. Lock: Self-latching lock. Screw driver slot for quarter turn cam lock Removable wrench lift handle.
- C. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.3 SHOP FINISHING

- A. Type 304 Stainless Steel.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify rough openings for access doors and panels are correctly sized and located.

3.2 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.
- C. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

END OF SECTION

SECTION 08 41 13
ENTRANCES AND STOREFRONTS *Preface*

DESCRIPTION

- A. Work Included as indicated on the drawings and elsewhere in these Specifications: Architectural Aluminum Storefront Systems and associated entrances, interior and exterior, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units. See below for general Summary. For See Part 2- Products for the College Standards for Basis of Design.
1. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.
 2. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.
- B. See drawings and specifications, in addition to following general summary indicated below, where scope includes work within new Addition as well as Existing Building V, and removal of existing and possibly refurbishment for reinstallation of existing:
1. Storefront Systems, Exterior Architectural Aluminum, Base Bid approx description:
 - a. New Addition Base Bid includes one (1) 6'Wx6'H panels / 3 horizontal x 3 vertical lites in clerestory area, plus twenty-three (23) nominal 10'Wx6'H panels / 5 horizontal x 3 vertical lites including clerestory area, plus one same width panel with single storefront door (Door 120A), plus one same width panel with pair of storefront doors (Door 112A); plus 4 triangular panels, approx 10' width; plus pair of storefront doors with narrow sidelite (Door 112A) RO approx 6'-10".
 - b. Existing Building V Base Bid includes removing existing system.
 2. Storefront Systems, Interior Architectural Aluminum, Base Bid approx description:
 - a. New Addition Base Bid includes: Interior Storefront along two sides of Director's Office (with Wood Doors, not storefront entrance doors); and Interior Storefront at Bookstore for entrance pair of doors (see also Item 3 below regarding existing entrance system Option for Bookstore); East-West storefront adjacent to Bookstore entrance 119/A identified in 4 below is to receive a perforated metal panel, installed under this Work; see Div 05 Metal Fabrication, C1/A301, A1/A301.
 - b. Existing building Base Bid includes: modifying existing system at Bookstore to replace one pair of doors with two pairs of doors and providing new at pairs of doors (two locations) from new Community, to Activity Center.
 3. Entrance Doors, Exterior, Base Bid approx description:
 - a. Single Door in Addition west wall & in Existing (referenced in 1.b).
 - b. Two pairs in Addition; one (1) on west wall; one (1) on north wall is to be ADA accessible/push-button actuated operable systems.
Contractor Option: One of the two pairs can be relocated existing doors (and if feasible relocate the exterior storefront panel in which the doors located).
 4. Entrance Doors, Interior, Base Bid approx description: in Addition consisting of two (2) new pairs of doors at Bookstore entrance [Contractor Option: Relocate existing pair from existing location at Bookstore V0119E to new location at new Bookstore, including relocating hardware]; in Existing Building, two new pairs replacing existing at new Community, and two relocated existing pairs.
 5. Door Hardware specified under 08 71 00 to be coordinated by Contractor to provide functionality required by the owner, while maintaining the Warranty of the Storefront Manufacturer. Doors to be relocated would include relocating existing hardware, except that sweeps and weatherstripping inserts replaced.

Modifications to College Project General Requirements Standards Section 08 41 13:

PART 1 - GENERAL

1.2 SUMMARY

B. Related Sections:

Modify:

- ~~3. 10 71 13 – Exterior Sun Control Devices~~ “Glazing requirements for Perforated Panel insert identified in above section 1.01 B, 2, 2 is provided in Section 05 50 00 Metal Fabrications.”

Add:

5. 05 12 00 - Miscellaneous steel supports and bracing
6. 06 10 00 – Rough Carpentry for wood blocking
7. 08 42 29 – Swinging Automatic Entrances
8. 08 71 00 – Door Hardware for hardware to the extent not specified herein.
Note: Hardware requirements relative to Entrances and Storefront; Hardware not specified within the Door Hardware specifications section 08 71 00 and shown in Storefront Section 08 41 13 still required to be of the same Owner performance criteria and to be coordinated by Contractor.

1.4 PERFORMANCE REQUIREMENTS

A. Storefront System Performance Requirements, Item 1:

Modify last sentence to read:

“The design pressures are to be based on the Florida Building Code, current Edition.”

Add new subsection:

B. Entrance Performance Requirements:

1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures of +41 lbs./sq. ft. inward and -54 lbs./sq. ft. outward. The design pressures are to be based on the Florida Building Code, current Edition.
2. Air Infiltration: Test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 1.57 psf (75 PA) for single and pairs of doors. A single 3'0" x 7'0" (915 mm x 2134 mm) entrance door and frame shall not exceed 1.0 cfm/ft². A pair of 6'0" x 7'0" (1830 mm x 2134 mm) entrance doors and frame shall not exceed 1.0 cfm/ft².
3. Structural Performance: Corner strength shall be tested per the Kawneer dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity [Testing procedure and certified test results available upon request].

1.5 SUBMITTALS

G. Other Action Submittals:

Replace:

- ~~1. Entrance Door Hardware: See Section 08 71 400~~

With

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of Architectural Hardware Consultant via supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

PART 2 - PRODUCTS

2.5 ENTRANCE DOOR SYSTEM

Replace subsection "A" with the following:

- A. Entrance Doors are to match existing door pairs. Basis of Design: Kawneer Company 500 Swing Door, Wide Stile (5" vertical stile and top rail, 6 1/2" bottom rail, 1 3/4" depth, high traffic application), single acting; Paneline EL where Access Control System specified.
1. Stiles and Rails: Extruded aluminum hollow tubes, 0.125-inch (minimum) wall thickness.
 2. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (29 mm) long fillet welds inside and outside of all four corners, or by means of dove tailed type clips and 3/8-inch diameter cadmium plated steel tension rods running full length of rails and secured with tension plates and lock nuts.
 3. Accurately fit and secure joints and corners. Make joints hairline in appearance.
 4. Prepare components with internal reinforcement for door hardware.
 5. Arrange fasteners and attachments to conceal from view.
 6. Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufacturer's drawings and details.
 7. Provide 12-inch wide intermediate horizontal rail located at exit device mounting height with doors specified to receive exit devices; Paneline EL where Access Control System specified.
 8. Glazing Beads:
 - a. Aluminum extrusions, 0.050-inch (minimum) wall thickness, square type.
 - b. Interior: Snap-in type.
 - c. Exterior: Theft proof snap-in type or fixed type.
 - d. Provide with glazing gaskets that shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
 - e. Provide adjustable glass jacks to center the glass in door opening.
 - f. Spacers & Setting Blocks: Manufacturer's standard elastomeric type.
 9. Clearances: As required to suit hardware furnished or as follows:
 - a. Hinge Stile: 1/16-inch (see also Hardware section and below).
 - b. Lock Stile and Top Rail: 1/8-inch.
 - c. Bottom Rail: 3/16-inch.
 - d. Bevel: 1/8-inch at lock and hinge stiles.

Under 2.5 ENTRANCE DOOR SYSTEM, subsection "B Hardware" add the following:

- B. *General Note regarding Exterior Storefront Hardware: Review products of Section such as requirement for Continuous Hinge, EL at access control location, paneline exit device to accommodate Access Control System, etc.*

Hardware, standard & non-standard*, accounting for and/or providing of same in the fabrication of entrances and frames, to be coordinated with Section 08 71 00 Hardware providing College Standards for Access Control Entrance Hardware, Hinges, Locks, Latches, etc.:

1. Weather-stripping:
 - a. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
 - b. The door weathering on continuous or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.

2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).
3. *Continuous Hinge, incl EL Hinge for access control.
4. *Exit Device: Kawneer Paneline™ EL
5. *Power supply for Exit Device: SP 1000X (One per pair. Max of 2 doors per power supply) and required for Paneline™ EL.
6. *Power Transfer EPT 2 or 10 as Applicable; one per EL Exit Device required for access control.
7. *Interior push button release.
8. Point to Point wiring diagram as would be required for Kawneer System.

PART 3 – EXECUTION

3.2 INSTALLATION

Add:

- F. Regarding Entrance Door System Installation:
 1. Install level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
 2. Cope ends of thresholds to fit jambs closely; set threshold in bed of sealant for weather tight construction.
 3. Align pivots and hinges so doors swing free and easily without binding and close accurately against stops on frames.
 4. Adjust operable parts for correct function.
 5. Replace or re-hang doors that do not swing or operate freely, or replace/adjust storefront frames impacting operation of the door.

**SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

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: Architectural Aluminum Storefront Systems, interior and exterior, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
- B. Related Sections:
1. 07 90 00 - Joint Protection
 2. 08 80 00 - Glazing
 3. 10 71 13 - Exterior Sun Control Devices
 4. 28 13 00 - Security Access Control

1.3 DEFINITIONS

- A. For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS

- A. Storefront System Performance Requirements:
1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures of +41 lbs./sq. ft. inward and -54 lbs./sq. ft. outward. The design pressures are based on the Florida Building Code; 2014 Edition.
 2. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283. Air Leakage rate shall not exceed 0.06 cfm/ft² (0.3 l/s · m²) at a static air pressure differential of 6.2 psf (300 Pa) with interior seal, or, rate shall not exceed 0.06 cfm/ft² (0.3 l/s · m²) at a static air pressure differential of 1.6 psf (75 Pa) without interior seal. CSA A440 Fixed Rating.
 3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
 4. Uniform Load: A static air design load of 35 psf (1680 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
 5. Seismic: When tested to AAMA 501.4, system must meet design displacement of 0.010 x the story height and ultimate displacement of 1.5 x the design displacement.
 6. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - a. Temperature Change (Range): 0°F (-18°C); 180°F (82°C).
 - b. Test Interior Ambient-Air Temperature: [75°F (24°C)] .
 - c. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.
 7. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
 - a. Glass to Exterior – 38 (STC) and 31 (OITC).
 - b. Glass to Center – 37 (STC) and 30 (OITC).
 - c. Glass to Interior – 38 (STC) and 30 (OITC).
 8. Prep storefront doors and frame systems to receive access control wiring as required in Section 28 13 00 – Security Access Control
 9. Perform ASTM leak test on section of storefront system selected by Owner.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
- C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
- D. Samples for Verification: For aluminum-framed storefront system and components required.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.
- G. Other Action Submittals:
 - 1. Entrance Door Hardware: See Section 08 71 00 - Door Hardware

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements". Do not modify size and dimensional requirements.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".
- F. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- G. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion of the project.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product:
 - 1. Kawneer Company Inc. Trifab™ 451T (Exterior) & Trifab 400™ (Interior)

- B. Acceptable Exterior Products
 1. Kawneer Company Inc., Trifab™ 45-T
 2. YKK AP, YES 45 Series
 3. Old Castle Architectural Products, Series 3000 XT
- C. Acceptable Interior Products
 1. Kawneer Company Inc., Trifab™ 400
 2. YKK AP, YES 40FS Series
 3. Old Castle Architectural Products, Series FG 1000
- D. Substitutions: Refer to Substitutions Section for procedures and submission requirements.

2.2 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070"(1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 STOREFRONT FRAMING SYSTEM

- A. Thermal Barrier
 1. Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
 - a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
- D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
- E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 GLAZING SYSTEM

- A. As specified in Division 08 Section 08 80 00 - Glazing

- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - 1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - a. Color: Black
 - 2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Color: Matching structural sealant.

2.5 ENTRANCE DOOR SYSTEM

- A. Entrance Doors: As specified in Division 08 41 13 Section - Aluminum-Framed Entrances and Storefronts.
- B. Entrance Door Hardware: As specified in Section 08 71 00 - Door Hardware.

2.6 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants".
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

2.7 FABRICATION

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fit joints; make joints flush, hairline and weatherproof.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.

2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 - 1. Fluoropolymer Coating (Color TBD) (70% PVDF AAMA 2605).

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting

performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3" (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.
- B. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
 1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
 - a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
 - b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.2 psf (300 Pa).
- B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 ADJUSTING, CLEANING AND PROTECTION

- A. Clean aluminum surfaces immediately after installing aluminum-framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

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SECTION 08 71 00
DOOR HARDWARE Preface

Modifications to College Project General Requirements Standards Section 08 71 00:

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Add:

- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade

1.2 SUMMARY

A, 2: Note, there are no Sliding Doors on this Project

C. Related Sections:

Revise:

- 4. ~~Div 08 Section "Access Control Hardware"~~
NOTE: This Section 08 71 00 includes Access Control Hardware.

Add:

- 6. Div 06 Section "Millwork" for Cabinet hardware:
- 7. Div 08 Section "Automatic Entrance Operators"
- 8. Hardware for aluminum entrance doors except as scheduled in this section: Section 08 40 00 – Entrances and Storefronts.
Hardware not specified within the Door Hardware specifications and shown in Storefront Section 08 41 13 still required to be of the same Owner performance criteria and to be coordinated by Contractor.

Work specified elsewhere but a part of this section:

- 9. Access Control: Section 28 13 00 – Security Access Control

Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

D. Codes...:

Add after 7:

- a. State Building Code: Florida Building Code, and Florida Accessibility Code, 2017, 6th edition; Florida Fire Protection Code, 2017, 6th edition.

PART 3 – EXECUTION

3.8 DOOR HARDWARE SETS (SCHEDULE):

Add after "A":

Note: Balance of Hardware not indicated on the following pages, and shown in Entrances and Storefront Section 08 41 13 to be coordinated by Contractor to provide functionality required by the Owner, while maintaining the Warranty of the Storefront Manufacturer.

Hardware Sets located at the end of *Project General Requirements Standards Section 08 71 00*

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**SECTION 08 71 00
DOOR HARDWARE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
1. Swinging doors.
 2. Sliding doors.
 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
1. Mechanical door hardware.
 2. Electromechanical door hardware.
 3. Cylinders specified for doors in other sections.
- C. Related Sections:
1. Division 08 Section "Door Hardware Schedule".
 2. Division 08 Section "Hollow Metal Doors and Frames".
 3. Division 08 Section "Flush Wood Doors".
 4. Division 08 Section "Access Control Hardware".
 5. Division 28 Section "Access Control".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 2. ICC/IBC - International Building Code.
 3. NFPA 70 - National Electrical Code.
 4. NFPA 80 - Fire Doors and Windows.
 5. NFPA 101 - Life Safety Code.
 6. NFPA 105 - Installation of Smoke Door Assemblies.
 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:
1. ANSI/BHMA Certified Product Standards - A156 Series
 2. UL10C - Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.

- f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
- 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
 - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
 - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

- F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Five years for exit hardware.
 - 2. Twenty five years for manual surface door closer bodies.
 - 3. Five years for motorized electric latch retraction exit devices.
 - 4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 – PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical & electro-mechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
 - c. Stanley Hardware (ST).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
 1. Manufacturers:
 - a. Bommer Industries (BO).
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
 - c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Data Transfer Hinges: Provide combined electrified power and Ethernet data transfer hinges with Molex™ standardized plug connectors to accommodate Electrified Quick Connect Data Transfer Hinges: Provide combined electrified power and Ethernet data transfer hinges with Molex™ standardized plug connectors to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 1. Data transfer hinges feature two 6-position and two 4-position Molex connectors, 9 multi-strand wires; 2 twisted pairs (26 AWG), 4 straight conductors (28 gauge) and 1 straight conductor (22 AWG) with concealed plug connectors eliminating the need for separate or exposed wiring. Rated 350 mA continuous @ 48 volts DC nominal, the hinge is capable of two PoE wiring configurations:
 - a. Power over Data (5 wire): Power and Data supplied together over the 2 twisted 26 AWG pairs. The 22 AWG conductor is used for the earth ground connection.
 - b. Data with Power over Spares (9 wire): Data over 2 twisted (26 AWG) pairs with Power over spare pairs 94 straight 28 AWG conductors). The 22 Awg conductor is used for earth ground connection.
 2. Manufacturers:
 - a. Securitron (SU) CEPT
 - b. No Substitutions.
- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
 1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.
 2. Manufacturers:
 - a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – PoE Series.

2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 5. Manufacturers:
 - a. Door Controls International (DC).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).

- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - 5. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).

2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA).
 - b. No Substitution.
- C. Cylinders: Original manufacturer cylinders complying with the following:
 - 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 - 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 5. Keyway: Match Facility Standard.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Key locks to Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.
 - 1. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
 - 2. Locks are to be non-handed and fully field reversible.
 - 3. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.2 requirements to 9 million cycles.
 - 4. Manufacturers:
 - a. Sargent Manufacturing (SA) – 10 Line No Substitution.

- B. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA) – 8200 Series No Substitution.
- C. Hurricane and Tornado Resistance Compliance: Mechanical locking and latching devices to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 - 4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 - 1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 - 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 - 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 - 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 - 5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
 - 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 - 7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 - 8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
 12. Hurricane and Tornado Resistance Compliance: Conventional exit devices are to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 80 Series.
 - b. No Substitution.

2.9 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
 4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
 5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC6000 Series.
 - b. Norton Door Controls (NO) - 8500 Series.
 - c. Sargent Manufacturing (SA) - 1431 Series.
 - d. Yale Locks and Hardware (YA) - 3500 Series.

2.10 ARCHITECTURAL TRIM

- A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
 4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Rixson Door Controls (RF).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 1. National Guard Products (NG).
 2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
 3. Reese Enterprises, Inc. (RE).

2.13 POWER SUPPLIES AND DOOR POSITION SWITCHES

- A. Provide Power Supplies, including battery or uninterrupted backup powers supply (UPS) and separately fused surge protection, required for the electrified door hardware, access control equipment, and PoE switches or wireless routers driving the integrated card reader locking devices.

Dual Voltage Boxed Power Supply, UL Class 2 listed, allowing for wire run without the use of conduit from power supply to door.

1. Field selectable dual output, 12 or 24VDC
2. Battery charging circuit independent of output with 1 Amp continuous current output while charging.
3. Remote output for AC failure monitoring
4. Manufacturers: Securitron (SU) CEPT (No Substitutions).

B. Door Position Switches: provide SPST switch to remote monitor door position (closed or open position); concealed (surface only where approved by SJRState Facilities), rated .25 amp @24VDC

1. Manufacturers: Sargent Manufacturing (SA) (No Substitutions)

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in GWB walls where wall stops or other wall mounted hardware located.

- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The Hardware Sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. Manufacturer's Abbreviations:
 1. MK - McKinney
 2. PE - Pemko
 3. RO - Rockwood
 4. SA - Sargent
 5. AD - Adams Rite
 6. RF - Rixson
 7. BM - Besam
 8. SU - Securitron
 9. OT - OTHER

END OF SECTION 08 71 00 SPECIFICATION BODY
Remaining HARDWARE SETS on Following Pages (6 Pages)

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Hardware Sets

Quantity & Item	Model or Item #	Finish Abb	Section
Set: 1.0			
Doors: 100/A [from Entry Hall to sidewalk]			
Description: Ext Alum-Pair (Exits-Auto Operator push-button actuated-Card Access-CR)			
2 Continuous Hinge	CFMxxHD1 PT x door height	PE	08 71 00*
1 Concealed Vert Rod Exit	55 56 AD8410 106 x 862**	US32D SA	08 71 00*
1 Concealed Vert Rod Exit	55 56 AD8410 862	US32D SA	08 71 00*
1 Pair Door Operators	SW200i (surface pair)	689 BM	08 71 13
1 Threshold	2005AV x door width	PE	08 71 00
2 Electric Power Transfer	CEPT	SU	08 71 00*
2 (DPS) Switch	3287	SA	08 71 00*
2 ElectroLynx Harness	QC-C x L.A.R.	MK	08 71 00*
2 ElectroLynx Harness	QC-C1500	MK	08 71 00*
1 Door Switch	Besam	BM	08 71 13
1 Multi-Class Reader	RP40	00	28 13 01
1 Power Supply	BPS-12/24-voltage as required	SU	08 71 00
1 Wiring Diagram		00	28 13 01

Notes:

- 5" wide stile aluminum doors to accommodate exit device trim.
 - Weather seals to be provided by door manufacturer.
 - Provide necessary drop plates and fillers for proper installation of door closers.
 - Exterior doors and hardware to comply with FBC windstorm requirements.
 - Operation: presenting valid credential to reader temporarily retracts exit latches, permitting entry; additionally, once reader temporarily retracts exit latches, push-button actuates automatic operator.
Inside pushbar always permits egress; push-button actuates automatic operator.
- *Coordinate with Entrances and Storefronts
** Is to match existing Keying System

Set: 2.0

Doors: 101/B [Existing, Activity Center to Covered sidewalk]

Description: Exterior Pair, Existing to remain

1 EHW	Existing hardware to remain in Use/No Change	OT
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Notes to Supplier/Installer:

Coordinate with Contractor to ensure that existing hardware functions properly with Door(s).

Set: 3.0

Doors: 101/C [from Existing Building, exit to Courtyard]

Description: Storefront Exterior Aluminum, Single

1 Continuous Hinge	CFMxxHD1 PT x door height	PE	08 71 00*
1 Exit Device	55 56 WS AD8504 x 862**	US32D SA	08 71 00*
1 Door Closer	1431 CPS	EN SA	08 71 00
1 Threshold	2005AV x door width	PE	08 71 00

Notes:

- 5" wide stile aluminum doors to accommodate exit device trim.
 - Weather seals to be provided by door manufacturer.
 - Provide necessary drop plates and fillers for proper installation of door closers.
 - Exterior doors and hardware to comply with FBC windstorm requirements.
Inside lever always permits egress.
- ** CVR Exit Device with 106 Controller is to match existing Keying System

Designed to accommodate future Access Card Reader system but no power to this location at present.

Hardware Sets (Cont.)

Quantity & Item	Model or Item #	Finish	Abb	Section
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Set: 4.0

Doors: 100/B [Storefront Pair, from Viking Hall to west sidewalk]

Description: Storefront Exterior Aluminum Pair (Exit only, Lockset - Card Access - PoE)

2 Continuous Hinge	CFMxxHD1 PT x door height		PE	08 71 00*
1 Exit Device (PoE)	S1-IA-8877 ETMD**	US32D	SA	08 71 00
1 Exit Only Device	HC 55 8810	US32D	SA	08 71 00*
1 Removable Mullion	HCL980	PC	SA	08 71 00
1 Cylinder (for mullion)	41**	US32D	SA	08 71 00
2 Door Closers	1431 CPS	EN	SA	08 71 00
1 ElectroLynx Harness	PoE-CxxxPRJ x L.A.R.		MK	08 71 00*
1 ElectroLynx Harness	PoE-C1500 LAR		MK	08 71 00*
1 Threshold	2005AV x door width		PE	08 71 00
2 Electric Power Transfer	CEPT		SU	08 71 00*
2 (DPS) Switch	3287		SA	08 71 00*
Power Supply	BPS-12/24-voltage as required		SU	08 71 00
1 Wiring Diagram			00	28 13 01

Notes:

- Provide 5" wide stile aluminum doors to accommodate exit device trim.
- Weather seals to be provided by door manufacturer.
- Provide necessary drop plates and fillers for proper installation of door closers.
- Exterior doors and hardware to comply with FBC windstorm requirements.
- Operation: presenting numeric code to reader temporarily unlocks outside trim, permitting entry. Trim is fail secure with key override outside trim. Inside pushbar always permits egress.

*Coordinate with Entrances and Storefronts

** Exit Device and cylinder for mullion is to match existing Keying System

Set: 5.0

Doors: 120/A [from Bookstore staff side, to West sidewalk]

Description: Storefront, Exterior Aluminum, Single (Exit only)

1 Continuous Hinge	CFMxxHD1 x door height		PE	08 71 00*
1 Door Closer	1431 CPS	EN	SA	08 71 00
1 Exit Device (exit only)	HC 43 8810	US32D	SA	08 71 00
1 Threshold	2005AV x door width		PE	08 71 00
1 (DPS) Switch	3287		SA	08 71 00*

Notes:

- 5" wide stile aluminum doors to accommodate exit device trim.
- Weather seals to be provided by door manufacturer.
- Provide necessary drop plates and fillers for proper installation of door closers.
- Exterior doors and hardware to comply with FBC windstorm requirements.
- Operation: Inside lever always permits egress.

Set: 6.0

Doors: E119/Ae [access to exist Bookstore (Option to relocate to new Bookstore*)]

Description: Interior (as designed, although two currently exterior) Aluminum Pair.

2 Continuous Hinge*	CFMxxHD1		PE	08 71 00
1 Deadlock*	MS 1850S	US32D	AD	08 71 00
1 Thumbturn*	4066-01	US32D	AD	08 71 00
1 Cylinder*	41**	US32D	SA	08 71 00
2 Push Bar & Pull*	11047	US28	RO	08 71 00
2 Door Closer*	1431 CPS	EN	SA	08 71 00

*Contractor Option to relocate existing doors & hardware making above hardware N/A.

Notes:

- Provide necessary drop plates and fillers for proper installation of door closers.
- Operation: Locked when Bookstore closed; Inside push bar always permits egress.
- Coordinate with Entrances and Storefronts** To match existing Keying System

Set: 6.1

Doors: E101/Ae [exist egress from Activity Center (Relocate for new Community Rm, North access)],

E112/Ce [exist egress from Community Rm (Relocate for new Community Rm, South access)].

Description: Relocate Existing Exterior to Interior location, Aluminum Pair.

1 EHW	Existing hardware to be re-used		OT	
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Notes to Supplier/Installer:

Coordinate with Contractor to ensure that existing hardware functions properly with Door(s).

Hardware Sets (Cont.)

Quantity & Item	Model or Item #	Finish	Abb	Section
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Set: 7.0

Doors: 100/C [Entry Hall Egress to exterior/Receiving], 122/A [Bookstore Storage egress to exterior/Receiving]

Description: Exterior HM Pair (Exits – Card Access - CR)

1	Continuous Hinge	CFMxxHD1 x door height	PE	08 71 00
1	Continuous Hinge	CFMxxHD1 PT x door height	PE	08 71 00
1	Surface Vert Rod Exit	HC4-55-56 8710 x 306 **	US32D SA	08 71 00
1	Surface Vert Rod Exit	HC4-55-8710	US32D SA	08 71 00
2	Door Closer	1431 CPS	EN SA	08 71 00
1	Threshold	2005AV x door width	PE	08 71 00
2	Kick Plate	K1050 8" x 2"LDW	US32D RO	08 71 00
1	Gasketing	303CS head & jambs	PE	08 71 00
2	Sweep	315CN x door width	PE	08 71 00
2	Electric Power Transfer	CEPT	SU	08 71 00
2	(DPS) Switch	3287	SA	08 71 00
2	ElectroLynx Harness	QC-C x L.A.R.	MK	08 71 00
2	ElectroLynx Harness	QC-C1500	MK	08 71 00
1	Multi-Class Reader	RP40	00	28 13 01
1	Power Supply	BPS-12/24-voltage as required	SU	08 71 00
1	Wiring Diagram		00	28 13 01

Notes:

- Exterior doors and hardware to comply with FBC windstorm requirements.
- Operation: presenting valid credential to reader temporarily unlocks outside trim on active leaf, permitting entry. Trim is fail secure with key override outside trim. Inside pushbar always permits egress.

** To match existing Keying System

Set: 8.0

Doors: E112/D [Exit from Community Rm to covered Sidewalk (Cont Option to refurbish exist frame & door)]

Description: Exterior HM, Half full lite (Locksets)

3	Hinge	TA2714 4-1/2" x 4-1/2"	US32D MK	08 71 00
1	Door Closer	1431 CPS	EN SA	08 71 00
1	Threshold	2005AV x door width	PE	08 71 00
1	Gasketing	303CS head & jambs	PE	08 71 00
1	Sweep	315CN x door width	PE	08 71 00

Notes:

- Exterior door and hardware to comply with FBC windstorm requirements.

Set: 9.0

Doors: 123/A [Mechanical]

Description: Exterior HM Pr (Locksets – Card Access - PoE)

1	Continuous Hinge	CFMxxHD1	PE	08 71 00
1	Continuous Hinge	CFMxxHD1 PT x door height	PE	08 71 00
1	Dust Proof Strike	570	US26D RO	08 71 00
2	Flush Bolt	556WS	US26D RO	08 71 00
1	Access Control Lock (PoE)	S1-82276 IAMD	US26D SA	08 71 00
2	Kick Plate	K1050 8" x 2"LDW	US32D RO	08 71 00
1	Threshold	2005AV x door width	PE	08 71 00
1	Rain Guard	346C x door width plus 4"	PE	08 71 00
1	Gasketing	303CS head & jambs	PE	08 71 00
2	Sweep	315CN x door width	PE	08 71 00
1	ElectroLynx Harness - device thru door to CEPT	PoE-CxxxxPRJ x LAR	MK	08 71 00
1	Electric Power Transfer	CEPT	SU	08 71 00
1	ElectroLynx Harness-- device thru CEPT to Ceiling J-box	PoE-Cxxxx LAR	MK	08 71 00
1	Power Supply	BPS-12/24-voltage as required	SU	08 71 00
1	(DPS) Switch	3287 for active leaf	SA	08 71 00
1	Wiring Diagram		00	28 13 01

Notes:

- Exterior door and hardware to comply with FBC windstorm requirements.
- Operation: presenting card to reader temporarily unlocks outside trim, permitting entry. Trim is fail secure with key override outside trim. Inside lever always permits egress.

Hardware Sets (Cont.)

Quantity & Item	Model or Item #	Finish	Abb	Section
Set: 10.0				
Doors: 124/A [Data]				
Description: Exterior HM (Locksets - Card Access - PoE)				
3 Hinge	TA2314 4-1/2" x 4-1/2"	US26D	MK	08 71 00
1 Access Control Lock (PoE)	S1-82276 IKMD	US26D	SA	08 71 00
1 Electric Power Transfer	CEPT		SU	08 71 00
1 ElectroLynx Harness	QC-xxxxPRJ x L.A.R.		MK	08 71 00
1 ElectroLynx Harness	PoE-C1500		MK	08 71 00
1 Door Closer	1431 CPS	EN	SA	08 71 00
1 Threshold	2005AV x door width		PE	08 71 00
1 Kick Plate	K1050 8" x 2"LDW	US32D	RO	08 71 00
1 Rain Guard	346C x door width plus 4"		PE	08 71 00
1 Gasketing	303CS head & jambs		PE	08 71 00
1 Sweep	315CN x door width		PE	08 71 00
1 (DPS) Switch	3287		SA	08 71 00
1 Power Supply	BPS-12/24-voltage as required		SU	08 71 00
1 Wiring Diagram			00	28 13 01

Notes:

- Exterior door and hardware to comply with FBC windstorm requirements.
- Operation: presenting numeric code or card to card reader temporarily unlocks outside trim, permitting entry. Trim is fail secure with key override outside trim. Inside lever always permits egress.

Set: 11.0

Doors: 121/A [Bookstore Office]

Description: Interior, Wood in HM Frame, Single

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK	08 71 00
1 Office Lock	28 10G05 LL**	US26D	SA	08 71 00
1 Door Stop	442 or 409 as required	US26D	RO	08 71 00

Notes:

- Function: Office; key retracts latch when outside lever locked (turn button must be released manually).
- ** To match existing Keying System

Set: 12.0

Doors: 102/A, 103/A, 104/A, 106/A, 108/A, 110/A, 114/A, 118/A, 118/B (Existing: Offices, Food Prep, Restrooms, Electrical, Staff Break, Break Storage)

Description: Existing To Remain, Interior, Wood in HM Frame, Single

1 EHW	Existing hardware to remain in Use/No Change			OT
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Notes to Supplier/Installer:

Coordinate with Contractor to ensure that existing hardware functions properly with Door(s).

Set: 13.0

Doors: 113/A (Central Storage)

Description: Existing To Remain, Interior, Wood in HM Frame, Pair

1 EHW	Existing hardware to remain in Use/No Change			OT
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Notes to Supplier/Installer:

Coordinate with Contractor to ensure that existing hardware functions properly with Door(s).

Set: 14.0

Doors: E116/Ae, E117/Ae, 115/Ae (Relocate Existing Drs & Hrdwr: Café Storage, Custodial, Utility Rm (Contractor Option: Re-use/relocate exist Hardware as well as door and frame)

Description: Relocate entire Existing Interior, Wood in HM Frame

1 EHW	Existing hardware to be re-used			OT
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Notes to Supplier/Installer:

Coordinate with Contractor to ensure that existing hardware functions properly with Door(s).

Set: 15.0

Doors: 115/B and 123E/A [Existing Utility and Mechanical to Truckdock]

Description: Existing To Remain, Exterior, HM in HM Frame, Pair

1 EHW	Existing hardware to remain in use			OT
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Notes to Supplier/Installer:

Coordinate with Contractor to ensure that existing hardware functions properly with Door(s).

Opening List - in Opening Numerical Order

<u>Opening</u>	<u>Hdw Set</u>	<u>Fire Rating</u>	<u>Door Material</u>	<u>Frame Material</u>	<u>Comments</u>
100/A (Pr)	1.0	None	Alum SF	Aluminum	Exterior
100/B (Pr)	4.0	None	Alum SF	Aluminum	Exterior
100/C (Pr)	7.0	None	Hollow Metal	Hollow Metal	Exterior
E101/Ae (Pr)	6.0	None	Alum SF	Alum/or HM	Option to Re-use exist-Part
101/B (Pr)	2.0	None	Alum SF	Exist	Exist to Remain
101/C	3.0	None	Alum SF	Aluminum	Exterior
102/A	12.0	None	Wood/Exist	Exist	Exist to remain
103/A	12.0	None	Wood/Exist	Exist	Exist to remain
104/A	12.0	None	Wood/Exist	Exist	Exist to Remain
106/A	12.0	None	Wood/Exist	Exist	Exist to Remain
E107/A	0.0*	None	Wood	HM/Exist	w/ bottom louver
108/A	12.0	None	Wood/Exist	Exist	Exist to remain
E109/A	0.0*	None	Wood	HM/Exist	w/ bottom louver
110/A	12.0	None	Wood/Exist	Exist	Exist to remain
E112/A	0.0*	None	Wood	HM/Exist	
E112/B (Pr)	0.0*	None	Wood	HM/Exist	ea. w/ narrow lite
E112/Ce (Pr)	6.0	None	Alum SF	Alum/or HM	Option to Re-use exist-Part
E112/D	8.0	None	Hollow Metal (lite)	HM Exterior, Option to	Re-use exist-Part
113/A (Pr)	13.0	None	Wood/Exist	Exist	Exist to remain
114/A	12.0	None	Wood/Exist	Exist	Exist to remain
E115/Ae	14.0	None	Wood	HM/Exist, relocate	Re-use exist-All
115/B (Pr)	15.0	None	Hollow Metal/Exist	Exist	Exist to Remain
E116/Ae	14.0	None	Wood	HM/Exist, relocate	Re-use exist-All
E117/Ae	14.0	None	Wood	HM/Exist, relocate	Re-use exist-All
118/A	12.0	None	Wood/Exist	Exist	Exist to Remain
118/B	12.0	None	Wood/Exist	Exist	Exist to Remain
E119/Ae (Pr)	6.0	None	Alum SF	Aluminum, Option to	Re-use exist-Part
120/A	5.0	None	Alum SF	Aluminum	Exterior
121/A	11.0	None	Wood	Hollow Metal	Interior
122/A (Pr)	7.0	None	Hollow Metal	Hollow Metal	Exterior
123E/A (Pr)	15.0	None	Hollow Metal/Exist	Exist	Exist to Remain
123/A (Pr)	9.0	None	Hollow Metal	Hollow Metal	Exterior
124/A	10.0	None	Hollow Metal	Hollow Metal	Exterior

*Salvage to Owner (existing Hardware may be salvaged and reused in above Sets where applicable)

Opening List - in Hardware Set Numerical Order

<u>Opening</u>	<u>Hdw Set</u>	<u>Fire Rating</u>	<u>Door Material</u>	<u>Frame Material</u>	<u>Comments</u>
100/A (Pr)	1.0	None	Alum SF	Aluminum	Exterior
101/B (Pr)	2.0	None	Alum SF	Exist	Exist to Remain
101/C	3.0	None	Alum SF	Aluminum	Exterior
100/B (Pr)	4.0	None	Alum SF	Aluminum	Exterior
120/A	5.0	None	Alum SF	Aluminum	Exterior
E101/Ae (Pr)	6.0	None	Alum SF	Alum/or HM	Option to Re-use exist-Part
E112/Ce (Pr)	6.0	None	Alum SF	Alum/or HM	Option to Re-use exist-Part
E119/Ae (Pr)	6.0	None	Alum SF	Aluminum,	Option to Re-use exist-Part
100/C (Pr)	7.0	None	Hollow Metal	Hollow Metal	Exterior
122/A (Pr)	7.0	None	Hollow Metal	Hollow Metal	Exterior
E112/D	8.0	None	Hollow Metal (lite)	HM Exterior,	Option to Re-use exist-Part
123/A (Pr)	9.0	None	Hollow Metal	Hollow Metal	Exterior
124/A	10.0	None	Hollow Metal	Hollow Metal	Exterior
121/A	11.0	None	Wood	Hollow Metal	Interior
102/A	12.0	None	Wood/Exist	Exist	Exist to remain
103/A	12.0	None	Wood/Exist	Exist	Exist to remain
104/A	12.0	None	Wood/Exist	Exist	Exist to Remain
106/A	12.0	None	Wood/Exist	Exist	Exist to Remain
108/A	12.0	None	Wood/Exist	Exist	Exist to remain
110/A	12.0	None	Wood/Exist	Exist	Exist to remain
114/A	12.0	None	Wood/Exist	Exist	Exist to remain
118/A	12.0	None	Wood/Exist	Exist	Exist to Remain
118/B	12.0	None	Wood/Exist	Exist	Exist to Remain
113/A (Pr)	13.0	None	Wood/Exist	Exist	Exist to remain
E115/Ae	14.0	None	Wood	HM/Exist, relocate	Re-use exist-All
E116/Ae	14.0	None	Wood	HM/Exist, relocate	Re-use exist-All
E117/Ae	14.0	None	Wood	HM/Exist, relocate	Re-use exist-All
115/B (Pr)	15.0	None	Hollow Metal/Exist	Exist	Exist to Remain
123E/A (Pr)	15.0	None	Hollow Metal/Exist	Exist	Exist to Remain

Salvage to Owner (existing Hardware may be salvaged and reused in above Sets where applicable)

E107/A	0.0	None	Wood	HM/Exist	w/ bottom louver
E109/A	0.0	None	Wood	HM/Exist	w/ bottom louver
E112/A	0.0	None	Wood	HM/Exist	
E112/B (Pr)	0.0	None	Wood	HM/Exist	ea. w/ narrow lite

END OF HARDWARE SETS (6 Pages)

END OF SECTION

**SECTION 08 71 13
AUTOMATIC ENTRANCE OPERATORS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Automatic door operator with low energy automatic operator and push button actuator.
- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 - 1. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade
- C. Related Sections:
 - 1. Section 08 41 13, Aluminum-Framed Entrances and Storefronts
 - 2. Section 08 71 00, Door Hardware
 - 3. Division 26, Electrical: 115 volt AC, minimum 15 amp (for two operators), single-phase wiring in conduit between operator enclosure and building power supply and low voltage wiring between enclosure and actuators. Wiring is to be concealed. Surface wiring is not permitted.
 - 4. Division 28, Access Control System
- D. Automatic door operators shall be under the criteria of the Architectural Hardware Consultant (AHC), incl coordination with Access Control; automatic door operators to be installed by a factory representative and to include all accessories, trim, finish, safety guards, hardware and other pertinent devices and details needed for a complete installation and intended use.

1.2 REFERENCES:

- A. References: Refer to the version year adopted by the Authority Having Jurisdiction
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 101 - Life Safety Code.
- B. American National Standard Institute (ANSI): ANSI/BHMA A156.19, American National Standard for Power Assist and Low Energy Power Operated Doors.

1.3 DEFINITIONS

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to activate the operation of the door.
 - 1. Knowing act: Consciously initiating the opening of a power operated door using acceptable methods including wall mounted switches such as push plates and controlled access devices such as keypads, card readers and key switches.

- B. Safety Device: A device that detects the presence of an object or person within a zone where contact could occur and provides a signal to stop the movement of the door.

1.4 PERFORMANCE REQUIREMENTS

- A. Automatic door equipment accommodates medium to heavy pedestrian traffic.
- B. Opening Force Requirements: Doors shall open with a manual force, not to exceed 30lbf (133N) to set the door in motion and 15 lbf to fully open the door applied at 1" (25 mm) from the latch edge of the door. The force required to prevent a stopped door from opening or closing shall not exceed 15 lbf (67 N) measured 1" (25 mm) from the latch edge of the door at any point during opening or closing.
- C. Closing Time:
 - 1. Doors shall be field adjustable to close from 90 degrees to 10 degrees in 3 seconds or longer as applicable per ANSI/BHMA A156.19 standards; and field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's catalog data, detail sheets, installation data and specifications.
- B. Shop Drawings: Prepared specifically for this project, showing profiles, door dimensions, location of components, joining method and anchorage details, adjacent construction interface, operators, actuators and wiring diagrams.
 - 1. Indicate locations and elevations of entrances showing activation and safety devices.
 - 2. Wiring Diagrams: For power, signal, and activation / safety device wiring.
- C. Samples: Submit manufacturer's samples of aluminum finish.
- D. Manufacturers Field Reports: Submit manufacturer's field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA after completion of installation.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the work of this section in quantity as required in Division 01 for Submittals and Closeout. The manual to include the name, address, and contact information of the manufacturers providing the operators and their nearest service representatives. The final copies delivered after completion of the installation test to include spare parts list.
- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section
- G. Section 01 77 00 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operating and Maintenance Data: Operating and maintenance instructions, parts lists and wiring diagrams.
 - 2. Submit written special warranty with forms completed in the College's name and registered with manufacturer as specified in this Section.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Automatic doors will be manufactured and installed by the Factory Authorized Contractor.
2. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 10 years of documented experience in manufacturing of doors and equipment of similar to that indicated for this Project and that have a proven record of successful in-service performance. Manufacturer to have a company certificate issued by AAADM.
3. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing and maintenance of units 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.
4. Certified Inspector Qualifications: Certified by AAADM.
5. Source Limitations for Automatic Door Operators: Obtain each type of door, frame, operator and sensor components specified in this Section from a single source, same manufacturer unless otherwise indicated.
6. Certifications: Operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards.
 - a. ANSI/BHMA A156.19 American National Standard for Power Assist and Low Energy Operated Doors.
 - b. NFPA 101 - Life Safety Code.
 - c. UL 325 - Standard for Door Operators and Systems.
 - d. UL Listed R-9469 Fire Door Operator with Automatic Closer.
7. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

B. Pre-Installation Meetings:

1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
2. Require attendance of parties directly affecting Work of this Section.
3. Review conditions of operations, procedures and coordination with related Work.

C. Coordination

1. Coordinate door operators with doors, frames and related work to ensure proper size, thickness, hand, function and finish. Coordinate hardware for automatic entrances with hardware required for rest of the project.
2. Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to power supplies and access control system as applicable

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer will pack and transport Products to the job site; receive, handle, store, & protect.

1.8 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Automatic Door Operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
- C. During the warranty period a factory-trained technician shall perform service and affect repairs. An inspection shall be performed after each adjustment or repair.
- D. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal business hours.
- E. Manufacturer shall have in place a dispatch procedure that shall be available 24 hours a Day, 7 Days a week for emergency call back service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The following manufacturer is basis of design:
 - 1. Besam ASSA ABLOY Entrance Systems.
- B. Alternate equivalent products by the following manufacturers may be used:
 - 1. Stanley Access Technologies LLC, Stanley Security Solutions Company
 - 2. Horton Entry Solutions

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, as indicated below:
 - 1. Extruded Aluminum, Alloy 6063-T5.

2.3 SWING DOOR OPERATORS

- A. Model: Besam ASSA ABLOY SW200i low energy automatic door operator (Basis of Design):
 - 1. Reference Standard: ANSI/BHMA A156.19.
 - 2. Configuration: Operator to control single swinging doors and pairs of swinging doors as indicated on the drawings and specified below:
 - a. Traffic Pattern: One way.
 - b. Pairs of Doors: Simultaneous swing.
 - 3. Automatic Door Operator: Electro-mechanical, non-handed operator, powered by 24 volt, 1/4 hp motor. Operator shall be adjustable to compensate for different manual push forces as required.
 - a. Automatic operator shall be capable of operating and controlling up to a 700 pound (317.5 kg) door, 48 inches (1219 mm) in width.
 - b. Surface Mounted Operator:

1. Surface Mounted Housing: Continuous for full width of door.
 2. Connecting Hardware: Surface mounted operators to have a steel arm from the operator, mounted to the top face of the swing door.
 3. UL Listed R-9469 Fire Door Operator with Automatic Closer (surface mounted operator).
 - c. Operator shall be field switchable between an ANSI/BHMA A156.19 and an ANSI/BHMA A156.10 compliant operator and vice versa. Addition of the required safety sensors, activation devices and guard rails may be required to comply with the applicable standard.
 - d. Operator Temperature Range: Capable of operating within temperature ranges of -31° F to 160° F (-35° C to 71° C).
 - e. Electrical Characteristics: Maximum power consumption is 300 watts (2.5 amps at 120 VAC), 50/60hz, built-in thermal overload protection.
 - f. Battery Convenience Mode: Operator to maintain continuous operation by battery power during power failure. Battery is continuously monitored and provides a warning signal if the battery is not working properly.
4. Door Operation:
- a. Opening Cycle The adjustable speed operator mechanically powers the drive shaft and the torque control maintains constant speed throughout the opening cycle regardless of stack pressures or wind speed. Operator shall allow manual door operation with operational forces as indicated to fully open the door applied at 1" (25 mm) from the latch edge of the door.
 1. Manual push force shall be adjustable from 5 lbf to 15 lbf maximum.
 - b. Hold Open: The operator shall stop and hold the door open at the selected door opening angle for an adjustable period of time (1.5 seconds to 30 seconds).
 - c. Closing Cycle: Spring close with speed controlled power assist.
 1. Upon loss of power, dynamic braking will control the door insuring controlled closing.
 2. Selectable Torque Control: Automatically adjusts torque without changing the closing speed of the operator.
 - (a) When the torque control is activated, the closing speed shall remain constant regardless of stack pressures or wind speed.
 - (b) Torque Cancellation: The torque control is deactivated whenever there is a signal received from door mounted sensors.
 - (c) The torque control is disabled during manual use of the door.
 - d. Wind Force Dampening: The operator electromechanically counteracts wind forces, slowing down the door movement to safely open or close the door.
 - e. Stack Pressure Compensation: Operator shall counteract positive stack pressures, negative stack pressures, and sudden changes of stack pressures. The operator never allows the door to open or close faster than the speed control settings, regardless of pressures.
 - f. Obstruction Control: The operator will stop and reverse the door movement.
 - g. Electric Lock Management:
 1. Internal module for electrified locking integration.
 2. Electric Lock Output: Selectable 12 VDC, maximum 1200 mA / 24 VDC, maximum 600 mA.

3. Lock monitoring prevents operator(s) from opening door(s) until release of electrified lock.
4. Operator pulls door closed before opening, automatically unjamming electric latch hardware.
5. Sequenced operation between operators for pairs of doors allowing lock release and astragal coordination.
- h. Lock Retry Circuit: If attempt to fully close the door is unsuccessful, the operator will automatically reverse open 10 degrees and reclose in an attempt to successfully close the door.
- i. Selectable Alarm Reset: The operator can be field set so that after receiving an alarm signal, the operator will not accept any activation impulses and will operate only as a manual door closer until manually reset.
- j. Electronic Controls: Solid state integrated circuit controls the operation and switching of the swing power operator. The electronic control provides low voltage power supply for all means of actuation. The controls include time delay (1 to 30 seconds) for normal cycle.
- k. Control Switch: Automatic door operators shall be equipped with the following type of multi-position function switch:
 1. 4 position rotary switch remotely mounted (On-Off-Hold- Special Function).
5. Operator Interface:
 - a. Safety Sensor Integration for overhead presence safety device and door mounted reactivation safety sensors.

2.4 ACTIVATION DEVICES

- A. General: Provide activation devices in accordance with ANSI/BHMA standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
- B. Knowing Act Activation Device:
 1. Push Plate: Radio controlled, wireless, 4-1/2 inch square stainless steel push plate switches engraved with "Push to Open" with a blue handicap logo.
- C. Manual Operation:
 1. Operator shall allow manual door operation with operational forces adjustable from 5 lbf to 15 lbf maximum.

2.5 SAFETY DEVICES

- A. General: Provide safety devices in accordance with ANSI/BHMA A156.10 standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate safety devices with door operation and door operator mechanisms.
- B. Safety Devices:
 1. Door Mounted Presence Sensor (DMPS): Shall be the ASSA ABLOY door mounted infrared presence safety device (mounted at top of each door); adjustable to provide detection field sizes and functions required by ANSI/BHMA A156.10.
 - a. Unit to provide detection during the travel of the door.

- b. Upon detection the sensor shall provide a signal to stop or reverse the door action.
- 2. Door Mounted Safety Sensor Devices: Safety sensor devices shall be door mounted as specified.
 - a. The door mounted safety sensor devices shall be mounted on the approach (push) side of the door (1 safety sensor per leaf), providing detection on one side of the door only.
 - b. Power transfer from the door mounted safety sensor to operator shall be through an EPT (electrical power transfer) specified in Division 8 Section "Door Hardware".

2.6 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Automatic Door Operator Enclosure:
 - 1. To match storefront.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, wall and floor construction, and other conditions affecting performance of swinging power operated doors.
- B. Examine roughing-in for electrical source power to verify actual locations of wiring connections.
- C. Proceed only after such discrepancies or conflicts have been resolved.

3.2 INSTALLATION

- A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Operators: Install automatic door operators plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
 - 1. Install surface mounted hardware using concealed fasteners to greatest extent possible.
 - 2. Set headers, carrier assemblies, tracks, operating brackets and guides level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system including fire detection system as specified in Division 26 Sections.
- D. Sealants: Comply with requirements specified in division 7 Section "Joint Sealants" to seal between the operator housing and the adjacent surfaces.
- E. Signage: Apply signage on both sides of each door and sidelite as required by ANSI/BHMA A156.19 and manufacturers installation instructions.

3.3 ADJUSTING

- A. Adjust automatic door operators, controls and hardware for smooth and safe operation and for weather tight closure. Adjust doors in compliance with ANSI/BHMA A156.19.

3.4 FIELD QUALITY CONTROL

- A. Before placing doors into operation, AAADM certified technician shall inspect and approve doors for compliance with ANSI/BHMA A156.19. Certified technician shall be approved by manufacturer.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by automatic door operator installation.
- B. Clean metal surfaces promptly after installation. Remove excess sealants, compounds, dirt and other substances. Repair damages and finish to match original finish.

3.6 DEMONSTRATION

- A. Engage a factory-authorized representative to train Owner's maintenance personnel to adjust, operate, and maintain safe operation of the door.
- B. OPERATING INSTRUCTION
 1. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation.
 2. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

**SECTION 08 80 00
GLAZING**

PART 1 - GENERAL

1.1 SCOPE

- A. This section describes the required materials and installation standards for all glass and glazing including, but not limited to: interior and exterior windows, sidelights, door lights and observation ports.

1.2 APPLICABLE PUBLICATIONS

- A. The following publications form a part of the specification to the extent referenced. The publications are referred to in the text by the basic designation only:
- B. American Society for Testing and Materials (ASTM) Publications:
 - 1. Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors
 - 2. Water Penetration of Exterior Windows, Curtain Walls and Doors
 - 3. Cellular Elastomeric Performed Gasket and Sealing Material
 - 4. Staining and Color Change of Single or Multi-component Joint Sealants
 - 5. Volatility of Oil and Resin Based, Knife Grade, Channel Glazing Compounds
 - 6. Standard Specification for Flat Glass
- C. American National Standards Institute, Inc. (ANSI):
 - 1. 797.1-75 Performance Specification and Methods of Test for Safety Glazing Material used in Buildings.
- D. Consumer Products Safety Commission (CPSC) Standard:
 - 1. 16 CFR Safety Standard for Architectural Glazing Materials, January 1977, Part 1201
- E. National Fire Protection Association (NFPA) Publication
 - 1. 80-1977 Fire Doors and Windows
- F. Flat Glass Marketing Association (FGMA) Publications
 - 1. Glazing Manual – 1974 Edition
 - 2. Glazing, Sealing Systems Manual, First Edition, 1970
- G. National Association of Architectural Metal Manufacturers (NAAMM) Publication
 - 1. SG-1-70 Dense Rubber-Like Compression Gasket Material

1.3 SUBMITTALS

- A. Shop Drawings: Show details of each type of glazing system in conjunction with the framing system indicating type of glass, sizes, shapes, glazing material and quantity. Show details indicating glazing material, glazing thickness, bite on the glass and glass edge clearance.
- B. Samples: Submit 12" long samples of each type of glass indicated except for clear monolithic glass products, and 12" long samples of each color required, except black, for each type of sealant or gasket exposed to view.
- C. Test and Evaluation Reports: Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.
- D. Manufacturer Reports: Submit Glass Fabricator's Shop Drawing Review indicating compliance with glazing standards established by the Glass Association of North America (GANA). Submittal to include thermal stress and structural load analysis of the proposed glass types, configuration and sizes.
- E. Warranties:
 - 1. Provide a written 10-year warranty from date of manufacture for sputter coated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.

2. Provide a written 5-year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
3. Provide a written 10-year warranty (vertical application) or 5-year warranty (sloped application) from date of manufacture for insulating glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions.
4. Provide a written 5-year warranty from date of manufacture for fully tempered glass that has been Heat Soaked. Warrants that heat soaked tempered glass will not break spontaneously as a result of Nickel Sulfide (NiS) inclusions at a rate exceeding 0.5% (5/1000) for a period of five years from the date of manufacture.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.
- B. Mock-ups: Before glazing, build mockups for each glass product indicated in Part 2 Product Schedule to verify selections and to demonstrate aesthetic effects and qualities of materials and execution.
 1. Construction: Build mockups with glass and glazing systems specified for the project, including typical lite size, framing systems and glazing methods.
 2. Scheduling: Notify architect seven days in advance of dates and times when mockups will be available for viewing.
 3. Quality Assurance: Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work. Accepted mockups may become part of the completed work if undisturbed at the time of substantial completion.
- C. Publications: Comply with recommendations in the publications below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or in Article 1.2 References.
 1. GANA Glazing Manual
 2. GANA Engineering Standards Manual
 3. GANA Laminated Glazing Reference Manual

1.6 DELIVERY, STORAGE AND HANDLING

- A. Storage and Handling Requirements:
 1. Protect glass from edge damage during handling. For insulating units exposed to substantial altitude changes, comply with insulating glass manufacturers written recommendations for venting and sealing to avoid hermetic seal ruptures.
 2. Storage and Protection: Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.

1.7 SITE CONDITIONS

- A. Ambient Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by the glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation or other causes.
 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40°F (4.4°C).

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. See drawings for location of each type of glass specified herein. Unless otherwise shown, all door lights and sidelights, entrance ways and high traffic areas shall be glazed with safety glazing materials conforming to CPC 16 CFR, Part 1201.
- B. All exterior glass and glazing systems shall meet the requirements of ASCE 7-10.
- C. All glazing within 48" of a door (including door glazing) shall be tempered safety or laminate safety glass.
- D. All tinted exterior glazing shall match existing tinted exterior glazing.

2.2 SHEET OR FLOAT GLASS

- A. Clear sheet or float glass shall be glazed in interior openings not indicated or specified otherwise. Install 3/16" float glass for glazing openings up to and including 36 sq. ft. Install 7/32" glass for the glazing openings over 36 sq. ft. but not over 45 sq. ft., tempered as required by codes. Sheet for float glass shall be one of the following manufacturer's products:
 - 1. DS Float Glass: PPG Industries, Inc.
 - 2. DS Float Glass: Ford Glass Division
 - 3. DS Float Glass: Guardian Industries
 - 4. DS Float Glass: Oldcastle Glass

2.3 TINTED FLOAT GLASS

- A. Tinted float glass shall be glazed in all exterior window openings. Glass thickness shall be as outlined in clear float section, tempered as required by codes.
 - 1. Light Transmittance: 58%
 - 2. Shading Coefficient: 0.76
 - 3. U-Value (Summer): 1.08

2.4 INSULATING GLASS

- A. Insulating glass units shall be 1" total thickness and shall be as follows:
 - 1. Exterior glass shall be 1/4", tinted to match existing glazing (tempered as required by code).
 - 2. Space shall be 1/2", Low-E coating (3).
 - 3. Interior glass shall be 1/4" clear (tempered as required by code).
- B. Insulating glass unit shall be a product of one of the following manufacturers:
 - 1. PPG Industries, Inc.
 - 2. Guardian Industries, Inc.
 - 3. Oldcastle Glass, Inc.

2.5 TEMPERED GLASS:

- A. Tempered glass shall be fully tempered safety glass manufactured by a special heat treating process to improve its mechanical strength. Glass shall meet the requirements of ANSI Z97.1 and USPC standard 16 CFR 1201 C and C11. Interior glass shall be clear and exterior glass shall be tinted with tongless edges of thickness shall be a minimum of 7/32" or as required by CPSC for openings size.
- B. Tempered glass shall be products of one of the following manufacturers:
 - 1. Herculite as manufactured by PPG Industries, Inc.
 - 2. Tempered safety glass as manufactured by Ford Glass Division
 - 3. Guardian tempered glass as manufactured by Guardian Industries, Inc.
 - 4. Tempered Safety Glass as manufactured by Oldcastle Glass

2.6 MIRRORS:

- A. Mirrors shall be 1/4" Plate Glass (Tempered).

2.7 SEALING MATERIAL

- A. Provide neoprene setting materials of the types required for the applicable setting method specified in the FGMA Glazing Sealing Systems Manual, unless specified otherwise herein. Do not use metal sash putty, non-skinning compounds, non-resilient preformed sealers or impregnated preformed gaskets. Materials which will be exposed to view and unpainted shall be gray or neutral color.

2.8 GLAZING TYPE

- A. Butyl-polyisobutylene preformed sealant complying with AAMA 804.1 for Channel Glazing.

2.9 GLAZING COMPOUND

- A. Non-hardening, elastic type as recommended by glass manufacturer.

2.10 ELASTOMERIC SEALANT

- A. Shall be recommended by sealant manufacturer for glazing applications of project. Sealant shall be chemically compatible with setting blocks, edge blocks, sealing tapes and with sealants used in manufacture of insulating glass units.

2.11 PREFORMED CHANNELS

- A. Neoprene, vinyl or rubber, NAAMM SG-1, as recommended by the glass manufacturer for the particular condition.

2.12 SEALING TAPES

- A. Preformed, semi-solid, polymeric based material of proper size and compressibility for the particular condition. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes.

2.13 SETTING BLOCKS AND EDGE BLOCKS

- A. Lead or neoprene of 70 to 90 Shore durometer hardness, chemically compatible with sealants used and of sizes recommended by the glass manufacturer.

2.14 ACCESSORIES

- A. As required by manufacturer to provide a complete installation, including glazing points, clips, shims, angles, beads and spacer strips. Provide non-corroding metal accessories. Provide primer sealers and cleaners as recommended by the glass and sealant manufacturers.

PART 3 – EXECUTION

3.1 PRECAUTIONS AND PROCEDURES

- A. Determine the sizes to provide the required edge clearances by field measuring the actual openings to receive the glass. Grind smooth all edges of glass that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on insulating glass units as soon as glass is installed. Securely fix moveable items or keep in a closed and locked position until glazing compound has thoroughly set.

3.2 GLASS SETTING

- A. Items to be glazed shall be either shop or field glazed using glass of the quality and thickness specified or indicated. Preparation and glazing, unless otherwise specified or approved, shall conform to all applicable recommendations in the FGMA Glazing Manual and Glazing Sealing Systems Manual. Aluminum windows, wood doors and wood windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with the manufacturer's instructions. Use beads or stops which are furnished with the items to be glazed to secure the glass in place.

3.3 EDGE CLEARANCE, FACE CLEARANCE AND BITE

- A. The glazing system must provide adequate edge and face clearance to properly cushion the glass, thermally and mechanically isolate the glass from the framing members and prevent glass to metal contact.

3.4 WEEP SYSTEMS

- A. The glazing system must be installed to prevent accumulation of moisture in glazing channels for prolonged periods. Weep holes shall be provided to ensure adequate drainage.

3.5 FLOAT GLASS

- A. Cut and set with any visible lines or waves horizontal.

3.6 CLEANING

- A. Thoroughly clean glass and remove labels, paint spots, putty and other defacement. Glass shall be clean at the time the Work is accepted.

END OF SECTION

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**SECTION 08 91 00
WALL LOUVERS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Sections:
 - 1. Division 01
 - 2. Division 23
 - 3. Division 25

1.2 REFERENCES

- A. AMCA Compliance: Test and rate louvers in accordance with AMCA Standard 500. Provide AMCA certified rating seal.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for louvers including:
 - 1. Model Number
 - 2. Accessories furnished
 - 3. Construction
 - 4. Finish
 - 5. Mounting Details
 - 6. Free Area
 - 7. Performance Data
- B. Samples:
 - 1. Submit a sample louver section which indicates frame corner construction, blade, construction, typical welds and specified finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Ruskin
- B. Arrow
- C. American Warming and Ventilating
- D. Greenheck
- E. Substitutions: Approved equal permitted prior to bid.

2.2 PRODUCTS

- A. General:
 - 1. Except as otherwise indicated, provide manufacturer's "stormproof" louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
 - 2. Provide Kynar 500 coated, corrosion resistant finish; color and gloss to be selected by the Architect.
- B. Substrate Compatibility:
 - 1. Provide louvers with 4" frame, flange and sill extension piece that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation.
 - 2. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.
- C. Materials:
 - 1. Construct of 0.125 inch thick aluminum extrusions, ASTM B221, Alloy 6063-T5.
 - 2. Weld units or use stainless steel fasteners. Blades shall be positioned at 45° angle.

- D. Louver Screens:
 - 1. On inside face of exterior louvers, provide ½" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.
- E. Stationary Louvers:
 - 1. Provide extruded aluminum, horizontal, drainable wind driven rain resistant louvers.
 - 2. Basis of Design: EME-420DD.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install where shown on the drawings in accordance with the manufacturer's printed instruction. Exercise care to prevent scratches.
- B. Verify size of louvers shown on drawings prior to fabrication. Coordinate with wall openings and structural requirements. Sizes may be altered subject to approval by Engineer provided free area remains approximately the same as indicated.

END OF SECTION

**SECTION 09 21 16
GYPSUM WALLBOARD (DRYWALL)**

PART 1 – GENERAL

1.1 SCOPE

- A. The listing herein of article or material, operation or method requires that the Contractor shall furnish and install each item listed, of quality, or subject to qualification, noted: according to conditions stated providing therefore all necessary labor, equipment, and incidentals, including:
 - 1. Gypsum Wallboard
 - 2. Metal trim features, including corner treatment
 - 3. Metal wall and ceiling framing systems
 - 4. Joint reinforcement and treatment
 - 5. Fasteners
 - 6. Clean-up

1.2 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM) Publications:
 - 1. Gypsum Wallboard
 - 2. Joint Treatment Materials for Gypsum Wallboard Construction
 - 3. Steel Drill Screws for the Application of Gypsum Board to Light-Gauge Steel Studs
 - 4. Application and Finishing of Gypsum Board
 - 5. Surface Burning Characteristics of Gypsum Board
- C. Underwriters Laboratories (UL) Publication:
 - 1. Fire Resistance Directory, 1980 Edition.
- D. Commercial Publication:
 - 1. United States Gypsum Company Publications SA-923, SA-932

1.3 SUBMITTALS

- A. See Section 01 33 00 – Submittals for requirements, if any.

PART 2 – PRODUCTS

2.1 GYPSUM WALLBOARD

- A. Gypsum wallboard shall be manufactured from asbestos-free materials. Gypsum wallboard shall be as follows:
 - 1. Gypsum Wallboard: ASTM C36
 - a. Regular: M.R. 48" wide, 5/8" thick, tapered edges (unless noted otherwise on drawings).
 - b. Type X Special Fire-Resistant: 48" wide, 5/8" thick, tapered edges (rated assemblies).
 - c. Cement Backer Board (CB): 48" wide, 1/2" thick, tapered edges (Provide in all toilet rooms shown to be finished with tile).

2.2 JOINT TREATMENT MATERIAL: ASTM C475

- A. Taping or Embedding Compound: Specifically formulated and manufactured for use in embedding tape at gypsum board joints and completely compatible with tape and substrate.
- B. Finishing or Topping Compound: Specifically formulated and manufactured for use as a finishing compound.
- C. All-Purpose Compound: Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape and substrate.

- D. Joint Tape: Perforated cross-laminated, tapered edge, reinforced paper, or special tape recommended by the manufacturer.
- E. Screws: ASTM C546, Type "S" or Type "W" steel, self-drilling and self-tapping screws.
- F. Adhesives: Adhesive containing benzene, carbon tetrachloride, and trichloroethylene shall not be used.
- G. Adhesive for Fastening Gypsum Board to Metal Framing: Type as recommended by the gypsum board manufacturer and approved.
- H. Corner Bead and Edge Trim: Fabricate from protective-coated steel or plastic designed for its intended use. Flanges shall be free of dirt, grease and other materials that may adversely affect the bond of joint treatment. Materials shall be prefinished or decorated.
- I. Water: Clean, fresh and potable.

2.3 WALL/PARTITION SUPPORTS MATERIALS:

- A. Studs: 25 gauge (except noted otherwise on the drawings) screw-type "Cee" shaped studs of the depth indicated on the drawings, zinc-coated steel; comply with ASTM C645. Provide 20 gauge studs at following locations:
 1. Interior door jambs in 25 gauge stud walls.
 2. Studs higher than 13'-6" and where wall hung cabinets or other wall mounted equipment is to be installed.
 3. At structural exterior skin locations.
 4. See drawing for stud gauge for structural bearing walls.
- B. Depth of Section: 3-5/8" and 6" as indicated on the drawings.
- C. Runners: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall at other work.
- D. Stiffeners: 3/4" rolled steel channels at 0.3 lb. per ft, rust-inhibitive paint finish.
- E. Stud System Accessories: Provide stud manufacturer's standard clips, shoes, ties, reinforcements, fasteners, and other accessories as needed for a complete stud system.
- F. Resilient furring channels shall be similar and equal to USG RC-1 resilient channels faced with sound absorbent acoustical tape. Install in accordance with manufacturer's direction.

2.4 CEILING SUPPORT/FRAMING MATERIALS

- A. Support/framing for suspended gypsum wallboard ceilings shall consist of 1-1/2" galvanized steel main runner channels and hat shaped galvanized steel furring channels.

2.5 HANGERS, TIE WIRES AND CLIPS

- A. Hangers supporting main runner channels shall be soft steel wire not less than 0.1620" nominal diameter (8 gauge) conforming to Federal Specification QQ-W-461, AISI No. 1010, Class 2 zinc coating. Flat steel hangers, 1" by 3/16", with zinc coating, may be substituted for the wire hangers.
- B. Tie wires for splicing furring channels or securing furring to main runner channels shall be galvanized steel of not less than 0.0915" nominal diameter (13 gauge). Tie wires for splicing hat-shaped furring channels to main runner channels or to structural members shall be galvanized steel of not less than 0.0625" nominal diameter (16 gauge).
- C. Clips used in lieu of wire shall be galvanized steel equivalent in holding power to that provided by tie wires for the specific application.
- D. Metal trim features for wallboard shall be formed from zinc-coated steel not lighter than 0.0217: nominal thickness (25 gauge) and shall conform to Federal Specification QQ-S-775, Type I, Class D or E. Metal trim shall be in the following shapes and sizes:

- E. Casing beads shall be channel shaped with a concealed wing not less than 7/8" wide and an exposed wing. Exposed wing may be covered with paper cemented to metal and shall be suitable for joint treatment.
- F. Corner beads for use at perimeter of ceilings shall be angle-shaped with wings not less than 3/4" wide. Concealed wing shall be perforated for nailing and exposed wing edge folded flat. Exposed wing may be factory finished in a white color.

2.6 GYPSUM WALLBOARD/ASSEMBLY FASTENERS:

- A. Bolts shall conform to Federal Specification FF-B-575.
- B. Expansion shields shall conform to Federal Specification FF-S-325, Group I, II, or III, of the type and class applicable.
- C. Metal screws shall be not less than 1" long with self-tapping threads and self-drilling points.
- D. Toggle bolts shall conform to Federal Specification FF-B-588, type and class best suited for the purpose.
- E. Approved manufacturers of gypsum drywall products subject to compliance with the drawings and this section are as follows:
 - 1. Gypsum Board and Related Products:
 - a. United States Gypsum Company
 - b. Flintkote Products, Genstar Building Materials Company
 - c. Georgia Pacific Company
 - d. Gold Bond Building Products Division, National Gypsum Company.
 - 2. Metal Support Materials:
 - a. United States Gypsum Company
 - b. Gold Bond Building Products Division, National Gypsum Company
 - c. Milcor Division, Inryco, Inc.
 - 3. Direct Suspension Systems:
 - a. Chicago Metallic Corporation
 - b. Donn Corporation
 - c. National Rolling Mills Company
 - d. United States Gypsum Company

PART 3 – EXECUTION

3.1 DELIVERY AND STORAGE

- A. Wallboard delivered prior to use shall be stored within a completely enclosed structure or off the ground and completely enclosed within a weather tight covering. Wallboard shall be dry, free of warpage, and with bundling tape intact immediately prior to use. Application shall commence only after the structure is completely weather tight.

3.2 CEILING FRAMED SYSTEMS

- A. Framing for furred ceilings shall be installed at the locations indicated and shall conform to the following:
 - 1. Suspended Ceilings: For spans up to and including 4' on centers: Ceiling framing shall consist of 1-1/2" steel main runner channels suspended plumb from structural slab or frame by hanger wires or straps spaced at not more than 4' on centers. Hanger wires shall be wrapped around power driven inserts installed in the supporting precast concrete slab. Hanger wires shall be looped around steel supports and shall receive three full turns around itself. Hanger strap shall be looped around structural framing and connected to itself with 3/8" galvanized bolts and nuts. Hanger wire shall be saddle-tied to main runner channels and shall receive three full turns around itself. Hanger strap shall be looped under main runner channels to form stirrups and through-bolted shall be located within 6" of parallel walls and shall be cut short of abutting walls 1/2" plus or minus 1/4". Where channels are spliced, the ends shall be overlapped not less than 12" with flanges of channels interlocked and securely tied near each end of the splice with two loops of 16 gauge tie wire. Splices shall be staggered.

3.3 FURRING

- A. Hat-shaped steel channels or steel studs shall be provided where steel furring is indicated for screw attachment of gypsum wallboard.
- B. For Spans Up To and Including 4' On Centers: Hat-shaped furring members shall be spaced 16" on centers and securely attached across suspended main runner channels with wire clips or double strand of 16 gauge tie-wire saddle-tied at each crossing. Ends of wire ties shall receive three full twists. Furring shall be spliced with 8" nested laps securely tied near each end of lap with two loops of 16 gauge tie-wire. Splices shall be staggered. Furring wall channels shall be located within 2" of walls. Where wallboard abuts dissimilar wall materials, perimeter of ceilings shall be finished with an edge bead trim strip applied to wall and accurately aligned with the finished ceiling.

3.4 WALL/PARTITION SUPPORT SYSTEM:

- A. Install supplementary framing, in accordance with ASTM C754. Provide blocking and bracing to support fixtures, equipment, services, heavy trim, furnishings and similar work which cannot be adequately supported on gypsum board alone. Blocking for TV brackets, grab bars, or other equipment shall support a minimum weight of 200 lb.
- B. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
- C. Anchor ends of horizontal stiffeners where system abuts structural columns or walls.
- D. Install runner tracks at floors, ceilings, and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.
- E. Space studs 16" o.c., except as otherwise indicated.
- F. Fasten studs at ends of floor and ceiling runner tracks by installing a screw into both flanges at each end.
- G. Install horizontal stiffeners in stud system; space 4'-0" o.c. vertically; wire-tie at each intersection.
- H. Secure jamb studs to frames of openings with screws, wire-ties or welds, either directly to frames or to special frame-support brackets; and install runner track sections (for jack studs) above and below openings, secured to jamb studs.
- I. Space jack studs same as partition studs, and screw to runner tracks above and below.
- J. Install 2 studs at each jamb of each opening and one additional stud not more than 6" from jamb studs.
- K. Install horizontal stiffeners 6" above and 6" below each opening more than 3'-0" wide, and extend 2 regular stud spaces beyond each jamb.
- L. Wall furring shall be "2" members. Space furring members 24" o.c. except as otherwise indicated.
- M. Install extra furring members and angle runners at terminations of drywall work, and at openings and where required for support of other work occurring in the drywall work.

3.5 APPLICATION OF GYPSUM BOARD

- A. Apply gypsum board to framing and furring members in accordance with ASTM C840 and the requirements specified herein. Apply gypsum board with separate boards in moderate contact; do not force in place. Stagger end joints of adjoining boards. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length. Cut out gypsum board as required to make neat close joints around openings. In vertical application of gypsum board, panels shall be of length required to reach full height of vertical surfaces in one continuous piece. Surfaces of gypsum board and substrate members may be adhered together with an adhesive, except where prohibited by fire rating(s). Leave a space approximately 1/4" at the bottom of gypsum board for caulking. Type of gypsum board for use in each system specified herein shall be as indicated. Screw spacing shall not exceed 8".

- B. Erection Tolerances: Wall surfaces shall have square corners, be plumb and true, with variations not exceeding 1/8' in 8' from required plane.
- C. Control Joints: Install expansion and contraction joints in ceilings and walls in accordance with ASTM C 840, System XIII, unless indicated otherwise. See reflected ceiling plan.

3.6 FINISHING OF GYPSUM BOARD

- A. Tape and finish gypsum board in accordance with ASTM C840. Provide joint, fastener depression, and corner treatment. Gypsum board finishing shall be Level 4.
- B. Caulking: Caulk openings around pipes, fixtures and other items projecting through gypsum board as specified in SECTION 07 90 00 – JOINT SEALANTS. Apply caulking material with exposed surface flush with gypsum board.

3.7 FIRE-RESISTANT ASSEMBLIES

- A. Wherever fire-rated gypsum board construction is indicated, provide all materials and application methods, including types and spacing of fasteners, in accordance with the specifications contained in the UL Fire Resistance Directory for the Design Number(s) indicated.

3.8 PATCHING

- A. Correct surface defects and damage as required to leave gypsum board smooth, uniform in appearance, and ready to receive finish as specified.

3.9 CLEAN UP

- A. Clean up all debris caused by the work of this Section.

END OF SECTION

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Section 09 24 23

PORTLAND CEMENT STUCCO WITH AIR/WATER BARRIER SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials and installation of exterior system of stucco wall covering backed with continuous insulation, drainage mat, and fluid applied air/ water-resistive barrier for CMU walls along with limited concrete (beams within CMU walls) and frame walls (such as rebuilt dormers).
- B. Related Sections:
 - 1. Div 03, Concrete (See cautionary note below on 3.04 E.3)
 - 2. Div 04, Masonry (See cautionary note below on 3.04 E.3)
 - 3. Div 06, Sheathing for use at the few locations of stud system exterior walls (stucco on ci on sheathing on mtl studs), such as at rebuilt dormers.
 - 4. Div 07, at intersections with Sheet Waterproofing, Modified Bituminous Membrane Roofing, Sheet Metal Flashing and Trim, and Joint Protection
 - 5. Div 08, Entrances and Storefronts, Metal Doors and Frames, Louvers

1.02 DEFINITIONS

- A. Air Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air Barrier Auxiliary Material: A transitional component that provides air barrier continuity whether or not furnished by a source other than the primary air barrier manufacturer.
- D. Air Barrier Assembly: The collection of air barrier materials, accessory and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.03 PRE-INSTALLATION MEETING

- A. Pre-installation Conference:
 - 1. Review air barrier and stucco installation requirements and installation details, mock-ups, testing requirements, protection, and sequencing of Work.
 - 2. Provide Submittals prior to Pre-Installation Meeting.

1.04 REFERENCES

- A. Building Codes and Standards
 - 1. 2012 and 2015 IBC (International Building Code)
 - 2. 2012 and 2015 IRC (International Residential Code)
 - 3. 2012 and 2015 IECC (International Energy Conservation Code)
 - 4. ICC ES AC 11, Acceptance Criteria for Cementitious Exterior Wall Coatings
 - 5. ICC ES AC 212, Acceptance Criteria for Water-resistive Coatings used as Water-resistive Barriers over Exterior Sheathing
- B. ASTM Standards:

1. A 641 Standard Spec for Zinc-Coated (Galvanized) Carbon Steel Wire
2. C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
3. C 847 Standard Specification for Metal Lath
4. D 4541 Test Method for Pull-Off Strength of Coatings
5. E 84 Test Method for Surface Burning Characteristics, Building Materials
6. E 96 Standard Test Methods for Water Vapor Transmission of Materials
7. E 283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
8. E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
9. E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
10. E 2178 Standard Test Method for Air Permeance of Building Materials
11. E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

1.05 SUBMITTALS

- A. Manufacturer's specifications, details, installation instructions and product data.
- B. Manufacturer's standard warranty
- C. Samples for approval as directed by architect or owner
- D. Shop drawings: substrate joints, cracks, flashing transitions, penetrations, corners, terminations, and tie-ins with adjoining construction, interfaces with separate materials that form part of the air barrier and stucco wall assembly.

1.06 QUALITY ASSURANCE

- A. Moisture Control: Prevent the accumulation of water into or behind the stucco, either by condensation or leakage into the wall construction assembly:
 1. Air Leakage Prevention—prevent excess air leakage in the design and detailing of the wall assembly. Provide continuity between air barrier components in the wall assembly.
 2. Provide Air/Moisture Barrier over CMU (& over sheathing at locations of mtl framing).
- B. Indicative of scope and requirements of this Specification Section, refer to Manufacturer's details such as Sto Guide Details at www.stocorp.com.
- C. Manufacturer requirements
 1. Air barrier products manufacturer for a minimum of ten (10) years.
 2. Stucco finish products & barrier products manufactured under ISO 9001:2008 Quality System & 14001:2004 Environmental Management System.
- D. Contractor requirements
 1. Knowledgeable in the proper use and handling of specific approved materials.
 2. Employ skilled mechanics who are experienced and knowledgeable in portland cement stucco application and requirements of the specified work.
 3. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.

4. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with manufacturer's published specifications and details and the project plans and specifications.
- E. Insulation board manufacturer requirements
1. Listed by an approved agency. Label insulation board with information required by Stucco manufacturer, the approved listing agency, & applicable building code.
- F. Mock-up and Testing
1. Construct full-scale mock-up of typical stucco/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, E 331 and E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
 2. Conduct air barrier adhesion testing in accordance with ASTM D 4541.
 3. Conduct air barrier assembly testing in accordance with ASTM E 783.
 4. Verify adequacy of pull-out or withdrawal capacity of fasteners used for frame construction with manufacturer in relation to negative design wind pressures.
 5. Conduct pH testing to check stucco surface alkalinity before application of primer or finish materials. Where alkaline resistant primer is used pH testing may be waived.
 6. Conduct wet sealant adhesion testing in accordance with sealant manufacturer's field quality control test procedure.
 7. Notify design professional minimum 7 days prior to testing.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.
- B. Protect insulation materials from prolonged UV exposure, keep away from sources of heat, sparks, flame, flammable or volatile materials. Store on a clean, flat surface, off the ground in a dry area.
- C. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.
- D. Protect portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.
- E. Handle all products as directed on labeling.

1.08 PROJECT/SITE CONDITIONS

- A. Weather conditions affect application, drying time and curing requirements. Hot or dry conditions limit working time and accelerate drying and may require adjustments in application, scheduling and curing to achieve desired results; cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing.

1. Maintain ambient and surface temperatures above 40°F (4°C) during application and for 24 hours after set of stucco, and application of waterproof air barrier and finish materials.
 2. Provide supplementary heat for installation in temperatures less than 40°F (4°C) such that material temperatures are maintained as in 1.08A. Prevent concentration of heat on uncured stucco and vent fumes and other products of combustion to the outside to prevent contact with stucco.
 3. Prevent uneven or excessive evaporation of moisture from stucco during hot, dry or windy weather. For installation under any of these conditions provide special measures to properly moist cure the stucco. Do not install stucco if ambient temperatures are expected to rise above 100°F (38°C) within a 24 hour period.
- B. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.09 COORDINATION/SCHEDULING

- A. The work in this section requires close coordination with related sections and trades. Sequence work to provide protection of construction materials from weather deterioration and from damage from trades per manufacturer's instructions.
- B. Note: windows and doors are typically installed immediately following installation of the air/moisture barrier and work should be sequenced accordingly. Consult with window manufacturer for installation requirements to maintain air barrier continuity and for head, jamb, sill flashing and perimeter sealant requirements needed to prevent leaks into the wall assembly).
- C. Sequence work such that placement of stucco, stucco primers and finish coat closely follow air barrier installation and drainage mat per manufacturer's instructions, to prevent surfaces from being contaminated by atmospheric conditions, dust, dirt, salts, trades, or other sources of surface contamination.
1. Protect continuous insulation from prolonged UV exposure per manufacturer's published instructions.
 2. Protect sheathing from climatic conditions to prevent weather damage until the installation of the waterproof air barrier.
 3. Commence the stucco installation after completion of all roof construction and other construction that imposes dead loads on mtl framing prior to stucco installation to prevent stud distortion (and potential cracking) of the stucco.
 4. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.
- D. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier and continuous moisture protection. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall and provide sill flashing.

1.10 WARRANTY

- A. Provide manufacturer's standard warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Air/Moisture Barrier, Drainage Mat, Portland Cement Stucco.
 - 1. 102 StoPowerwall Stucco Pre-Blended : Sto Corp., 3800 Camp Creek Parkway, Bldg 1400, Suite 120. Atlanta, GA 30331
- B. Substitutions: Approved equal permitted prior to bid
 - 1. Stucco approved equal Quikrete One Coat Fiberglass Reinforced Stucco – Sanded no. 1200-80.
 - 2. Air/Moisture Barrier approved equal Prosoco R-Guard system for barrier including similar fill, tape, etc. identified below under 2.02, if material compatibility with insulation and submitted and approved Stucco System.

2.02 AIR/MOISTURE BARRIER

- A. StoGuard-- fluid applied waterproof air barrier for sheathing, concrete, and concrete masonry substrates consisting of multiple compatible components:
 - 1. Sto Gold Fill -- ready mixed acrylic based flexible joint treatment for rough opening protection, joint treatment of wall sheathing, CMU crack repair, and detail component for shiplap connections with flashing, weep screed, and similar shiplap details.
 - 2. Sto GoldCoat -- ready mixed flexible waterproof coating for wall sheathing, concrete and CMU wall surfaces
 - 3. Sto AirSeal™ -- ready mixed medium-high build coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar shingle lap details
 - 4. StoGuard Mesh-- nominal 4.2 oz/yd² (142 g/m²), self-adhesive, flexible, symmetrical, interlaced glass fiber mesh, with alkaline resistant coating for compatibility with Sto materials, used with Sto Gold Fill to reinforce rough openings, inside and outside corners, sheathing joints, and shiplap connections with flashing, weep screed, and similar shingle lap details
 - 5. StoGuard Fabric - nonwoven cloth reinforcement used with Sto EmeraldCoat for rough opening protection, joint treatment of wall sheathing, and detail component for shiplap connections with flashing, weep screed, and similar shingle lap details
 - 6. StoGuard RediCorner - a preformed fabric piece used in the corners of rough openings in tandem with StoGuard Fabric for quicker installation
 - 7. StoGuard Tape and Primer-- self adhering rubberized asphalt tape for rough opening protection in wood or metal frame construction.
 - 8. StoGuard Transition Membrane - flexible air barrier membrane for continuity at static transitions: sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions. Also used for dynamic joints: floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.
 - 9. Sto RapidGuard™ - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap over flashing, wall to balcony floor slab or ceiling, and through wall penetrations – pipes, electrical boxes, and scupper penetrations

10. StoGuard RapidSeal – one component quick drying waterproof air barrier material for rough opening protection incl rough bucks, sheathing joints (with StoGuard Mesh), CMU crack repair, and for sealing fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials
12. StoGuard RapidFill - one component rapid drying gun-applied joint treatment for sheathing. Also used at static transition joints or seams in construction and to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials. Also used as a detail component for shiplap connections to flashing, weep screed, and similar ship lap details

2.03 CONTINUOUS INSULATION AUXILLIARY MATERIAL

- A. Owens Corning Type IV XPS rigid insulation board in compliance with ASTM C 578.
- B. Dow Type IV XPS rigid insulation board in compliance with ASTM C 578.

2.04 SPRAY FOAM ADHESIVE, CI SEAM AND GAP FILLER

- A. Sto TurboStick – single component polyurethane spray foam adhesive for attaching foam insulation and filling seams and gaps in insulation board surface.

2.05 DRAINAGE MAT

- A. Sto DrainScreen 6mm – nominal ¼” (6 mm) tangled filament nylon core drainage mat with fabric facing.

2.07 LATH AUXILLIARY MATERIAL

- A. Minimum 2.5 lb./yd² (1.4 kg/m²) self-furred galvanized steel diamond mesh metal lath in compliance with ASTM C 847
 1. paper-backed stucco lath as water resistive barrier

2.08 LATH MECHANICAL FASTENERS AUXILLIARY MATERIAL

- A. See Part 3 for additional specifications regarding attaching metal through barriers, and cautions regarding tools/methods. Non-corroding fasteners in compliance with AISI S200 – 2007 and ASTM C 1513:
 1. Wood Framing--minimum #10 Type S wafer head fully threaded corrosion resistant screws with minimum 1 inch (25 mm) penetration into studs.
 2. Steel Framing— corrosion resistant fasteners and plates with minimum three thread penetration beyond steel framing members, and with minimum fastener size and length of,
 - #8 x 3 inch (76 mm) for 1 inch (25 mm) insulation board thickness
 - #10 x 3-1/2 inches (89 mm) for 1-1/2 inch (38 mm) insulation board thickness
 - #10 x 4 inch (102 mm) for 2 inch (51 mm) insulation board thickness
 3. Note: pull-out or withdrawal capacity of the selected fastener must be verified with respect to anticipated wind load, desired safety factor and building code requirements. Consult applicable code compliance report for specific assemblies and fastening schedules or conduct project specific testing to verify compliance with design wind pressure requirements.

- B. Tie Wire—18 gauge galvanized and annealed low-carbon steel in compliance with ASTM A 641 with Class I coating.

2.09 ACCESSORIES

- A. Weep screed, casing bead, corner bead, corner lath, expansion and control joint accessories. All accessories shall meet the requirements of ASTM C 1063 and its referenced documents
 1. PVC plastic in compliance with ASTM D 1784, cell classification 13244C, or galvanized metal in compliance with ASTM A 653 with G60 coating.
- B. All accessories shall have perforated or expanded flanges and shall be designed with grounds for the specified thickness of stucco.
 1. PVC accessories acceptable.
 2. Care must be taken when attaching metal lath or other wall assembly components so that fasteners go into [not between] framing supports.
 3. Powder actuated or other fastening devices that can damage the water-resistant barrier, sheathing, or CI should be avoided.
 4. Do not use channel reveal accessories that interfere with proper drainage and stress relief.

2.10 JOB MIXED INGREDIENTS

- A. Water: clean and potable.
- B. Sand: in compliance with ASTM C 897 or C 144, for use with one coat and C 926 stucco concentrates

2.11 STUCCO

- A. 102 StoPowerwall Stucco Pre-Blended , uniform ¾ inch thickness throughout the wall area: fiber reinforced one coat portland cement stucco pre-blended with graded sand, and in compliance with ICC AC 11. See ICC ESR 2323.
- B. Stucco Finish
 1. Any Sto exterior decorative and protective textured finish as selected and approved by design professional or owner on basis of job site installed mock-ups.
 - a. NOTE: Surface alkalinity (pH) is an important consideration for stucco surfaces to receive acrylic or elastomeric finishes and should be checked to verify pH less than 10 before primer or finish is applied. Priming is also recommended to provide uniform substrate absorption and finish color, to improve adhesion and water resistance, and to retard efflorescence.
 - b. Sto Hot Prime is the preferred primer for use on stucco surfaces to “mask” surface alkalinity. Sto Hot Prime may be applied 48 hours after moist curing the brown coat.
 - c. Other Sto primers and finishes require 28 days curing of brown coat or pH less than 10 before application. Refer to Product Bulletins for complete information on textured finish options.

2.12 PERFORMANCE REQUIREMENTS

- A. Water penetration resistance: comply with ICC ES AC 212, par 4.8.3, no water penetration after 5 hours hydrostatic pressure
- B. Adhesion: ASTM D 4541, > 50 psi (344 kPA) on prepared CMU substrates
- C. Water vapor permeance, ASTM E96 Method B, greater than 10 perms (573 ng/Pa·s·m²)
- D. Material Air Leakage Res.: ASTM E 2178, < 0.02 L/s·m² (0.004 cfm/ft² at 1.57 psf)
- E. Field adhesion testing: ASTM D 4541, strength requirements as dictated by design professional based on exposure conditions such as building height, orientation, climate, and building design.
- F. Assembly air leakage resistance: ASTM E2357: < 0.2 L/s·m² (cfm/ft² at 1.57 psf)
- G. Volatile Organic Compounds: SCAQMD Rule 1113, primary air barrier material, < 50 g/L

2.13 CONSTRUCTION CRITERIA

- A. Structural (Wind and Axial Loads)
 - 1. Maximum allowable deflection normal to the plane of the wall: L/360
 - 2. Wind load in conformance with code requirements.
- B. Moisture Control
 - 1. Prevent the accumulation of water in the wall assembly and behind the exterior wall cladding:
 - a. Minimize condensation within the assembly.
 - b. Drain water directly to the exterior where it is likely to penetrate components in the wall assembly (windows and doors, for example).
 - c. Provide corrosion resistant flashing to direct water to the exterior in accordance with code requirements, including: above window and door heads, beneath window and door sills, at roof/wall intersections, floor lines, decks, intersections of lower walls with higher walls, and at the base of the wall.
 - d. Air Leakage Prevention – prevent excess air leakage and provide continuity between air barrier components in the wall assembly.
 - e. Protect rough openings with StoGuard rough opening treatment extended no further than the stucco termination accessory expanded flange (as stucco will not adhere to StoGuard rough opening treatments). Refer to Sto Guide Details.
 - g. Where casing bead is used back-to-back at expansion joints, back joints with appropriate StoGuard Transition Membrane. Refer to Sto Guide Details.
 - h. Seal stucco terminations and accessory butt joints with appropriate sealant. Seal all penetrations through the stucco wall assembly with appropriate sealant, or backer rod and sealant, as dictated by joint type.
 - i. Provide Sto Air/Moisture Barrier over sheathing as specified above in 2.02.
- C. Air Barrier Continuity: provide continuous air barrier assembly of compatible air barrier components.
- D. Substrates
 - 1. Provide surface plane tolerance not to exceed ¼ inch in 10 feet.

2. Remove form ties, trim projecting concrete and fill honeycombs or other surface defects with appropriate patch and repair material.
 3. Concrete – provide for removal of form oil, curing compounds, efflorescence, coatings, salts, or other surface contamination, laitance or other surface conditions that could interfere with adhesion.
 4. Concrete Masonry – provide open texture concrete masonry units with flush joints, free of efflorescence, coatings, salts, or other surface contamination, weak surfaces or other surface conditions that could interfere with adhesion.
 5. Do not install air barrier over efflorescence, laitance or weak surface conditions, painted, coated, salt-contaminated surface or any concrete or CMU substrate where adhesion is in question.
- E. Mechanical Ventilation: maintain pressurization and indoor humidity levels in accordance with recommendations of ASHRAE (see 2005 ASHRAE Handbook – Fundamentals).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect concrete and masonry surfaces, and misc sheathing surfaces for:
1. Contamination: Algae, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
 2. Surface deficiencies – weak, friable, chalkiness, laitance, bugholes, honeycombs, and spalls.
 3. Cracks: Measure crack width and record location of cracks.
 4. Damage and deterioration.
 5. Moisture Damage: Record any areas of moisture damage or excess moisture.
- B. Inspect sheathing application for compliance with applicable requirements and installation in conformance with specification and manufacturer requirements:
1. Exterior Grade and Exposure I wood based sheathing - APA Engineered Wood Association E 30
 2. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional.
 3. Fasteners seated flush with sheathing surface and not over-driven
- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the waterproof air barrier, CI, or stucco installation to the General Contractor. Do not proceed with air barrier, CI, or stucco installation until deviations are corrected.

3.02 SURFACE PREPARATION.

- A. In accordance with manufacturer's published instructions. Do Not Proceed until surface is acceptable in accordance with same; proceeding with work on unacceptable surfaces puts the responsibility of same on Stucco System installer.
1. Provide surface plane tolerance not to exceed ¼ inch in 10 feet.

2. Remove or provide for removal of form ties, trim projecting concrete and fill honeycombs or other surface defects with appropriate patch and repair material.
3. Concrete - Remove or provide for removal of form oil, curing compounds, efflorescence, coatings, salts, or other surface contamination, laitance or other surface conditions that could interfere with adhesion.
4. Concrete Masonry – provide open texture concrete masonry units with flush joints, free of efflorescence, coatings, salts, or other surface contamination, weak surfaces or other surface conditions that could interfere with adhesion.
5. Do not install air barrier over efflorescence, laitance or weak surface conditions, painted, coated, salt-contaminated surface or any concrete or CMU substrate where adhesion is in question.
6. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness
7. Repair cracks up to 1/8 inch wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint reinforcement material centered over crack, then dependent on substrate apply RapidGuard, StoGuard RapidFill, or Sto ExtraSeal with a trowel, drywall or putty knife to cover the reinforcement.

3. 04 AIR/MOISTURE BARRIER INSTALLATION

- A. Transition Detailing: Detail transition areas with Sto RapidGuard (static joints and seams) or StoGuard Transition Membrane (dynamic joints and seams) to achieve air barrier continuity. For illustrations of installation, refer to Sto Guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocop.com)
- B. Rough Opening Protection incl masonry rough openings with wood bucks and similar openings with complex 3-dimensional geometry.
 1. Sto RapidGuard or RapidSeal: apply a fillet bead of material with caulking gun at interior corners inside the opening to seal jamb/sill and jamb/head seams.
 2. Apply material in a zig-zag pattern along sill, jams, and head to form a generous bead of material along the surface to be covered.
 3. Use a 6 inch (152 mm) wide plastic drywall knife to spread the material to a uniform thickness of 12-20 mils (0.3-0.5 mm) before the material skins.
 4. Treat the entire rough opening surface in this manner and overlap onto the face of the sheathing 2 inches (51 mm) minimum all the way around. (refer to Sto Details)
- C. Sheathing Joint Treatment: Sto Gold Fill with StoGuard Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread smooth with a trowel to completely cover the mesh. Or, StoRapid Guard per instructions.
- D. Air/Moisture Barrier Coating Installation
 1. Plywood Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform thickness of 10 wet mils in one coat (Sto EmeraldCoat) or 50 wet mils in one coat (Sto AirSeal). Use ½ inch (13 mm) nap roller for plywood. Protect from weather until dry.

2. CMU Surfaces: Liberally apply coating to the surface with a ¾ inch nap roller or spray equipment to a minimum wet thickness of 10 – 30 mils (Sto Gold Coat) or 20 – 40 wet mils (StoAirSeal), depending on surface condition. Apply to a uniform thickness. Additional coats may be necessary to provide a void and pinhole free surface. Protect from weather until dry.
 3. NOTE: The Sto coating functions as an air and moisture barrier on standard concrete and normal weight concrete masonry wall construction with flush (struck flush with the surface of the CMU) or concave joints when minimum two liberal coats are applied. Additional coats may be necessary depending on the condition of the CMU wall surface, CMU porosity, joint profile, and other variables that may exist. For "rough" CMU wall surfaces, skim coat the entire surface with one of Sto's cementitious levelers (Sto BTS Xtra) before application of coating. A VOID AND PINHOLE FREE SURFACE must be achieved for the coating to properly function as an air and moisture barrier on Concrete and CMU wall surfaces.
- E. Air /Moisture Barrier Connections and Shingle Laps
1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
 2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
 3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

NOTE: DO NOT ALLOW WATERPROOF AIR BARRIER INSTALLATION TO REMAIN EXPOSED MORE THAN 180 DAYS. PROTECT WITH STUCCO WALL COVERING PROMPTLY AFTER INSTALLATION.

3.05 CONTINUOUS INSULATION INSTALLATION

- A. Attach insulation boards to framing with corrosion resistant bugle head metal screws and 1-1/4 inch metal lath locks or other corrosion resistant cap fastener. Use only enough fasteners (typically 3 per board mid-span) to temporarily hold the board in place. Sto TurboStick can also be applied on the back of the insulation board (minimum 4 – 8 vertical ribbons per board) to temporarily hold the insulation in place. (lath attachment is intended to permanently hold it in place).
- B. Attach in courses with vertical joint staggered.
- C. Cut insulation board in an "L" shape around openings. Tightly abut insulation board joints and interlock inside and outside corners. Trim or rasp board flush for square corners.
- D. Seal gaps or open joints with Sto TurboStick spray foam and rasp or shave flush with surface.
- E. Do not allow insulation board to be exposed to weather from more than 60 days.

3.06 DRAINAGE MAT INSTALLATION

- A. Install per manufacturer's details and published instructions.
 - 1. Use as few corrosion-resistant fasteners as needed to hold the mat in place, starting from the bottom of the wall at base flashing or weep screed and working up. Do not fasten through flashing.
 - 2. Immediately follow installation of drainage mat with stucco lath installation.

3.08 STUCCO INSTALLATION

General Note: Apply the stucco in discrete panels without interruption to avoid cold joints and differences in appearance. Abut wet stucco to set stucco at natural or architectural breaks in the wall such as expansion joints, pilasters, terminations, or changes in plane.

Hot or dry conditions accelerate drying and moisture loss from stucco which can diminish strength and resistance to cracking. Under these conditions adjustments in the application, scheduling and curing of stucco to prevent rapid loss of moisture are necessary to achieve a satisfactory stucco installation.

Cold temperatures retard drying and strength gain and adjustments may have to be made in the application, scheduling and curing of stucco to prevent damage from frost and other trades. Do not install stucco during extremely hot, dry and/or windy conditions. Do not install stucco during freezing conditions or on frozen substrates.

Do not install stucco onto grounds of accessories. Completely embed lath and flanges of accessories and completely cover fastener attachments with stucco.

Moist cure stucco minimum 48 hours for optimum strength gain and resistance to cracking. Allow final stucco application to completely dry (28 days) before applying primer or finish or until pH of stucco surface is less than 10 (except in the case of StoPrime Hot which can be applied 48 hours after completing moist cure of stucco).

The finished installation must be true, plumb and square.

Should stucco get into control or expansion joints, remove the stucco from within the joint before the stucco sets.

Refer to Sto Guide Details.

After satisfactory inspection of surfaces and correction of any deviations from specification requirements commence the stucco installation as described below:

- A. Accessories: Install over StoGuard/Sto DrainScreen stucco accessories such as Weep Screed Installation (*may also be done in conjunction with flashing and air/moisture barrier installation to facilitate shingle lapping of components at base of wall*), Casing Bead, Expansion and Control Joint over drainage mat in accordance with manufacturer's and Stucco manufacturers instructions and published details. Provide weeps at window and door heads, and other areas to conduct water to the exterior.
- B. Lath Installation: Paper-backed lath—Lap lath over lath, not paper to lath overlap. For horizontal overlaps the paper backing must lap shingle style behind the lath to lath overlap.
 - 1. General--install metal lath with the long dimension at right angles to structural framing (horizontally on solid substrates). Terminate lath at expansion joints. Do not install continuously at joints.
 - 2. Seams/Overlaps--overlap side seams minimum 1/2 inch (13 mm) and end seams minimum 1 inch (25 mm). Stagger end seams. Overlap casing beads and expansion joints minimum 1 inch (25 mm) over narrow wing accessories,

minimum 2 inches (51 mm) over expanded flange accessories. Do not install lath continuously beneath expansion joints.

3. Attachment--fasten securely through sheathing into structural framing at 6 inches (152 mm) on center maximum vertically and 16 inches (406 mm) on center horizontally*. Wire tie at no more than 9 inches (225 mm) on center at: side laps, accessory overlaps, and where end laps occur between supports..
4. Install corner lath at inside corners and corner bead at outside corners over lath. Attach through lath into solid substrate or framing at no more than 7 inches (178 mm) on center with appropriate fasteners.

C. Stucco Installation, per Manufacturer's published instructions and as follows:

1. Scratch Coat: apply stucco with sufficient pressure to key into and embed the metal lath. Apply sufficient material, 3/8 or 1/2 inch (9 or 12 mm), to cover the metal lath and to permit scoring the surface. Score the stucco upon completion of each panel in preparation for a second coat. Score horizontally.
2. Brown Coat: as soon as the first coat is firm enough to receive the second coat without damage, apply the second coat. Alternatively, moist cure the first coat up to 48 hours and dampen the scratched surface with water immediately before applying the second coat. Apply the second coat with sufficient pressure to ensure intimate contact with the first coat and as needed to bring the stucco to a uniform thickness that matches the grounds of the accessories. Use a rod or straight edge to bring the surface to a true, even plane. Fill depressions in plane with stucco. Final thickness of stucco shall be uniform throughout the wall area and shall be either 3/4 inch or 7/8 inch (19 or 22 mm), and shall not exceed 7/8 inch (22 mm).
3. After the stucco has become slightly firm float the surface lightly with a darby or wood float to densify the surface and to provide a smooth, even surface. The proper time to float is when the wood float no longer sticks to the surface of the stucco.
4. Moist cure after the stucco has set by lightly fogging for at least 48 hours. Fog as frequently as required during the 48 hour period to prevent loss of moisture from the stucco. Avoid eroding the stucco surface with excess moisture. If relative humidity exceeds 75% the frequency of moist curing can be diminished.

D. Primer Installation

1. StoPrime Hot—Moist cure stucco for a minimum of 48 hours. Allow stucco to dry an additional 48 hours, then apply primer evenly with brush, roller or proper spray equipment over the clean, dry stucco and foam build-outs, and allow to dry. Final age of primed stucco application must be minimum 7 days before application of finish.
2. StoPrime Sand—Moist cure stucco for a minimum of 48 hours. Wait until stucco is 28 days old or the pH level of the surface is below 10 before applying primer. Final age of primed stucco application must be minimum 28 days before application of finish or pH must be below 10.
3. StoPrime— Moist cure stucco for a minimum of 48 hours. Wait until stucco is 28 days old or the pH level of the surface is below 10 before applying primer. Final age of primed stucco application must be minimum 28 days before application of finish or the pH must be below 10.

D. Finish Installation

1. Apply finish to minimum 28 day old stucco or primed stucco, or when pH of stucco surface is less than 10. If StoPrime Hot is used as the primer the primed stucco/foam build-out surfaces need only be minimum 7

days old. Apply finish by spraying or troweling with a stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:

- a. Avoid application in direct sunlight.
 - b. Apply finish in a continuous application, and work a wet edge towards the unfinished wall area. Work to an architectural break in the wall before stopping to avoid cold joints.
 - c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results; cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
 - d. Float "R" (rilled or swirl texture) finishes with a plastic float to achieve their rilled texture
 - e. Do not install separate batches of finish side-by-side.
 - f. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
 - g. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.
 - h. Do not install finish over high pH (≥ 10) stucco surfaces or surfaces that have not been fully cured.
- E. Provide sealant and backer material at stucco terminations and at fixture penetrations through the stucco to protect against air, water and insect infiltration.

3.09 FIELD QUALITY CONTROL

- A. Owner's qualified testing agency or building envelope consultant shall perform inspections and tests.
- B. Inspections: air barrier materials are subject to inspection to verify compliance with requirements.
 1. Condition of substrates and substrate preparation.
 2. Installation of primary air barrier material, accessory materials, and compatible auxiliary materials over structurally sound substrates and in conformance with architectural design details, contractor's shop drawings, project mock-up, and manufacturer's written installation instructions.
 3. Air barrier continuity and connections without gaps and holes at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.
- C. Tests: air barrier materials and assembly are subject to tests to verify compliance with performance requirements:
 1. Qualitative air leakage test: ASTM E 1186
 2. Quantitative air leakage test: ASTM E 779, ASTM E 783, and ASTM E 1827
 3. Adhesion test: ASTM D 4541
 - a. IMPORTANT: For direct applications to concrete establish testing frequency to verify adhesion to prepared substrates as determined by design professional.
 4. Qualitative adhesion and compatibility testing: wet sealant manufacturer's field quality control adhesion test

- D. Repair non-conforming substrates and air barrier material installation to conform with project requirements.
- E. Take corrective action to repair and replace, or reinstall materials, seal openings, gaps, or other sources of air leakage to conform with project performance requirements.

3.10 PROTECTION

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

3.11 CLEANING, REPAIR AND MAINTENANCE

- A. Clean and maintain the stucco finish for a fresh appearance and to prevent water entry into and behind the stucco. Repair cracks, impact damage, spalls or delamination promptly.
- B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.
- C. Refer to Sto reStore Repair and Maintenance Guide ([reStore Program](#)) for detailed information on stucco restoration - cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

END OF SECTION

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**SECTION 09 31 00
CERAMIC TILE**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Floor Tile (Men's and Women's limited area where wall removed and new or shifted existing fixture.)
 - 2. Wall Tile (Men's and Women's limited area where wall removed and new or shifted existing fixture.)
 - 3. Marble thresholds
- B. Related Work Specified Elsewhere:
 - 1. Moisture resistant gypsum wallboard: Section 09 21 16 – Gypsum Board.
 - 3. Cement Backer board: Section 09 21 16 – Gypsum Board.

1.02 QUALITY ASSURANCE

- A. Conform to ANSI/TCA A137.1.
- B. Conform to Tile Council of America (TCA) Handbook for Ceramic Tile Installation.
- C. Qualifications:
 - 1. Manufacturer: Company specializing in manufacture of products specified in this Section with minimum 3 years experience.
 - 2. Installer: Company specializing in applying work of this Section with minimum 3 years experience.

1.03 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Recommended installation instructions.
 - 2. Maintenance and cleaning instructions.
 - 3. Product data sheets for setting and grouting of materials including safety precautions if required.
- B. Master Grade Certificates: Conform to ANSI A137.1.
- C. Samples:
 - 1. Tile: Submit samples of full range of colors for selection by Architect.
 - 2. Thresholds: Show type, shape, material and finish.
 - 3. Grout:
 - a. Full range of available colors for color selection.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original sealed containers.
 - 1. Labels legible and intact identifying brand name and contents.
 - 2. Tile cartons grade sealed by manufacturer in accordance with ANSI A137.1.

3. Grade seals unbroken.
 4. Manufactured mortars and grouts to contain hallmarks certifying compliance with reference standards.
 5. Organic adhesive containers to bear hallmark of either Mortar Manufacturer's Association of America or Tile Council of America certifying compliance with ANSI A136.1.
- B. Mastic Grout: Deliver ready for use.
 - C. Dry Set Mortar: Deliver in sealed, moistureproof containers.
 - D. Store material under cover in manner to prevent damage or contamination.
 - E. Protection: Protect adjoining work surfaces before tile work begins.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Architect's final selection will be within limits of manufacturer's standard material.

2.02 TILE

- A. Conform to ANSI A137.1, Standard Grade.
- B. Ceramic Mosaic Floor Tile: The intent is to match the existing tile; should that tile or very similar not be available, and accent/contracting tile will be selected.
- C. Glazed Wall Tile: The intent is to match the existing tile; should that tile or very similar not be available, and accent/contracting tile will be selected.

2.03 MARBLE

- A. Marble Window Sill Stools (existing Building, where window revised): to match existing if even required.

2.04 INSTALLATION MATERIALS

- A. General: Provide setting, grouting, and waterproof membrane materials from same manufacturer to insure compatibility.
- B. Thin-set Systems:
 1. Dry Set:
 - a. Factory mixed mortar conforming to ANSI A118.1.
 - b. Acceptable:
 - 1) Laticrete International, Inc., Drybond Floor 'N Wall Thin Set Mortar.
 - 2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
 2. Latex Portland cement:

- a. Conform to or exceed water absorption and strength requirements of ANSI A118.4.
 - b. Portland cement: ASTM C150, Type 1.
 - c. Sand: ASTM C 144.
 - d. Additive:
 - 1) High strength, weather, frost, shock, and chemical resistant liquid additive.
 - 3. Acceptable:
 - a. Laticrete International, Inc., Laticrete 4237 Latex Thin Set Mortar Additive.
 - b. Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
 - c. Mix:
 - (1) One bag portland cement.
 - (2) 100 pounds sand (30-60 mesh).
 - (3) 5 gallons additive.
 - 4. Organic Adhesive: Conform to ANSI A136.1, Type II.
- C. Setting Bed Systems:
- 1. Portland cement: ASTM C150, Type I.
 - 2. Hydrated Lime: ASTM C206 or ASTM C207, Type S.
 - 3. Sand: ASTM C144.
 - 4. Water: Clean, potable.
 - 5. Reinforcing: 2" x 2" x 16/16 gauge galvanized wire mesh.
 - 6. Membrane: 4 mil. polyethylene film.
 - 7. Metal Lath: Galvanized, 3.4 lbs./sy expanded metal lath.

2.05 GROUTING MATERIALS:

- A. Latex Portland Cement Grout:
 - 1. Special latex emulsions with Portland cement grout.
 - 2. Portland Cement Grout:
 - a. Factory mixed blend of Portland cement, graded aggregates, and color fast pigments.
 - b. Acceptable:
 - (1) Laticrete International, Inc., Laticrete Floor Grout and Joint Filler gauged with Laticrete 3701 Grout and Mortar Admix.
 - (2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

PART 3 - EXECUTION

3.01 INSPECTION OF SURFACES

- A. Examine surfaces to receive ceramic tile before tile installation begins to determine that surfaces to receive tile are firm, dry, clean, and free of oily or waxy films.
- B. Verify that grounds, anchors, plugs, hangers, and plumbing work in or behind tile are installed prior to proceeding with tile work.

- C. Do not proceed with installation work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. General:
 - 1. Prepare surface, fit, set, or bond, grout, and clean in accordance with applicable requirements or ANSI standards and manufacturer's recommendations for setting method specified.
 - 2. Conform to Tile Council of America "Handbook for Ceramic Tile Installation" and as specified herein.
- B. Floor Tile System:
 - 1. Thin-set: Conforming to ANSI A108.5 using dry set mortar or latex Portland cement mortar and commercial Portland cement grout.
- C. Wall Tile and Base System: One of the following:
 - 1. Thin-set conforming to ANSI A108.4 using water resistant organic adhesive and latex portland cement grout or mastic grout.
- E. Cut and fit tile tight to penetrations throughout tile.
- F. Form corners and bases neatly.
- G. Align base and wall joints, particularly with adjacent existing; NOTE: if tiles are not the exact same size, a narrow (3-4") accent band may be elected to separate existing from new work.
- H. Place tile joints uniform in width, subject to variance allowed in tile size.
- I. Make joints watertight without voids, cracks, excess mortar, or excess grout.
- J. Sound tile after setting; replace hollow sounding units.
- K. Allow tile to set minimum of 48 hours prior to grouting.

3.03 CLEANING AND PROTECTION

- A. Cleaning: After grout has set, scrub clean all surfaces using warm water & mild soap. Leave tile clean with no residue or film on surface.
- B. Protection:
 - 1. Cover and protect tile from damage.
 - 2. Permit no one on floor for period of 24 hours after work is completed.
 - 3. Replace all units that are damaged, improperly installed or that cannot be properly cleaned.
- C. Owner's Stock: Leave one full box of each type of tile plus unused material for Owner's use.

End of Section

0SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Non-fire rated suspended metal grid systems complete with wall trim.
 - 2. Acoustical units.

- B. Related Work Specified Elsewhere:
 - 1. Wood blocking and framing: Section 06 10 00 - Rough Carpentry
 - 2. Gypsum wallboard ceilings including suspension system: Section 09 26 00 - Gypsum Board.
 - 3. Air conditioning devices within ceiling system: Div 15.
 - 4. Lighting fixtures within ceiling system: Div 16.

- C. Tolerances:
 - 1. Deflection:
 - a. Suspension system components, hangers, and fastening devices supporting light fixtures, ceiling grilles, drapes, and acoustical units: Maximum deflection 1/360 of span.
 - b. Deflection Test: ASTM C 635.
 - 2. Allowable Tolerance of Finished Acoustical Ceiling System: Level within 1/8 inch in 12 feet.

1.02 SUBMITTALS

- A. Samples:
 - 1. Submit full size sample of each type of acoustical material.
 - 2. Submit one 12-inch long sample of each suspension system member and moldings.

- B. Manufacturer's Literature:
 - 1. Recommendation for installation of suspension system.
 - 2. Descriptive data.

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

1.03 QUALITY ASSURANCE

- A. Conform to CISA requirements

- B. Surface Burning Characteristics: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original, unopened, protective packaging, with manufacturer's labels indicating brand name, pattern, size and thickness as applicable, legible and intact.

- B. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.

1.04 ENVIRONMENTAL CONDITIONS

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead mechanical work is completed, tested and approved, unless otherwise approved by Architect.
- B. Permit wet work to dry prior to commencement of installation.
- C. Maintain uniform temperature of minimum 60°F nor more than 85°F and a relative humidity of not more than 70% continuously before, during and after installation of acoustical units. Interior finish work such as gypsum wallboard and concrete work shall be completed and dry before installation.

Except at Ceiling Clouds, Mechanical, electrical and other work above the ceiling line shall be completed and approved prior to start of acoustical ceiling installation, unless otherwise approved by Architect.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEM

- A. Grid:
 - 1. Non-fire rated.
 - 2. Exposed tee, all components die cut and interlocking, conforming to ASTM C 635, heavy duty system.
 - 3. Profile: Standard profile with 15/16" exposed face dimension.
 - 4. Accessories: Provide edge moldings, stabilizer bars, clips, splices, hold down clips, and as required for suspended grid system and hold-down clips as required to complete and complement suspended ceiling grid system.
 - 5. Materials/Finish:
 - a. Type A Ceilings: Commercial quality cold rolled steel with galvanized coating; baked enamel finish on exposed surfaces.
 - b. Type B Ceilings: Commercial alloy quality all aluminum.
 - c. Either type ceiling grid acceptable. white finish all rooms.
 - 6. Rough Suspension System: Primed steel; size and type to suit application and to rigidly secure complete acoustical unit ceiling system, with maximum deflection of 1/360.
 - 7. Acceptable:
 - a. USG Interiors, Inc.
 - b. Armstrong, Donn
 - c. Rockfon, LLC
 - d. Chicago Metallic
 - e. Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
- B. Floating Ceiling Trim associated with Ceiling Clouds: Extruded aluminum construction, nominal 4" deep; Armstrong Axiom Classic Trim or approved equal.

2.02 ACOUSTICAL UNITS

- A. Ceilings:
 - 1. Type: Non-combustible mineral fiber tile.
 - 2. Surface Burning Characteristics: ASTM E 84, Class A.
 - 3. Classification: ASTM E 1264, Type III.

- a. Performance: Sound Transmission, Ceiling Attenuation Class (CAC), 35; Noise Reduction Coefficient (NRC) 0.70; Light Reflectance, 0.84 or more; fifteen (15) year warranty against visible sagging; equal, to 22111, ClimaPlus Frost High CAC/High NRC, USG Interiors, Inc.
- 5. Size: 24 inches by 24 inches by 5/8 inch.
- 6. Finish: White.
- 7. Edges: Tegular Edge.
- 8. Style: Non-directional fissured pattern.
- 9. Acceptable:
 - a. USG Interiors, Inc.
 - b. Armstrong
 - c. Rockfon, LLC
 - d. Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect..

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install acoustical ceiling systems in accordance with ASTM C 636, ASTM E580/E580M, UL WH, and manufacturer's recommendations to produce finished ceiling true to lines and levels and free from warped, soiled, or damaged grid or acoustical units.
- B. Install ceiling systems in manner capable of supporting all superimposed loads within tolerances specified.
- C. Install after major above ceiling work is complete.
- D. Coordinate location of hangers with other work.
- E. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest adjacent hangers and related suspension system carrying members as required to span from support to support.
- F. Supply hangers or inserts for installation to respective trades in ample time and with clear instructions for correct placement.
- G. Secure system hangers to structural framing members.
- H. Do not secure hangers to metal deck or joist bridging.
- I. Wall Molding:
 - 1. Install wall molding at intersection of suspended ceiling and vertical surfaces.
 - 2. Set flush with grid members.
- J. Acoustical Units:
 - 1. Install in level plane in straight-line courses.
 - 2. Place materials to bear all around on suspension members.
 - 3. Minimum Width of Border Units: One-half unit dimension.
 - 4. Install acoustical units surrounding recessed troffer lights with hold-down clips to prevent movement or displacement of units. Per Addendum 3, for clarification, ceiling type 1 is to receive 2x2 acoustical batt insulation adhered on top side (Rm 125) prior to installation

3.02 ADJUSTMENTS AND CLEANING

- A. Adjust any sags or twists, which develop in ceiling systems and replace any part which is damaged.
- B. Clean soiled or discolored unit surfaces after installation.
- C. Touch up scratches, abrasions, voids, and other surface defects in painted surfaces.
- D. Furnish, to Owner, 2 cartons of extra acoustical units of each type of acoustical unit installed.

End of Section

**SECTION 09 65 20
LUXURY VINYL TILE FLOORING**

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Flooring and accessories as shown on the Drawings and Schedules as indicated by the requirements of this Section.

1.2 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract including General and Supplementary Conditions and Division 1 Sections apply to the Work of this Section.

1.3 RELATED SECTIONS

- A. Division 3 Concrete; not the Work of this Section.

1.4 QUALITY ASSURANCE

- A. Manufacturer: The manufacturer of the flooring product must be accredited to both ISO 9001 (Quality Management System) and ISO 14001 (Environmental Management System).
- B. Flooring Contractor Qualifications:
 - 1. Flooring contractor shall be an established firm with experience in the installation of the specified product and have access to all manufacturers' required technical, maintenance, specifications and related documents.
 - 2. Flooring Contractor shall have completed at least 3 projects of similar scope, material and complexity, and must provide project reference details including contact names and telephone numbers.
- C. Installer Qualifications: An experienced installer, as determined by Contractor, who has specialized in the installation of work similar to that required for this project is to perform the work of this Section.
 - 1. Installation procedures should be in strict accordance with Amitco International published technical documentation and shall not begin until the work of all other trades has been completed.
- D. Test Floors: Install test floor at project site using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of maintainability and workmanship standard. Comply with Division 01 Quality Control (Test Floor Requirements) Section.
 - 1. Maintenance: Maintain test floor during construction for workmanship comparison; remove and legally dispose of test floor when no longer required.
 - 2. Incorporation: Test floor may be incorporated into final construction upon Owner's approval.
- E. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 01 Project Management and Coordination (Project Meetings) Section.
- F. Provide flooring material that meets the following requirements:
 - 1. Wear Layer Thickness: minimum wear layer of 30 mils
 - 2. Overall Thickness: ASTM F 386 .125"
 - 3. Manufacturer's Minimum Wear Warranty of 20 years on commercial installations.

1.5 SUBMITTALS

- A. Submit listed submittals in accordance with Conditions of the Contract and Division 01 Submittal Procedure Section(s).
- B. Product Data: Submit product data, including manufacturer's technical specifications, for each type of specified product.
- C. Shop Drawings: Submit Shop Drawings showing layout, pattern and colors.
- D. Samples: Submit selection and verification samples for finish and colors.

- E. Quality Assurance/Control Submittals: Submit the following:
 1. Upon request, submit test reports of physical performance and characteristics from recognized test laboratories.
 2. Manufacturer's technical specification documents that certify products meet or exceed specified requirements.
 3. Manufacturer's installation instructions for LVT flooring.
- F. Closeout Submittals:
 1. Maintenance data for installed products in accordance with Division 01 Closeout Submittals, Maintenance Data and Operation Data Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finish and performance.
 2. Submit warranty documents specified herein.

1.6 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 01 Product Requirements Section.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials flat, protected from exposure to harmful weather conditions, between 50°F – 81°F (10 – 27°C) and 50% (± 10%) relative humidity.

1.7 PROJECT CONDITIONS

- A. Substrate Conditions: Use the current test methods described below to determine the dryness as required to ensure initial and long-term success:
 1. Comply with ASTM F1869 testing procedures.
 2. Comply with ASTM F2170 testing procedures.
 3. The General Contractor shall be responsible for conducting in situ relative humidity testing (ASTM F2170) or calcium chloride testing (ASTM F1869). Perform minimum of 3 tests for the first 1000 ft², and at least one test for each additional 1000 ft², to ensure concrete internal relative humidity does not exceed 80% or moisture vapor emissions do not exceed 5.0 lb per 1000 ft² within a 24 hour period.
 4. Contingency for High Moisture Readings: If at the time of testing the moisture readings are in excess of 80% internal relative humidity or 5.0 lb moisture vapor emissions and the Specifications were not followed in their entirety, water/cement ratio (as specified), and/or the concrete surface has been inadequately hydrated, the Contractor responsible for the placement of the cement shall be responsible for the costs associated with the petrographic analysis and subsequent remediation requirements.
- B. Flooring Contractor shall verify in writing to the Owner, a minimum of thirty (30) days prior to scheduled resilient flooring installation, the following substrate conditions:
 1. Moisture: Maximum of 80% internal relative humidity tested in accordance with the current ASTM F2170 or maximum of 5.0 lb Moisture Vapor Emission Rate tested in accordance with the current ASTM F1869.
 2. Alkalinity (ASTM F710): Between 7.0 - 10.0 pH.
 3. Suitability of Substrate Surface: Ensure that substrate surface is sound, smooth and flat to 1/8" in 10' (3.2 mm in 3.1 m).
 4. For substrate conditions that require additional preparation, Flooring Contractor shall furnish Owner and General Contractor with written documentation detailing noncompliance, proposed remediation, timing and cost.
 - a. Refer to section 2.2; Part C Moisture Remediation
- C. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations. Areas to receive flooring shall be clean, fully enclosed, weathertight with stable environmental conditions between 64°F – 81°F (18 – 27°C) and 50% (± 10%) relative humidity. The flooring material shall be conditioned in the same manner.

- D. Temperature Requirements: Maintain air temperature and relative humidity levels in spaces where products will be installed for time period before, during and after installation as recommended by manufacturer.
 - 1. Temperature Conditions: Maintain 64°F – 81°F (18 – 27°C) for 48 hours before, during and continuously after installation.
 - 2. Relative Humidity Conditions: Maintain 50% (± 10%) relative humidity for 48 hours before, during and continuously after installation.
- E. Close spaces to traffic during resilient flooring installation and for time period after installation recommended in writing by the manufacturer.
 - 1. No foot traffic for 24 hours after installation.
 - 2. No point loads for 48 hours after installation.
 - 3. Wait 48 hours after installation before any wet maintenance is performed.
- F. Install resilient flooring material and accessories after all other finishing operations, including painting, have been completed.

1.8 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit manufacturer's Commercial Limited Wear Warranty for Owner's acceptance. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.
 - 1. Warranty Period: Twenty years commencing on Date of Substantial Completion.
 - 2. Warranty Acceptance: Owner is sole authority who will determine acceptability of manufacturer's warranty documents.

1.9 MAINTENANCE

- A. Extra Materials: Deliver extra materials from same production run as products installed to Owner. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals (Maintenance Materials) Section.
 - 1. Quantity: Furnish 1 box of each LVT style and color.
 - 2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 - PRODUCTS

2.1 RESILIENT TILE FLOORING

- A. Basis of Design Manufacturer: Mannington Select
 - 1. Mannington Select
1844 US Hwy 41 SE
Calhoun, GA 30701
www.mannington.com
Sean DeVore 352 630 9884
- B. Mannington Select Luxury Vinyl Tile:
 - 1. Product Testing (Minimum): Provide manufacturer's products which have been tested to meet the following minimum test standards:
 - a. Comply with ASTM F1700, including the following:
 - 1) Classification (ASTM F1700): Class III (Printed Film) Types A & B.
 - 2) Flexibility (ASTM F137): 1" (25.4 mm) mandrel, no crack or break; pass.
 - 3) Total Thickness (ASTM F386): 0.100" (2.5 mm) +/- 0.005" (0.127 mm), satisfies requirement.
 - 4) Chemical Resistance (ASTM F925): Excellent resistance.
 - 5) Heat Resistance (ASTM F1514): ΔE < 8 average; satisfies requirement.
 - 6) Light Stability (ASTM F1515): ΔE < 8 average; satisfies requirement.
 - 7) Short-Term Residual Indentation (ASTM F1914): < 8%, satisfies requirement.
 - 8) Tile Size (ASTM F536): +/- 0.016"/lineal foot (0.4 mm/305 mm); satisfies requirement.
 - 9) Tile Squareness (ASTM F540): Maximum 0.010" (0.25 mm); satisfies requirement.

- 10) Dimensional Stability (Fed. Std. No. 501a Method 6211): Maximum 0.020"/lineal foot (0.51 mm/305 mm); satisfies requirement.
- b. Wearlayer Thickness: 30 mils
- c. Weight (EN 430): 29 lb/45 ft² P (0.7 lb/ft² P).
- d. Static Load Limit/Long-Term Indentation (ASTM F970) Armstrong Modified 1000 psi: Pass.
- e. Fire Performance:
 - 1) Critical Radiant Flux (ASTM E648 and NFPA 253): > 0.45 W/cm, Class 1.
 - 2) Optical Smoke Density (ASTM E662 and NFPA 258) Non-Flaming DM Corrected: < 450; pass.
- f. Slip Resistance (Dry Static Coefficient of Friction) (ASTM D2047 James Test): 0.6, ADA compliant.
- g. Abrasion Resistance:
 - 1) Taber Test (H22 wheels, 1 kg load, 1000 cycles): 0.14 g.
 - 2) Thickness Loss (EN 660 Group T): 0.077 mm.
- h. Caster Chair Test (EN 425): Pass.
- i. Thermal Conductivity (DIN 52612): 3.0 to 4.5 Btu/in/ft²/degree F (0.4 -0.65 W/mK); suitable for radiant heating.
- 2. Basis of Design Collection: Mannington Select - Plank
 - a. Size: 5" wide x 36" long.
 - b. Thickness: 0.100" (2.5 mm).
 - c. Edge: To be selected by Architect.
 - d. Surface Texture: To be selected by Architect.
- 3. Basis of Design Collection: Mannington Select - Tile
 - a. Size: 18" x 18"
 - b. Thickness: 0.100" (2.5mm)
 - c. Edge: To be selected by Architect
 - d. Surface Texture: To be selected by Architect
- 4. Vinyl Wall Base
 - a. Provide 1/8 in. thick, 4 in. high Johnsonite Wall Base with a matte finish, conforming to ASTM F1861, Type CB vinyl, coved (toe) profile.
- 5. Rubber Stair Treads
 - a. Non-slip heavy duty diamond - A6053, square color nose, cove riser
- 6. Johnsonite VCD-XX Vinyl Stair Nosing at auditorium risers
 - a. Color to be selected by Architect.
- C. Installation Adhesive: Amtico PSA-4 High Moisture Adhesive
- D. Substitutions: Approved equal permitted prior to bid.

2.2 RELATED MATERIALS

- A. Leveling and Patching Compounds: Refer to Division 03 Concrete Section.
- B. Concrete Curing, Sealing, Hardening and Parting Compounds: Refer to Division 03 Concrete Section
- C. If Moisture Level (RH) Exceed 90% then refer to product below for substrate preparation **Vaporseal DB – Dependable Products** Up to 25 lbs. Emissions / 2-part epoxy system
www.floorprep.com
 Richard Tanski 800-227-3434 X311
 Coverage up to 15 lbs = 12 sy / gal - 15 - 20 lbs = 10 sy / gal
 20 - 25 lbs = 8 sy / gal
 Application Poured and brushed
 Calcium Chloride 25 pounds
 RH 97%
 pH N/A
 Dry Time 5 - 12 hours
 Floor Prep Must be shot blasted
 Warranty 20 years * *Installer must be certified by Dependable*

2.3 SOURCE QUALITY CONTROL

- A. Source Quality Control: Obtain resilient tile flooring proprietary products, including vinyl tile, from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data for substrate condition, preparation and installation, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation. Flooring contractor must examine areas and conditions under which resilient flooring and accessories are to be installed and must notify General Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Owner and Architect.

3.2 EXAMINATION

- A. Substrates: Examine and verify that all substrates, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. Coordinate with Division 01 General Requirements for testing and allowances, Division 3 Concrete Section and Division 7 Vapor Retarder Section. To ensure a good quality appearance and good adhesion, the subfloor must be hard, smooth, clean, dry and free from defects. Slab on-grade and below-grade subfloors must incorporate an approved vapor retarder (ASTM E1745) properly installed (ASTM E1643) to ensure they are sufficiently dry and to reduce ground moisture vapor transmission from entering the slab after construction. This can be checked by using a suitable moisture test method. More detailed information is available on the preparation of specific subfloor types.
- C. Concrete Substrate Testing: Prior to flooring installation, test concrete substrates for internal relative humidity (maximum 80% per ASTM F2170) or water vapor emission (maximum 5.0 lb per ASTM F1869) and alkalinity (7.0 - 10.0 pH per ASTM F710) harmful to resilient flooring installation performance. Consult resilient flooring manufacturer for requirements pertaining to proprietary resilient flooring products. Include testing costs in contract sum. Refer to Division 01 Quality Requirements.

3.3 PREPARATION

- A. Surface Preparation:
 - 1. Concrete subfloors shall be constructed in accordance with ACI 302.1 and ACI SP-15, utilizing a water-to-cement ratio of 0.45 or less containing no admixtures or surface treatments that are adverse to the installation of resilient flooring.
 - 2. Concrete subfloors must be finished and cured without additives or surface treatments that will adversely affect the flooring materials according to ACI and ASTM F710 with a minimum compressive strength of 3500 psi (24,115 kPa).
 - 3. Wood subfloors and underlayment panels must be acclimated to within 3% and have an equilibrium moisture content of 14% or less.
 - 4. Floors must be clean, dry and smooth.
 - 5. Incompatible Compounds: Remove compounds and other substances harmful or incompatible with installation adhesives and flooring products. This includes any surface materials, such as paint, wax, grease, oil, adhesive residues, etc. Chemical adhesive removers must be completely removed. Floors must be free of any sealers, curing, hardening or parting compounds that would adversely affect the adhesive used with the flooring. Refer to ACI and ASTM F710.
 - 6. A vapor retarder shall be installed prior to pouring of on grade or below grade slabs. Moisture vapor transmission shall not exceed 80% internal Relative Humidity per ASTM F2170 In-Situ Relative Humidity Test and/or 5.0 lb/1000 ft² P/24 hours per ASTM F1869 Calcium Chloride Test.
 - 7. Wood floors must be double construction with a minimum thickness of 1" (25.4 mm). The top layer of wood shall be APA Underlayment Grade Plywood or other wood underlayment panel approved and warranted beneath resilient flooring. Refer to ASTM F1482.
 - 8. Maintain room temperature, adhesive and flooring material at 64°F – 81°F (18 – 27°C) and 50% (±10%) relative humidity for 48 hours before, during and continuously after installation.
 - 9. Broom clean or vacuum surfaces to be covered and inspect substrate. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed work.
 - 10. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
 - 11. Substrate Cleaning and Preparation: Comply with manufacturer's requirements for substrate cleaning and preparation for resilient flooring products.

12. Leveling and Patching: Use only Portland cement based leveling and patching compounds, in accordance with compound manufacturer's requirements, to fill depressions, holes and cracks and to smooth substrate surface to 1/8" (3.2 mm) in a 10' (3.1 m) radius to receive resilient flooring.

3.4 INSTALLATION

- A. Resilient Tile Installation: Install tiles from established center marks so that tiles at opposite room edge are of equal tile width. Follow installation procedures in accordance with Amtico International published Technical Manual, and do not begin until the work of all other trades has been completed.
 1. Patterns: Install tiles in patterns indicated on drawings.
 2. Rolling: Roll floor using 100 lb roller in both directions within 1 hour.
- B. Adhesive: Apply adhesive to substrate in accordance with manufacturer's instructions, including trowel notching, adhesive mixing and adhesive open and working times.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.6 CLEANING & PROTECTION

- A. Initial Cleaning: Remove temporary coverings and protection of adjacent work areas. When installation has been finished for 24 hours, inspect workmanship and repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
 1. Pick up litter and sweep floor to remove debris using a non-treated dust mop or vacuum cleaner with hard surface attachment.

3.7 INITIAL MAINTENANCE FOR A NEWLY INSTALLED FLOOR

- A. Proper cleaning is an essential part of keeping your floor attractive and these guidelines will help extend the appearance and life of your Amtico Collection and Spacia product(s).
- B. Allow the floor to bond to the underlayment/subfloor for at least 48 hours prior to cleaning the floor.
- C. When moving furniture, etc into a room protect floor with appropriate runner boards and moving dollies.
- D. Sweep or vacuum thoroughly.
- E. Remove any marks on the floor's surface. Residual adhesive can be removed using a clean white cloth dampened with mineral spirits.
- F. Damp mop the floor as required, using a neutral cleaner. Follow container instructions for proper dilution ratio.

END OF SECTION

**SECTION 09 68 13
CARPET TILE**

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes tufted carpet tile.
- B. Related Sections:
 - 1. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, and Division 1
 - 2. Section 09 30 00 - Ceramic Tile

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's Data - Submit two (2) copies of manufacturer's specifications and installation instructions for carpet tile and related items specified.
 - 2. Fiber and backing verification - Certification from the producer verifying use of the branded fiber and backing in the submitted carpet product.
 - 3. Maintenance Instructions - Submit with the Closeout Documents two (2) copies of the manufacturer's carpet maintenance instructions, including information needed for the removal of common stains from each type of carpet required.
 - a. A representative from the carpet manufacturer shall meet with the Contractor in the presence of a representative of the Owner and architect/design firm to review the characteristics of the recommended procedures prior to post construction cleanup or occupancy of the finished spaces.
- B. Shop Drawings:
 - 1. Submit shop drawings for areas to be carpeted showing installation of carpeting, seam diagram, pattern direction, necessary installation accessories, and provisions for work of other trades. Show location of different patterns or styles of carpet. Also, show locations of any threshold conditions.
- C. Samples:
 - 1. Submit standard size carpet samples of each type of carpet, in each specified pattern, color and construction.
 - 2. Any alternatives to specified product(s) or manufacturer must be submitted for approval by the Architect at least ten (10) working days prior to bid or proposal.
 - 3. Final Sample Submittal - Submit two (2) sets of samples for each carpet type.
 - 4. No carpet shipments are permitted until acceptance of final samples by the Owner or architect/design firm, certifying that samples are the approved color, pattern, and texture.
- D. Attic Stock
 - 1. Provide minimum of three cartons of each specified carpet color. Turn over to Owner.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 - Sustainable Design Requirements.

1.4 QUALITY ASSURANCE:

- A. Manufacturer - Carpet manufacturer shall have no less than three years of production experience with recyclable carpet tile (fiber to fiber and backing to backing) similar to type specified in this document; and whose published product literature clearly indicates compliance of products with requirements of this section.
 - 1. Single source responsibility - provide product material by a single manufacturer for each recyclable carpet type specified.
 - 2. Commitment to sustainability - carpet manufacturer must practice environmental responsibility through programs of source reduction, recycling, reuse, and conservation.

- B. Trade Contractor - firm with not less than five years of successful carpet tile experience similar to work of this Section and recommended and approved by the carpet manufacturer. Upon request, submit letter from carpet manufacturer stating certification qualifications and acceptance of all environmental requirements.
 - 1. Participant in environmental program including responsible carpet removal, recycling and installation.
- C. Substitutes - Where a selected manufacturer or product has been specified, an equal or superior product may be accepted only upon review and written acceptance by the architect. It is mandatory that such review and approval be obtained prior to bidding, or the substitution will not be considered. All such proposed substitutions shall be submitted to the architect with appropriate manufacturer's specifications, literature, environmental compliance assurance, and independent laboratory testing data. The architect's decision as to whether a product is equal or superior to the one specified shall be final. This section applies to any "or equal" noted in the specification.

1.5 PRODUCT DELIVERY AND STORAGE

- A. Deliver carpeting materials in sealed protective packaging for carpet tile and sealed containers for related materials. Carpet materials shall be bound with secure protective wrapping.
- B. Storage and staging area at the site must be coordinated with the Contractor.
- C. Materials shall be stored in an enclosed and dry area protected from damage and soiling.

1.6 PRE-INSTALLATION

- A. The manufacturer shall meet at the project site with representatives of the Owner, Contractor, and the Trade Contractor to review the carpet installation procedure and coordination with other trades. The Trade Contractor must have available at this meeting the carpet manufacturer's installation procedures and instructions for the carpet types specified in the various applications required.
- B. Store carpet in working areas that have been enclosed and have maintained environmental conditions as those planned for occupancy. Carpet shall be allowed to reach room temperature or minimum temperature recommended by manufacturer before installation.

1.7 WARRANTY

- A. Provide warranties by Carpet Manufacturer agreeing to replace defective materials and workmanship of carpet work during one (1) year warranty period following substantial completion. Also submit carpet manufacturer's warranties as follows:
 - 1. Wear - Surface wear shall not be more than 10% by weight in throughout the life of the product.
 - 2. Static - Carpet will maintain static generation at less than 3.5 kV at 70°F, and 20% R.H. throughout the life of the product.
 - 3. No delamination throughout the life of the product.
 - 4. No edge ravel throughout the life of the product.
 - 5. No dimensional instability, I.e. shrinkage, curling, and doming which adversely affect the ability of the tile to lay flat throughout the life of the product (per installation instructions). See Aachen test.
 - 6. Colorfastness Warranties: Lifetime Colorfastness to Light, Lifetime Colorfastness to Atmospheric Contaminants for 100% solution dyed nylon products.
 - 7. Stain Removal: Lifetime Stain Removal Limited Guarantee
- B. Submit manufacturer's certified independent test results to show that carpet meets or exceeds product performance specification criteria for carpet testing requirements (i.e. see section 2.3 flame, smoke, Aachen test, etc).
- C. Lifetime Commercial Limited Warranty

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Manufacturer:
 - 1. Basis of design is Shaw Contract Group Carpet Tiles.
 - a. Style: Diffuse 59575
 - b. Color & Pattern: To be selected from manufacturer's full line of "Diffuse" carpet tile.
 - c. Installation: Quarter Turn
 - 2. Alternate manufacturer: Mannington Commercial
 - 3. Substitutions: Approved equal permitted prior to bid.
 - 4. Subject to the minimum requirements listed above and below, provide carpeting as specified.
 - a. Colors and patterns of carpet shall match samples.
- B. Package Marking – Mark each carpet package according to style, color, pattern, dye lot, run number and quantity. Within each continuous carpet area, install carpet from the same dye lot and run.
- C. Carpet Construction Specification – All yarn and carpet shall be manufacturer's first quality and 100% recyclable.
- D. Carpet shall meet the following performance standards:
 - a. Carpet Flammability
 - 1) Pill Test (ASTM D2859 or CPSC FF-1-70): Passes
 - 2) Radiant Panel Test (ASTM E648): > .45 watts/cm², Class 1
 - b. Smoke Density (ASTM E662): < 300 Flaming Mode
 - c. Dimensional Stability (Aachen Method DIN 54318): < 0.2% change
 - d. Static Generation at 700 degrees F (AATCC 134 w/ neolite): < 3.5 kV at 20% R.H.
 - e. Lightfastness (AATCC 16E): 4.0 after 60 hours
 - f. Crocking (AATCC 165): 4.0 wet, dry
 - g. Cold Water Bleed (AATCC 107): 4.0
 - h. Gas Fade (AATCC 23): 4.0
 - i. Ozone Fade (AATCC 109): 4.0
 - j. Antimicrobial (AATCC 174, Part I or II): Pass
 - k. Fungicidal (AATCC 174, Part III): No growth
 - l. Appearance Retention Rating (ASTM D-5252 or ASTM D-5417): Moderate or Heavy use classification
 - m. CRI Green Label Plus Air Quality Certification: Passes
 - n. PPM Fluorine (AATCC 189): Minimum 350 ppm

2.2 PRODUCT SPECIFICATIONS

- A. Product (100% recyclable): Diffuse Tile
- B. Construction Type: Multi-Level Pattern Loop
- C. Face Fiber: Eco Solution Q Nylon
- D. Yarn Treatment: SSP Soil Protection, FlorSept Antimicrobial, Antistatic
- E. Gauge: 1/12 inches
- F. Stitches: 9
- G. Pile Density: 6,261
- H. Yarn Weight: 16 oz
- I. Pile Thickness (ASTM D-418): .092 inch
- J. Backing Structure: 75 oz.wt. polyolefin recyclable composite, PVC Free contains no 4-PCH, brominated flame retardants or phthalate plasticizers- total backing wt.shall not exceed 80 oz.
- K. Recycled Content: 33.3% Pre-Consumer / 11.1% Post-Consumer

- L. Cradle to Cradle Certified: Must be MBDC Cradle to Cradle Certified
- M. Total Weight: 87 oz.
- N. Total Thickness: 0.280 inches
- O. Size: 24 x 24 inches
- P. Base Color Method: Solution Dyed
- Q. Antimicrobial: FlorSept Antimicrobial Treatment (inhibits fungi, gram positive, and gram negative bacteria)
- R. NSF140: Platinum Certified

2.3 MINIMUM CONSTRUCTION STANDARDS IN ADDITION TO PRODUCT SPECIFICATIONS

- A. Nylon Specification - All nylon fiber shall be branded nylon containing pre-consumer recycled content.
- B. Carpet average density shall be 6,261 minimum. Average pile thickness as determined by ASTM D418.
- C. Appearance Retention Rating (see performance standards).
- D. Antimicrobial with broad spectrum efficacy against bacteria and fungus for the life of the product (see product specification). Minimizes likelihood of Building Related Illness, Sick Building Syndrome, and assists in improving Indoor Air Quality.
- E. Carpet tile backing shall contain pre consumer and post-consumer recycled content.

2.4 RELATED CARPET MATERIALS

- A. Leveling Compound: Latex type as recommended by carpet manufacturer and is compatible with carpet adhesive and curing/sealing compound on concrete.
- B. Releasable pressure sensitive type adhesive - Use the following as recommended by the carpet manufacturer which will allow removal of carpet tile at any time without damage or adherence to carpet:
 - 1. N5000 low VOC (no solvents) carpet tile adhesive.
- C. Multi-purpose adhesive – Provide the following adhesive as recommended by carpet manufacturer for direct glue-down of carpet on steps.
- D. Carpet Edge Guard, Non-metallic - Extruded or molded heavy duty vinyl or rubber carpet edge guard of size and profile indicated and with minimum 2 inch wide anchorage flange; colors selected by architect/designer from among standard colors available within the industry.
- E. Miscellaneous Materials - As recommended by manufacturer of carpet, cushion and other carpeting products and selected by Trade Contractor to meet project circumstance and requirements.
- F. If Moisture Level (RH) Exceed requirements listed in paragraph 3.1.E. then refer to product below the required for substrate preparation:
 - 1. Vaporseal DB - Dependable Products Up to 25 lbs. Emissions / 2-part epoxy system
 www.floorprep.com
 Richard Tanski 800-227-3434 X311
 Coverage up to 15 lbs = 12 sy / gal - 15 - 20 lbs = 10 sy / gal
 20 - 25 lbs = 8 sy / gal
 Application Poured and brushed
 Calcium Chloride 25 pounds
 RH 97%
 pH N/A
 Dry Time 5 - 12 hours
 Floor Prep Must be shot blasted
 Warranty 10 years * Installer must be certified by Dependable

2. Perform a bond test over a small area to ensure adhesive will bond to epoxy sealed substrate.
- G. Shaw 9000 Floor Sealer Two Part Floor and Adhesive Sealer
1. Description: Two part water base product specifically formulated for sealing of old preexisting adhesive residue for cutback adhesives, multi-purpose adhesives, and pressure sensitive adhesives prior to installation of new floor covering with new adhesive. It is specifically recommended for use where new vinyl back floor coverings are being installed to prevent plasticizers in the vinyl back materials from reactivating or further plasticizing the pre-existing adhesive indicated above. Can also be used as a concrete floor sealer.
- H. Shaw 9050 Liquid Latex
1. For use in sealing concrete floors if dusting or powdering exists.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION REQUIREMENTS AND PREPARATORY WORK

- A. Flooring Contractor shall measure carefully and check all dimensions and other conditions in the field to insure proper fit in the areas designated. Flooring Contractor shall be totally responsible for accuracy of his measurements on total yardage requirements, individual floor yardage requirements and dye lot yardage requirements. No request for carpet or installation extras from the owner will be considered due to measurement or takeoff errors by the Flooring Contractor. The Flooring Contractor shall confirm total yardage required, including 3% attic stock along with bid.
- B. Flooring Contractor shall coordinate all installation activities with the General Contractor.
- C. Removal of carpet to be replaced (if applicable) should be handled according to pre-approved plan for reuse and / or recycling.
- D. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period. Carpet installation must not commence until painting and finishing work is complete and ceiling and other overhead work has been tested, approved and completed, unless specifically approved by owner's Project Manager, in writing.
- E. Flooring Contractor and manufacturer's representative must examine substrates for conditions over which carpeting is to be installed.
1. New concrete shall be allowed to cure for at least ninety (90) days before carpet installation.
 2. Flooring Contractor shall perform moisture content testing as required in manufacturer's instructions to ensure pH readings of no more than 9. Moisture transmission of 5.5 pounds per sqm per 24 hours is acceptable. If values exceed this level manufacturer's recommendations must be followed for moisture transmission mitigation. Do not proceed until unsatisfactory conditions are corrected.
 3. Cracks 1/16" or more, holes, unevenness and roughness must be filled, leveled and made smooth with a compatible latex floor patching compound. Prior to filling, the floor must be swept clean of all loose granular debris. After filling, allow filler to dry. Then damp mop the floor with warm water and allow to dry. Vacuum after mopping, to ensure all loose granular debris is removed and provide a proper substrate to install carpet.
- F. Seal existing concrete with Shaw Floor Sealer 9000:
1. Existing cutback adhesives should be reduced to a thin, well-bonded residue using the wet scraping method. Multi-purpose type adhesives and pressure sensitive adhesive should be reduced to a thin, well-bonded residue.
 2. All surfaces should be swept thoroughly clean or vacuumed before application of Shaw Floor Sealer 9000.
 3. Add all of Part B to Part A container and mix thoroughly for approximately 3 minutes.
 4. Apply sealer with a brush or medium nap paint roller. Sealer will dry to a tack free state in 3 to 4 hours.
 5. The sealer should be allowed to cure overnight prior to an application of new adhesive.
- G. If dusting or powdering exists, seal concrete floors with Shaw 9050 Liquid Latex.
- H. All surfaces to receive carpet shall be clean and dry, and in a condition satisfactory to the Flooring Contractor. Flooring Contractor shall notify Contractor in writing of any conditions which will prevent him from producing satisfactory finish work after above specified preparatory work is completed.

- I. Flooring Contractor shall vacuum floors again immediately before installation of carpeting.
- J. Confirm compatibility of adhesive with curing compounds on concrete floors. All adhesives and curing compounds shall comply with the CRI Green Label Certification program for low VOC.
- K. Environmental Conditions - Areas to be carpeted must be pre-heated at a minimum of 68° F. for 72 hours prior to installation with the relative humidity not more than 65%. A minimum temperature of 50° F. shall be maintained thereafter. Carpet and adhesive must be stored at a minimum temperature of 68° F. for 72 hours prior to installation.
- L. Once the Flooring Contractor commences installation work under this contract, it shall be assumed that the condition of the floor has been accepted and any repairs or further corrections in the floor surface shall become the responsibility of the Flooring Contractor.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's instructions and recommendations for uniformity of direction of carpet installation.
2. Install carpet under open-bottom obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.
3. Provide cut outs where required. Conceal cut edges with protective edge guards or overlapping flanges.
4. Run carpet under open-bottom items such as heating convectors and install tight against walls, columns and cabinets so that the entire floor area is covered with carpet. Cover over all floor type door closures.
5. Install edging guard at all openings and doors wherever carpet terminates, unless indicated otherwise. Prior to installation, report to the Contractor all other obstructions which may occur.
6. Cutting shall be done in accordance with the manufacturer's recommendation, using the tools designed for the carpet being installed. Scraps shall be retained or disposed of per the manufacturer's environmental program.
7. Edges shall be butted together with the proper pressure to produce the tightest joint possible without distortion.
8. All carpet shall be installed with pile-lay in the same direction except when directed to use a quarter turned method as specified in the drawings.
9. Use leveling compound where necessary. Any floor filling or leveling shall have a minimum of 4'0" of feather.
10. Expansion joints - Do not bridge building expansion joints with continuous carpeting. Provide for movements.

B. Installation:

1. Install carpet according to carpet manufacturer's printed instructions.
2. Measuring - Divide the room into four quadrants and snap a chalk line. Make sure quadrants meet at right angles (offset the center line, if necessary, to ensure that perimeter tiles will be cut no less than half size (9 inches).
3. Apply environmentally approved adhesive as per instructions in the area to be carpeted first.
4. Note carefully if the product is designed to be installed "quarter turned" only. Arrows should point in the same direction every other tile and diagonally. Arrows on alternating tiles should be turned 90° in either direction, consistently.
5. Begin installing by laying an anchor row of tiles on one side of the center chalk line. Ensure straight lines and square corners. Repeat anchor rows in each quadrant, extending out from center. Fill in each quadrant with tiles using a stair step technique.
6. Tip individual tiles into place to avoid catching pile in the joint. Frequently check tile joints for proper alignment and firm abutment.
7. Although tiles are nominally 24" by 24" square, there will be slight gain due to joints. To check, measure 10 installed tiles from edge to edge, spanning 10 joints. This measurement should be no greater than 240 and 1/8" for tufted product. If more gain is measured, tiles are not butted tightly enough. Reposition and check again. Use this method to continually check for excessive gain. See manufacturer's instructions for 24" x 24" modular tiles.
8. Fixtures, architectural elements, and perimeters will require tile cutting. Cut tiles from the back. Secure cut or partial tiles with adhesive.
9. Electrical floor outlets are usually wired after tile installation. Install tile over electrical boxes and mark locations with a piece of tape. Tiles can be lifted for cut-outs later.

10. Center trench headers directly under a full tile row.
11. In open perimeter designs, use a fixed reducer strip to secure the tile area.
12. Use an environmentally acceptable permanent adhesive for tiles installed on stairs. Compatible edge trim and nosing products may also be required.

3.3 CLEANING AND PROTECTION

- A. On completion of the installation in each area, all dirt, carpet scraps, etc., must be removed from the surface of the carpet. Any soiling spots or excessive adhesive on the carpet shall be removed with the proper spot remover.
- B. Construction traffic other than as may be required to fit up specific carpeted area will not be allowed to traverse the completed work.
- C. Remove debris, and sort pieces to be saved from scraps to be redirected and recycled.
- D. Protect carpeting against damage during construction. Cover with 6-mil thick polyethylene covering with taped joints during the construction period, wherever protection is required, so that carpet will be damaged carpeting will be rejected and recycled. As the carpet is laid, remove all trimmings, excess pieces of carpet and laying materials.
- E. At the completion of the work and when directed by the Contractor, vacuum carpet using commercial dual motor vacuum of type recommended by carpet manufacturer. Remove spots and replace carpet where spots cannot be removed. Remove rejected carpeting and replace with new carpeting. Remove any protruding yarns with shears or sharp scissors.
- F. Protection of carpeting shall be maintained on each floor or area until accepted.

3.4 INSPECTION

- A. Preliminary Acceptance - Upon completion of the carpet installation of each floor, it shall be inspected by Owner, the Contractor and Flooring Contractor.
- B. Upon completion of the installation, verify that work is complete, properly installed and acceptable. Remove and replace all work not found acceptable to the owner at the installer's expense.

END OF SECTION

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**SECTION 09 80 00
ACOUSTICAL TREATMENT**

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Cementitious wood fiber plank acoustical wall panel system and ceiling cloud system, and installation accessories.
- B. Related Work Specified Elsewhere:
 - 1. Mounting framing: Section 05 12 00 – Structural Steel.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C635 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E1264 Standard Classification for Acoustical Ceiling Products.
- B. Ceilings and Interior Systems Construction Association (CISCA).
 - 1. CISCA Code of Practices.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Provide acoustical wall panel assembly designed and tested to provide surface burning characteristics (ASTM E84) as follows:
 - a. Flamespread: 25 or less.
 - b. Smoke Developed: 450 or less.
 - 2. Provide acoustical wall panel system which has been manufactured, fabricated and installed to provide Noise Reduction Coefficient (NRC) rating as follows:
 - c. NRC rating: 0.40

1.04 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.

1. Recommended procedures for normal cleaning and removal of stains including precautions in use of cleaning materials that may be detrimental to surfaces.
- C. Samples: Submit selection and verification samples: 6" x 6" sample for each wood fiber wall panel unit required, showing full range of exposed texture to be expected in completed work.
- D. Quality Assurance/Control Submittals: Submit the following:
 1. Test Reports: Upon request, submit certified test reports from recognized test laboratories.
 2. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

1.06 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
 1. Prevent soiling, physical damage or wetting.
 2. Store cartons open at each end to stabilize moisture content and temperature.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 1. Do not install acoustical panels until building is closed in and HVAC system is operational.
 2. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.
 3. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:
 - a. Relative Humidity: 65 - 75%.
 - b. Uniform Temperature: 55 - 70 degrees F (13 - 21 degrees C).

PART 2 - PRODUCTS

2.01 ACOUSTICAL WALL PANEL SYSTEM

- A. Manufacturer: Tectum Inc.

1. Contact: 105 South Sixth Street, Newark, OH 43055; Telephone: (888) 977-9691, (740) 345-9691; Fax: (800) 832-8869; E-mail: aird@tectum.com; website: www.tectum.com.
- B. Acoustical Wall panel systems, including the following:
 1. Tectum Standard Interior Wall Panels:
 - a. Material: Aspen wood fibers bonded with inorganic hydraulic cement.
 - b. Thickness: 2"
 - c. Edge: Square ends.
 - d. Width: 47 3/4"
 - e. Length: Refer to drawings.
 - f. Color: Natural
 - g. Mounting: Provide all fasteners for a complete single source installation.
- C. Substitutions: Items of same function and performance by other manufacturers not listed are acceptable as approved by Architect.

2.02 ACCESSORIES

- A. Provide accessories as follows:
 1. Tectum Painted Head Drywall Screws:
 - a. Material: Steel.
 - b. Length: 1 5/8"
 - c. Color: Natural
 2. Tectum Touch-Up Paint:
 - a. Color: Natural

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the instructions and recommendations of the acoustical wall panel system manufacturer.
- B. Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work.
 1. Comply with CISCA Code of Practices.

3.02 EXAMINATION

- A. Site Verification of Conditions:

1. Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work.
2. Do not proceed with installation of wall panel system until unacceptable conditions are corrected.

3.03 INSTALLATION

- A. Screw head to be flush with panel surface.
- B. Securely affix wall panels by means of splines attached vertically to smooth wall or furring strips. Engage vertical kerfs on the edges of the wall panels with splines. Apply adhesive or use Velcro hook and loop fastening where necessary.
- C. Cover field cut edges by means of trim or other moldings.

3.04 CLEANING

- A. Clean exposed surfaces of acoustical panel, trim, moldings and suspension members to comply with manufacturer's instructions for cleaning.
- B. Touch up any minor finish damage.
- C. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.05 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

End of Section

SECTION 09 90 00
PAINTS AND COATINGS *Preface*

PART 1 - GENERAL

1.1 SUMMARY, Add the following:

- B. Work Included:
 - 1. Painting and finishing all exposed interior surfaces unless indicated below or shown on drawings otherwise.
 - 2. Painting and finishing all exposed exterior surfaces unless indicated below or shown on drawings otherwise.
 - 3. Work for Concrete Masonry Coatings identified under Section 09 97 23 Concrete and Masonry Coatings, specific to existing exterior stucco.

- C. Surfaces Not To Be Painted:
 - 1. Prefinished wall and ceiling materials such as Architectural CMU, Tectum panels, ACP, etc.
 - 2. Items with factory applied final finish.
 - 3. Concealed ducts, pipes, and conduit; exposed conduit, boxes, etc. specified to be surface installed on Architectural CMU.
 - 4. Nonferrous metal, unless specified or indicated otherwise.
 - 5. Stainless steel.
 - 6. Concrete wearing surfaces (floors, walks, ramps, steps, and similar horizontal surfaces) unless specified or indicated otherwise.
 - 7. Cast iron frames and covers.

- C. Related Work Specified Elsewhere:
 - 1. Shop painting and priming of structural steel joists, deck, and miscellaneous metal fabrications: Div 5.
 - 2. Caulking: Section 07 90 00 - Joint Sealers.
 - 3. Factory shop painting and prefinished items as specified in their respective sections.

1.2 SUBMITTALS, Add the following:

- C. Schedule:
 - 1. Complete list of materials to be furnished and surfaces on which they will be used.
 - 2. Submit detailed data sheets for each product listed in schedule.

- D. Color Samples: Manufacturer's color chips or color charts for color selection by Architect.
 - 1. Limit exterior colors to two (2), exclusive of trim.
 - 2. Limit interior wall colors to four (4), plus metal frame color.
 - 3. Limit shade of wood stain to one (1).

- E. Prepare stained wood samples on type & quality of wood species specified for approval.

1.5 QUALITY ASSURANCE, Add the following:

- C. Include on label of containers following:
 - 1. Manufacturer's name.
 - 2. Type of paint.
 - 3. Manufacturer's stock number, Label analysis, and Color.
 - 4. Instructions for reducing, where applicable.

- D. Applicator Qualifications: Minimum of 3 years experience in painting of comparable type and scope.
- E. Field Quality Control:
 1. Request review of first finished room, space, area, or item of each painting system specified by Architect for color, texture, “hiding”, and workmanship.
 2. Use first acceptable room, space, area, or item as project standard for each painting system.
 3. For spray application, paint surface not smaller than 100 square feet as project standard.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Add the following below “A.”:
 1. Store only acceptable project materials on project site.
 2. Store in suitable, well ventilated location, not exposed to heat or direct rays of sun.
 3. Restrict storage to paint materials and related equipment.
 4. Keep all containers tightly closed when not in use.
 5. Remove cloths, rags, and similar waste material from building each night and when not in use.
 6. Take all necessary precautions to prevent spontaneous combustion including burning of waste material or placing in air tight covered containers.
 7. Comply with manufacturer's recommendations as to environmental conditions under which coatings or coating systems can be applied.
 8. Do not apply finish in areas where dust is being generated.
- B. Protection: Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

PART 3 - EXECUTION

3.1 EXAMINATION, Add the following after subsection “B”:

- C. Examine surfaces scheduled to receive paint finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work as included in Paragraph 3.02.
- D. Do not proceed with surface preparation or coating until conditions are suitable.

3.2 PREPARATION

- A. Add below “A.”, the following:
 1. Existing Surfaces:
 - a. General: Remove all dirt, rust, scale, splinters, loose particles, disintegrated paint, grease, oil and other deleterious substances from surfaces that are to be painted.
 - b. Defects in Surfaces:
 - (1) Repair, smooth, sand, or treat as required all surface defects, such as scratches, nicks, cracks, gouges, spalls, alligating, and irregularities due to partial peeling of previous paint coatings, to render them practically invisible in finished work.
 - (2) Remove existing paint from entire surface where impractical to satisfactorily eliminate defects by other means.

- (3) Where peeling is general over area, remove all paint. Sand out edges to provide imperceptible transition.
- c. Wiping of Surfaces:
 - (1) Upon completion of all other cleaning operations, wire brushing, and sanding, wipe down all previously painted surfaces.
 - (2) Use clean rags saturated with mineral spirits.
 - (3) Allow to dry and immediately begin application of paint.
 - (4) Do not wipe down stucco or other similarly rough surfaces.
- d. Wood Surfaces:
 - (1) Sandpaper entire area.
 - (2) Scrape where necessary to remove loose paint.
 - (3) Set all nail heads and putty stop.
 - (4) Where checking of wood is present and surface smooth, wipe with mineral spirits, apply one coat of wood preservative.
 - (5) Fill open joints and all other openings with wood filler. Sand smooth after it is dry.
 - (6) Prime all bare surfaces as specified for new surfaces.
 - (7) Seal all knots with knot sealer.
- e. Metal Surfaces:
 - (1) Sandpaper, wire brush, or rub entire surface with steel wool.
 - (2) Scrape where necessary to remove loose paint.
 - (3) Remove all rust down to bare metal including spots where rust discoloration appears through existing paint.
 - (4) Rust discoloration in pits will be allowed to remain.
 - (5) Prime all surfaces as specified for new surfaces immediately after cleaning.
- f. Concrete and Masonry:
 - (1) Remove loose dirt, fungus, grease, and oil by washing with suitable detergent. Rinse thoroughly with fresh water.
 - (2) Remove efflorescence by scraping, wire brushing, and washing with 5 to 10 percent, by weight, solution of muriatic acid. Rinse thoroughly with fresh water; remove all traces of acid.
 - (3) Wire brush entire area with power wire brushes and dust or wipe thoroughly to remove all dust.
- 2. New Surfaces:
 - a. General:
 - (1) Remove all dirt, rust scale, splinters, loose particles, grease, oil, and other deleterious substances from surfaces that are to be painted.
 - (2) Allow caulking and sealants to set one week before painting.
 - b. Wood Surfaces:
 - (1) Clean soiled surfaces.
 - (2) Sand to smooth and even surface, then dust off.
 - (3) Apply knot sealer to all knots, pitch, and resinous sapwood before priming coat is applied.
 - (4) Fill nail holes, cracks, open joints, and other defects with wood filler after priming coat has dried. Color to match finish color.
 - c. Gypsum Wallboard:
 - (1) Fill narrow, shallow cracks and small holes with spackling compound.
 - (2) Rake deep wide cracks and deep holes.
 - (3) Dampen with clear water.
 - (4) Fill with thin layer of drywall joint cement.
 - (5) Allow to dry.

- (6) Sand smooth.
- (7) Do not raise nap of paper on wallboard.
- d. Concrete and Masonry:
 - (1) Remove all mortar droppings, scale and glaze by wire brushing.
 - (2) Fill cracks and irregularities with Portland cement grout to provide uniform texture.
 - (3) Clean surfaces of all dirt, dust, grease stains, bond breaker, curing compound, and efflorescence.
- e. Ferrous Metal Surfaces:
 - (1) Solvent clean to remove oil and grease.
 - (2) Mechanically clean by powered wire brushing or surface blasting to remove rust, mill scale, and other foreign substances.
 - (3) Minor amounts of residual rust that cannot be removed except by thorough blast cleaning will be allowed to remain.
 - (4) Apply primer paint as soon as practicable after cleaning.
- f. Galvanized Metal:
 - (1) Clean surface with mineral spirits to remove oily residue.
 - (2) Dry with clean cloth.

B. Add below "B.", the following:

- 1. Remove, mask, or otherwise protect hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in contact with painted surfaces and not to be painted, prior to surface preparation and painting operations.
- 2. Reinstall removed items following completion of painting.
- 3. Removal and reinstalling by workmen skilled in trades involved.
- 4. Thoroughly clean surfaces to be painted.
- 5. Do not begin application until all surfaces are dry, unless specified otherwise.
- 6. Do not apply paint to surfaces on which there is frost, ice, or snow.
- 7. Maintain interior areas broom clean and dust free before and during application of painting materials.
- 8. Surfaces concealed by portable objects and by articles mounted on surfaces and readily detachable by fasteners such as screws and bolts are included.
- 9. Surfaces concealed and made inaccessible by panel boards, fixed ductwork, machinery and equipment fixed in place are not included.
- 10. Remove articles obstructing access to those surfaces specified to be painted and restore to their original position upon completion.
- 11. Do not paint surfaces of ferrous metal embedded in concrete.

3.3 APPLICATION, after this subsection, add the following:

3.4 APPLICATION - QUALITY CONTROL

A. General Requirements:

- 1. Moisture Content:
 - a. Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer.
 - b. Check with electronic moisture meter.
- 2. Apply materials with good clean brushes, rollers, or spraying equipment.
- 3. Brush or roll block filler.
- 4. Rate of Application: As recommended by paint manufacturer for surface involved and/or provide Dry Film Thickness (DFT) specified.
- 5. Comply with recommendation of product manufacturer for drying time between succeeding coats.
- 6. Vary slightly color of succeeding coats.

7. Sand and dust between each coat to remove defects visible from distance of 5 feet.
 8. Finish Coats:
 - a. Free of streaks, laps or pile of paints and skipped or missed areas.
 - b. Backroll spray on finish coat.
 9. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
 10. Apply primer on all work before glazing.
 11. Change colors at corner of stop where colors differ between adjoining spaces or rooms and where door frames match wall colors.
 12. Refinish entire wall where portion of finish has been damaged or is not acceptable.
 13. After fitting wood doors, remove from openings and seal top and bottom edges with spar varnish.
- B. Painted Work:
1. Back prime all exterior woodwork with exterior undercoater.
 2. Back prime all interior trim.
 3. Runs on face not permitted.
- C. Stained and Natural Finish: Adjust natural finishes as necessary to obtain identical appearance on veneers and solid stock.

End of Preface

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**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, and other coatings.

1.2 SUBMITTALS

- A. Product Data: Submit data on coatings.
- B. Samples: Submit two paper chip samples, illustrating the complete range of colors and textures available for each surface finishing product scheduled.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- A. Refer to Section 01 81 13 Sustainable Design Requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit maintenance and cleaning instructions.

1.5 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
 - 1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Maintain one copy of each document on site.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Store and apply materials in environmental conditions required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PAINTS AND COATINGS

- A. Manufacturers:
 - 1. Sherwin Williams (Basis of Design)
 - 2. Benjamin Moore
 - 3. Pittsburg Paints
 - 4. Substitutions: Approved equal permitted prior to bid.

2.2 COMPONENTS

- A. Coatings: Ready mixed except field catalyzed coatings of good flow and brushing properties, capable of drying or curing free of streaks or sags.
 - 1. Interior Flat and Non-Flat Paints: Maximum volatile organic compound content in accordance with GS-11.
 - 2. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve finishes specified.
 - 1. Interior Clear Wood Finishes: Maximum volatile organic compound content in accordance with SCAQMD Rule 1113.

2.3 SCHEDULE

- A. INTERIOR MASONRY - (CMU)
 - 1. Basis of Design: Latex Systems – Sherwin Williams
 - a. Egg-Shell / Satin Finish
 - 1) 1st Coat: S-W PrepRite® Block Filler, B25W25 (75-125 sq ft/gal)
 - 2) 2nd Coat: S-W ProMar® 200 Latex Eg-Shel, B20W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Eg-Shel, B20W2200 Series (4 mils wet, 1.6 mils dry per coat)
- B. INTERIOR DRYWALL (Gypsum Board)
 - 1. Basis of Design: Latex Systems – Sherwin Williams
 - a. Egg-Shell / Satin Finish
 - 1) 1st Coat: S-W ProMar 200 Latex Primer, B28W8200 (4 mils wet, 1.2 mils dry)
 - 2) 2nd Coat: S-W ProMar® 200 Latex Eg-Shel, B20W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Eg-Shel, B20W2200 Series (4 mils wet, 1.6 mils dry per coat)
- C. INTERIOR METAL – (Ferrous Metal)
 - 1. Basis of Design: Latex Systems – Sherwin Williams
 - a. Semi-Gloss Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series (2-4 mils dry)
 - 2) 2nd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series (4 mils wet, 1.3 mils dry per coat)
- D. INTERIOR WOOD (Clear Finish – Walls, Ceilings, Trim)
 - 1. Basis of Design: Clear Finish
 - a. 1st Coat: S-W Minwax 250 VOC Oil Stain (Optional) or S-W Wood Classics® Interior Oil Stain, A49 Series (Optional)
 - b. 2nd Coat: S-W Wood Classics® Waterborne Polyurethane Varnish, Satin
 - c. 3rd Coat: S-W Wood Classics® Waterborne Polyurethane Varnish, Satin (4 mils wet, 1.0 mil dry per coat)
- E. EXTERIOR METAL - (Galvanized)
 - 1. Basis of Design: Latex Systems – Sherwin Williams
 - a. Semi-Gloss Finish (return to index)
 - 1) 1st Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series
 - 2) 2nd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series (4 mils wet, 1.5 mils dry per coat)
- F. EXTERIOR CONCRETE (Cementitious Siding, Flexboard, Transite Board, Non-Roof Shingles, Common Brick, Stucco, Tilt-up, Precast, and Poured-In-Place Concrete)
 - 1. Basis of Design: S-W Latex Systems
 - a. Gloss Finish
 - 1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)
 - a) Early Moisture Resistant Finish
 - (1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - (2) 2nd Coat: S-W Resilience Latex Gloss, K44 Series
 - (3) 3rd Coat: S-W Resilience Latex Gloss, K44 Series (4 mils wet, 1.44 mils dry per coat)
 - b. Semi-Gloss Finish
 - 1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - 2) 2nd Coat: S-W Metalatex Semi-Gloss Coating, B42 Series
 - 3) 3rd Coat: S-W Metalatex Semi-Gloss Coating, B42 Series (3-5 mils dry per coat)
 - c. Satin Finish
 - 1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - 2) 2nd Coat: S-W A-100 Exterior Latex Satin, A82 Series

- 3) 3rd Coat: S-W A-100 Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)
 - a) Early Moisture Resistant Topcoat
 - (1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - b) 2nd Coat: S-W Resilience Latex Satin, K43 Series
 - c) 3rd Coat: S-W Resilience Latex Satin, K43 Series (4 mils wet, 1.52 mils dry per coat)
- d. Flat Finish
 - 1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - 2) 2nd Coat: S-W A-100 Exterior Latex Flat, A6 Series
 - 3) 3rd Coat: S-W A-100 Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)
 - a) Early Moisture Resistant Topcoat
 - (1) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - (2) 2nd Coat: S-W Resilience Latex Flat, K42 Series
 - (3) 3rd Coat: S-W Resilience Latex Flat, K42 Series (4 mils wet, 1.52 mils dry per coat)
 - b) High Build Flat Coating
 - (1) 1st Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4- 8.3 mils dry)
2. S-W Textured & Smooth Masonry Systems
 - a. Textured Water Based Finish
 - 1) Low VOC Topcoat
 - a) 1st Coat: S-W Loxon XP Smooth, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry)
 - b) 2nd Coat: S-W Loxon XP Fine Textured Waterproofing System, A24-750 Series (14-18 mils wet)
 - 2) Alternate
 - a) 1st Coat: S-W Loxon Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 dry)
 - b) 2nd Coat: S-W UltraCrete Textured Masonry Topcoat A44-800 Series (Fine, Medium, Extra Coarse) (50-80 sq ft/gal)
 - b. Smooth Water Based Finish
 - 1) 1st Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry)
 - 2) 2nd Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry) optional
3. S-W Stain System
 - a. Solid Color Waterborne Finish
 - 1) 1st Coat: S-W Vertical Concrete Stain, A31 Series
 - 2) 2nd Coat: S-W Vertical Concrete Stain, A31 Series (50-250 sq/ft gal)
4. S-W Clear Water Repellant
 - a. Clear Siloxane
 - 1) 1st Coat: S-W Loxon 7% Siloxane Water Repellant, A10T7
 - 2) 2nd Coat: S-W Loxon 7% Siloxane Water Repellant, A10T7 (50-200 sq ft/gal)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate conditions are ready to receive Work.
- B. Measure moisture content of porous surfaces using electronic moisture meter. Do not apply finishes unless moisture content is less than 12%.

3.2 PREPARATION

- A. Correct minor defects and clean surfaces affecting work of this section.
- B. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or applying finishes.

- C. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- D. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- E. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove foreign matter. Remove oil and grease with solution of tri-sodium phosphate, rinse well and allow to dry.
- F. Uncoated Steel and Iron Surfaces: Remove scale by wire brushing, sandblasting, clean by washing with solvent. Apply treatment of phosphoric acid solution. Prime and paint after repairs.
- G. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Clean surfaces with solvent. Prime bare steel surfaces.
- H. Interior Wood Items Scheduled to Receive Paint 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; sand between coats.
- I. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
- J. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior paintable caulking compound after prime coat has been applied.
- K. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.

3.3 APPLICATION

- A. Sand wood and metal surfaces lightly between coats to achieve required finish.
- B. Where clear finishes are required, tint fillers to match wood.
- C. Prime concealed surfaces of interior and exterior woodwork with primer paint.
- D. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25% with thinner.
- E. Finishing Mechanical And Electrical Equipment:
 1. Refer to Divisions 22, 23 and 26 for schedule of color coding, identification banding of equipment, duct work piping, and conduit.
 2. Color code items in accordance with requirements indicated. color schedule. Color band and identify with flow arrows, names, and numbering.
 3. Paint shop primed equipment.
 4. Remove unfinished louvers, grilles, covers, and access panels and paint separately. Paint dampers exposed behind louvers, grilles, convector and baseboard cabinets to match face panels.
 5. Prime and paint insulated and exposed pipes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.
 6. Paint interior surfaces of air ducts and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 7. Paint exposed conduit and electrical equipment occurring in finished areas.
 8. Paint both sides and edges of plywood backboards.
 9. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- F. Cleaning: As work proceeds, promptly remove finishes where spilled, splashed, or spattered.

END OF SECTION

SECTION 09 97 23
SECTION CONCRETE AND MASONRY COATINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Water-based, 100% acrylic, smooth, easy-cleaning, waterproof coating for exterior, above-grade, vertical surfaces of existing coatings where demo and/or repair required on existing surface.

1.2 RELATED REQUIREMENTS

- A. Section 07 90 00 – Joint Protection
- B. Section 09 90 00 – Painting and Coating

1.3 REFERENCE STANDARDS

- A. ASTM D 522 / D 522M – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
- B. ASTM D 1475 – Standard Test Method For Density of Liquid Coatings, Inks, and Related Products.
- C. ASTM D 3359 – Standard Test Methods for Measuring Adhesion by Tape Test.
- D. ASTM D 3719 – Standard Test Method for Quantifying Dirt Collection on Coated Exterior Panels.
- E. ASTM D 4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- F. ASTM D 5201 – Standard Practice for Calculating Formulation Physical Constants of Paints and Coatings. ASTM D 5590 – Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay.
- G. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
- H. ASTM G 155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.
- I. ICRI 310.2R – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
- J. ISO 9001:2008 – Quality Management Systems – Requirements.
- K. Miami/Dade TAS 143-95 – Dirt Pickup Resistance.

1.4 PREINSTALLATION MEETINGS

- A. Convene pre-application meeting 2 weeks before start of application of touch-up waterproof coating.
- B. Require attendance of parties directly affecting work of this section, including Contractor, Architect, applicator, and manufacturer’s representative.
- C. Review the Following:
 - 1. Materials.
 - 2. Protection of in-place conditions.
 - 3. Surface preparation.
 - 4. Application.
 - 5. Protection.
 - 6. Coordination with other work.

1.5 SUBMITTALS

- A. Comply with Division 1– General Requirements.

- B. Product Data: Submit manufacturer's product data, including surface preparation, mixing, and application instructions.
- C. Samples: Submit manufacturer's complete line of samples of full range of colors of waterproof coating.
 - 1. Sample Size: Minimum 3" by 3".
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Manufacturer's Project References: Submit manufacturer's list of successfully completed waterproof coating projects, including project name and location, name of architect, and type and quantity of waterproof coatings furnished.
- F. Applicator's Project References: Submit applicator's list of successfully completed waterproof coating projects, including project name and location, name of architect, and type and quantity of waterproof coatings applied.
- G. Cleaning Instructions: Submit manufacturer's cleaning instructions.
- H. Warranty Documentation: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Manufacturer regularly engaged, for a minimum of 10 years, in the manufacturing of waterproof coatings of similar type to that specified.
 - 2. ISO 9001:2008 certified.
- B. Applicator's Qualifications:
 - 1. Applicator regularly engaged, for a minimum of 5 years, in application of waterproof coatings of similar type to that specified.
 - 2. Employ persons trained for application of waterproof coatings.
- C. Mock-ups:
 - 1. Apply materials to 4-foot by 4-foot (1.2-m by 1.2-m) mock-up to verify acceptable color, texture, and adhesion.
 - 2. Measure adhesion in accordance with ASTM D 3359, Method A.
 - a. Required Minimum Adhesion Rating, 0 to 5 Scale: 4A.
 - 3. Construct mock-ups using same materials, surface preparation, mixing, and application for use in the Work.
 - 4. Construct mock-ups at locations determined by Architect.
 - 5. Do not proceed until mock-ups are approved by Architect.
 - 6. Retain approved mock-ups.
 - 7. BASF representative to inspect each phase of work associated with applied coating system, including but not limited to, surface preparation, detail work and coating application.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials in accordance with manufacturer's instructions.
 - 2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
 - 3. Store materials in clean, dry area.
 - 4. Store materials out of direct sunlight.
 - 5. Keep materials from freezing.
 - 6. Protect materials during storage, handling, and application to prevent contamination or damage.

1.8 AMBIENT CONDITIONS

- A. Do not apply materials when substrate or ambient temperatures are 40°F (4°C) or below during application or within 24 hours after application.

- B. Do not apply materials when rain, snow, or excessive moisture is expected during application or within 24 hours after application.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: BASF Corporation, 889 Valley Park Drive, Shakopee, Minnesota 55379. Toll Free 800-433-9517. Website www.master-builders-solutions.basf.us.

1. Approved Pre-Qualified Coating Contractors:

- a. Advanced Coating & Caulking
3535 Spring Park Rd.
Jacksonville, FL 32207
(904) 396-4383
A.W. Aguilar at acc6120@bellsouth.net (904) 294-6385
- b. Blanchard Coating & Caulking
150 Hilden Rd., Suite. 303
Ponte Vedra, FL 32081
Phone: 904.880.8886
Fax: 904.880.1887
Dennis Blanchard at dennis@blanchardcc.com (904) 880-8886
- c. Complete Property Services
5896 Azalea Street, Port Orange, FL 32127
Phone: 386-322-0097
Fax: 386-322-0955
Jim Allison at jallison@completeproperty.com (904) 591-7984
- d. CPR Contracting, Inc.
11468 New Berlin Rd.
Jacksonville, Florida 32226
(904) 723-3500
Gerard Taylor at gerard@cprcontracting.com (904) 723-3505
- e. Florida Paint
5277 Lenox Ave
Jacksonville, FL 32205
Andy Scroggins at andy@floridapaintco.com (904)783-1717
- f. JB Painting & Waterproofing Inc.
303 Jim Moran Boulevard
Deerfield Beach FL. 33442
Office 800-228-3992
Fax 321-775-3528
Cell 772-216-4608
Keith Schoenrock Northern Territory Sales Manager
<http://www.jbpaintingandwaterproofing.com/>
- g. Southern Waterproofing
4533 Sunbeam Rd Ste 105,
Jacksonville, FL 32257
Mike Winkles at mikewinkles@gmail.com (904) 636-6364
- h. Waterproofing Specialists
3142 Lenox Ave
Jacksonville, Florida 32254
904-389-7261
904-384-5212 Fax
Steve Vanderlinde at sv@wpsi.ws (904) 389-7261

- B. Substitutions: Not permitted.

- C. Single Source: Provide materials from single manufacturer.

2.2 CONCRETE AND MASONRY COATINGS

- A. Waterproof Coating: "MasterProtect C 350".
 - 1. Description: Water-based, 100% acrylic, smooth, easy-cleaning, waterproof coating.
 - 2. Use: Exterior, above-grade, vertical surfaces.
 - 3. Breathable.
 - 4. UV resistant.
 - 5. VOC Content: Less than 50 g/L, less water and exempt solvents.

- B. Test Data:
 - 1. Density, ASTM D 1475: 11.8 lbs/gal (1.41 kg/L).
 - 2. Solids by Volume, ASTM D 5201: 41%.
 - 3. Adhesion to Concrete, ASTM D 4541, 28 Days: 500 psi.
 - 4. Dirt Pickup Resistance, Miami/Dade TAS 14395, Section 7.8 (Modified): Greater than 90% retention of reflectance.
 - 5. Dirt Collection, ASTM D 3719, 61 Days, 45° Angle, Southern Exposure, Dc Index: 0.98.
 - 6. Artificial Weathering and UV Resistance, ASTM G 155, Xenon Arc, Type B, 2,000 Hours: No deleterious effect.
 - 7. Water-Vapor Permeance, ASTM E 96, Wet Cup Test: 20 perms.
 - 8. Flexibility, ASTM D 522, 7 Wet Mils, ½" Mandrel, 40°F (4°C) and 70°F (21°C): No cracking.
 - 9. Fungus Resistance, ASTM D 5590, 30-Day Exposure: No growth.

2.3 ACCESSORIES

- A. Patching Compound: MasterProtect FL 746", textured
 - 1. Description: 100% acrylic-emulsion patching compound.
 - 2. Use: Crack repair.

- B. Base Coat: "MasterProtect HB 200".
 - 1. Description: Water-based, 100% acrylic, smooth, waterproof coating.
 - 2. Use: Base coat for waterproof coating.

- C. Primer: "MasterProtect P 100".
 - 1. Description: Acrylic primer.
 - 2. Use: Primer for all chalky surfaces.

2.4 COLORS

- A. Coating Colors
 - 1. Finish coating colors will be selected by the Architect.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive waterproof coating.
- B. Notify Architect of conditions that would adversely affect application or subsequent use.
- C. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 PROTECTION OF IN-PLACE CONDITIONS

- A. Protect adjacent surfaces and landscaping from contact with waterproof coating.

3.3 SURFACE PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.
- B. Ensure surfaces are sound, clean, dry, and free of bond-inhibiting contaminants.
- C. Ensure concrete substrates are fully cured.

- D. Repair Materials: Repair holes, spalled areas, and damaged concrete with appropriate repair materials from same manufacturer as waterproof coating.
 - 1. Apply repair materials in accordance with manufacturer's instructions.
 - 2. Ensure repair materials are compatible with waterproof coating.
 - 3. Allow repair materials to fully cure.
- E. Remove protruding concrete accessories.
- F. Smooth out surface irregularities.
- G. Roughen concrete surfaces in accordance with manufacturer's instructions to achieve surface profile of CSP 3 in accordance with ICRI 310.2R.
- H. Use chemical cleaning compounds in accordance with manufacturer's instructions, if necessary to remove stains.
- I. Crack Repair:
 - 1. Treat cracks larger than 1/32" with patching compound from same manufacturer as waterproof coating.
 - a. Apply patching compound in accordance with manufacturer's instructions.
 - b. Ensure patching compound is compatible with waterproof coating.
 - c. Allow patching compound to fully cure.
- J. New Concrete Masonry Units:
 - 1. Apply to new concrete masonry units and cement plaster areas a base coat of block filler from same manufacturer as waterproof coating.
 - a. Apply block filler in accordance with manufacturer's instructions.
 - b. Ensure block filler is compatible with waterproof coating.
 - c. Apply block filler to be free of pinholes.
 - d. Allow block filler to fully cure.
- K. Priming:
 - 1. If applying to bare concrete, prime surface with MasterProtect P 150 prior to coating.
 - 2. Chalky surfaces should be primed with MasterProtect P 100.
- L. Blending:
 - 1. Color blend coating on the repaired and new surface areas to achieve a uniform color and texture. Work coating to natural breaks.

3.4 MIXING

- A. Mix waterproof coating in accordance with manufacturer's instructions.
- B. Mix waterproof coating to ensure uniform color and texture.
- C. Mix waterproof coating to minimize air entrapment.

3.5 APPLICATION

- A. Apply waterproof coating in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Apply 1 coat of MasterProtech C350 coating over base coat of MasterProtech HB 200 or HB400.
- C. Maintain proper uniform wet-film thickness (WFT) during application.
- D. Work to natural break and maintain wet edge during application.
- E. Apply waterproof coating using consistent techniques to achieve uniform thickness, consistent appearance, and uniform color and texture to blend existing surfaces and new repaired surfaces. Architect to review.
- F. Do not thin waterproof coating.

3.6 PROTECTION

- A. Protect applied waterproof coating to ensure that, except for normal weathering, coating will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 10 14 00 SIGNAGE

PART 1 – GENERAL

1.1 SCOPE

- A. This Section includes the furnishing and installation of specialty signed including room identification, building identification and an exterior sign.
 - 1. All signs shall be produced by a single manufacturer and shall include mounting hardware.
 - 2. Provide listing of sign types, lettering and locations to be attached with overall dimension of each sign.
 - 3. Provide the following signs for each door or pair of doors:
 - a. Room occupancy name shall be provided by Owner. Verify names with Owner prior to fabrication.
 - b. Room number, actual room numbers will be supplied by Owner.
 - c. FISH number, list of numbers will be furnished by Owner.
 - d. Accessible Toilet Room pictogram (for handicapped toilets, see plans).
 - e. Toilet Room pictogram (for non-handicapped toilets, see plans)
 - 4. Do not deliver signs until ready for their installation. Protect from damage during delivery, handling, storage and installation.
 - 5. All signage shall meet ADA requirements.

1.2 SUBMITTALS – See Section 01 33 00 – SUBMITTALS

PART 2 – PRODUCTS

2.1 IDENTIFICATION SYSTEM

- A. Room Signage, Type S-1
 - 1. Signs of laminated or colored plastic total thickness 0.125".
 - a. Room Occupancy Name and Room Number (FISH) sign shall be attached with two stainless steel screws. In addition, provide adhesive backs to signs as recommended by the manufacturer for permanent mounting.
 - 2. Size of Sign: 4" high x number of characters plus ¾" each end or as shown on the drawings.
 - 3. Color: Dark matte background with white letters.
 - 4. Letters: Letters shall be raised 1/32" and shall be ¾" tall with Grade 2 Braille matching sign message. All letters shall be capitalized.
- B. FISH Number, Type S-5
 - 1. Signs of laminated or colored plastic total thickness 0.125".
 - a. FISH number sign shall be attached to doorhead frame with two stainless steel screws. Provide one sign at each door frame.
 - 2. Size of Sign: 1 ½" high x number of characters plus 3/8" each end, or as shown on drawings.
 - 3. Color: Dark matte background with white letters.
 - 4. Numbers shall be engraved into laminate 1/32" and shall be ¾" tall.
- C. Pictograms
 - 1. 6" minimum border printed with smaller international symbol inside with verbal description below and Grade 2 Braille. See Room Occupancy Name signage requirements for material, lettering and color. Secure pictogram with four stainless steel screws and adhesive.
- D. Location
 - 1. Signs are to be placed on the wall adjacent to the latch side of the door.
 - 2. The dimension from the floor to the centerline of the sign or sign grouping is to be 60".
 - 3. For double doors, or if no wall space exists, sign is to be placed on the nearest adjacent wall.
 - 4. Space from door swing or any obstacles is to be a minimum of 3".
 - 5. For overhead signs, the clearance is to be 6' 8" (80").

2.2 EXTERIOR SIGN: "FIRE ALARM PULL STATION INSIDE" – SIGN S-4

- A. Sign 6" x 6" x 0.125", acrylic background, red matte.
- B. White letters, size proportional to sign dimensions (minimum height to be 5/8")

- C. Unit shall be equal to "Volmar 18T" Series.
- D. All interior fire alarm pull stations shall have this signage at the nearest exterior door.
- E. Provide Grade 2 Braille pictogram on fire alarm signage matching sign message.

2.3 ACCESSIBLE AND NON-ACCESSIBLE TOILET ROOM PICTOGRAM – SIGN S-3

- A. Sign 6" x 6" x .0125" thick acrylic background with universal pictogram (color to be selected by Architect).
- B. Mount at 5'0" above finish floor to centerline of sign.
- C. Attach with four stainless steel screws and wall adhesive.
- D. Provide handicapped pictogram at all accessible Toilet Rooms and all Group Toilets.
- E. Provide standard pictogram at all other Toilet Rooms that are not accessible.

2.4 FIRE EXTINGUISHER SIGNAGE: "FIRE EXTINGUISHER INSIDE" – SIGN S-2

- A. Sign 6" x 6" x .0125" thick red matte acrylic background with 5/8" raised (1/32") white letters and numbers. Provide Grade 2 Braille at bottom of sign to match sign message.
- B. Mount at 5'0" above finish floor to centerline of sign.
- C. Attach with four stainless steel screws and wall adhesive.
- D. Provide one sign outside of all rooms containing FE's and FEC's.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install sign units and components at locations shown or scheduled, securely mounted with theft-resistant fasteners, unless otherwise indicated. Attach signs to substrates in accordance with manufacturer's instructions.
- B. Install level, plumb, and at proper height. Cooperate with other trades for installation of sign units to finish surfaces. Repair or replace damaged units as directed by the Contractor.

END OF SECTION

**SECTION 10 44 00
FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fire extinguisher – See plans for locations.
 - 2. Fire extinguisher cabinets – See plans for locations.
 - 3. Mounting Brackets.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified. For fire extinguisher cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style and materials.
- C. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors available for those units with factory applied color finishes.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain fire extinguisher and cabinets from one source from a single manufacturer.
- B. Coordination: Verify that extinguisher cabinets are sized to accommodate fire extinguisher specified.
- C. UL-Listed Products: Fire extinguisher approved by Factory Mutual Research Corporation for type, rating and classification of extinguisher and carry appropriate FM marking.
- D. FM-Listed Products: Fire extinguisher approved by Factory Mutual Research Corporation for type, rating and classification of extinguisher and carry appropriate FM marking.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Allenco
 - 2. Ansul Fire Protection, Wormald US Inc.
 - 3. Badger-Powhatan
 - 4. Bobrick Washroom Equipment, Inc.
 - 5. J.L. Industries
 - 6. Larsen's Manufacturing Co.
 - 7. Modern Metal Products, Inc.
 - 8. Potter-Roemer, Inc.
 - 9. Samson Metal Products, Inc.
 - 10. Walter Kidde, Division of Kidde, Inc.

2.2 FIRE EXTINGUISHERS

- A. Provide fire extinguisher for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard, which comply with requirements of governing authorities.

1. Abbreviations indicated below identify extinguisher types related to UL classification and rating system and not necessarily to type and amount extinguishing material contained in extinguisher.
- B. Multi-purpose Dry Chemical Type: UL rated 2-a:10:B:C, 10 lb. nominal capacity, in enameled steel container with current inspection labels attached. Provide all locations except data and electrical rooms.
- C. Carbon Dioxide Type: UL Rated 10 B:C, 10 lb. normal capacity in enameled steel container with current inspection labels attached. Provide at electrical rooms and data equipment rooms.

2.3 FIRE EXTINGUISHER CABINETS

- A. Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguisher of type and capacity indicated.
- B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim, style and door style indicated. Weld all joints and grind smooth. Miter and weld permanent door frames.
- C. Cabinet Type: Suitable for mounting conditions indicated, of the following types:
 1. Semi-recessed: Cabinet box (tub) partially recess in 8" masonry walls.
- D. Trim Style: Fabricate trim in one piece with corners mitered, welded and ground smooth.
- E. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.
 1. Enameled Steel: Manufacturer's standard finish, hollow steel door construction with tubular stiles and rails.
 2. Door Glazing: Tempered float glass complying with ASTM C 1048, Type I, Quality q3, Class as follows:
 - a. Clear glass, Class 1 (transparent)
- F. Identify fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" applied to door. Provide lettering to comply with requirements indicated for letter style, color, size, spacing and location or, if not otherwise indicated, as selected by Architect from manufacturer's standard arrangements.
 1. Application Process: Engraved
 2. Door Style: Manufacturer's standard design
 3. Full-Glass Panel: Float glass, 1/8" thick
- G. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style and door material and style indicated. Provide either level handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180°.

2.4 FINISHES FOR FIRE EXTINGUISHER CABINETS

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.

2.5 STEEL FIRE EXTINGUISHER CABINET FINISHES

- A. Baked Enamel Finish: Immediately after cleaning and pretreatment, apply manufacturer's standard 2 coat baked enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's instructions for application and baking to achieve a minimum dry film thickness of 2.0 mils.
 1. Color and Gloss: As indicated by reference to manufacturer's standard color and gloss designations.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install items included in this Section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.
 - 1. Prepare recesses in walls for fire extinguisher cabinet as required by type and size of cabinet and style of trim. Comply with Manufacturer's instructions.
 - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
 - 3. Where exact location of surface mounted cabinets and bracket mounted fire extinguisher is not indicated, locate as directed by Architect.

END OF SECTION

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**SECTION 31 10 00
SITE CLEARING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Protecting existing trees and vegetation to remain.
 - 2. Removing trees and other vegetation as required.
 - 3. Clearing and grubbing.
 - 4. Topsoil stripping.
 - 5. Removing above-grade site improvements as required.
 - 6. Disconnecting, capping or sealing, and abandoning site utilities in place.
 - 7. Disconnecting, capping or sealing, and removing site utilities.
 - 8. Reinstalling above-grade site improvements where specified.
 - 9. Reconnecting site utilities where specified.
- B. Related Sections include the following:
 - 1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
 - 2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
 - 3. Division 1 Section "Temporary Tree and Plant Protection" for protecting trees remaining on-site that are affected by site operations.
 - 4. Division 22 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
 - 5. Division 32 Sections for finish grading, including placing and preparing topsoil for lawns and planting.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings according to Division 1 Section "Project Closeout."
 - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

- A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
 - 2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.
- B. Do not excavate within drip line of trees, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
 - 1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.

2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.3 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing when requested by Contractor.
 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 2. Arrange to shut off indicated utilities with utility companies.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in Division 23 mechanical or Division 26 electrical Sections.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed sub-grade.
 4. Use only hand methods for grubbing within drip line of remaining trees.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 1. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Limit height of topsoil stockpiles to 72 inches.
 2. Do not stockpile topsoil within drip line of remaining trees.
 3. Dispose of excess topsoil as specified for waste material disposal.
 4. Stockpile surplus topsoil and allow for re-spreading deeper topsoil.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

**SECTION 31 20 00
EARTH MOVING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing sub-grades for slabs-on-grade, walks, pavements, lawns, and plantings.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Excavating and backfilling for stormwater basins and berms.
 - 4. Excavating and backfilling for wetland restoration activities.
 - 5. Sub-grade course for concrete walks and pavements.
 - 6. Base course for asphalt paving.
 - 7. Excavating and backfilling trenches within building lines.
 - 8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

1.3 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Layer placed between the sub-grade course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated sub-grade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above sub-grade elevations.
 - 1. Additional Excavation: Excavation below sub-grade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Bulk Excavation: Excavations more than 10' (3 m) in width and pits more than 30' (9 m) in either length or width.
 - 3. Unauthorized Excavation: Excavation below sub-grade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.
- I. Stabilized Sub-grade: Layer placed between the natural ground and base course for paving. Stabilized sub-grade shall be FDOT Type B.
- J. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of plastic warning tape.
 - 2. Drainage fabric.
 - 3. Separation fabric.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.

1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Stabilized Sub-grade: Stabilized sub-grade per FDOT Standard Specifications for Type B.
- F. Base: Limerock per FDOT Standard Specifications.
- G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2" (38-mm) sieve and not more than 12% passing a No. 200 (0.075-mm) sieve.
- H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100% passing a 1" (25-mm) sieve and not more than 8% passing a No. 200 (0.075-mm) sieve.
- I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100% passing a 1-1/2" (38-mm) sieve and 0 to 5% passing a No. 8 (2.36-mm) sieve.

- J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100% passing a 1" (25-mm) sieve and 0 to 5% passing a No. 4 (4.75-mm) sieve.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6" (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30" (750 mm) deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.
- B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
 - 2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
 - 3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
 - 4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
 - 5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.
- C. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Grab Tensile Strength: 200 lbf (890 N); ASTM D 4632.
 - 2. Tear Strength: 75 lbf (333 N); ASTM D 4533.
 - 3. Puncture Resistance: 90 lbf (400 N); ASTM D 4833.
 - 4. Water Flow Rate: 4 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
 - 5. Apparent Opening Size: No. 30 (0.6 mm); ASTM D 4751.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared sub grades, and from flooding Project site and surrounding area.
- B. Protect sub-grades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1" (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Pile Foundations: Stop excavations from 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1" (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12" (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12" (300 mm) on each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench sub-grade.
 - 1. For pipes and conduit less than 6" (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed sub-grade.
 - 2. For pipes and conduit 6" (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90° of pipe circumference. Fill depressions with tamped sand backfill.
 - 3. Excavate trenches 6" (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required sub-grade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- C. Proof roll sub-grade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated sub-grades.
- D. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Inspecting and testing underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Backfill trenches excavated under footings and within 18" (450 mm) of bottom of footings; fill with concrete to elevation of bottom of footings.
- C. Provide 4" (100-mm-) thick, concrete-base slab support for piping or conduit less than 30" (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4" (100 mm) of concrete before backfilling or placing roadway sub-base.
- D. Place and compact initial backfill of sub-base material, free of particles larger than 1" (25 mm), to a height of 12" (300 mm) over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- E. Coordinate backfilling with utilities testing.
- F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- G. Place and compact final backfill of satisfactory soil material to final subgrade.
- H. Install warning tape directly above utilities, 12" (300 mm) below finished grade, except 6" (150 mm) below sub-grade under pavements and slabs.

3.13 FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.

2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

- A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill layer before compaction to within 2% of optimum moisture content.
 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum density according to ASTM D 1557:
 1. Under structures, stormwater basin berms, building slabs, steps, and pavements, scarify and recompact top 12" (300 mm) of existing sub-grade and each layer of backfill or fill material at 98%.
 2. Under walkways, scarify and recompact top 6" (150 mm) below sub-grade and compact each layer of backfill or fill material at 98%.
 3. Under lawn or unpaved areas, scarify and recompact top 6" (150 mm) below sub-grade and compact each layer of backfill or fill material at 90%
 4. Stormwater basin berms: Compact each layer of backfill or fill material at 98%

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish sub grades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 1" (25 mm).
 2. Walks: Plus or minus 1" (25 mm).
 3. Pavements: Plus or minus ½" (13 mm).
 4. Stormwater basin bottoms: Minus 1"
 5. Stormwater basin berm tops: Plus 1"
- C. Grading inside Building Lines: Finish sub-grade to a tolerance of ½" (13 mm) when tested with a 10' (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

- A. Drainage Piping: Drainage pipe is specified in Division 2 Section "Foundation Drainage Systems."
- B. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6" (150-mm) course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12" (300 mm) of filter material and wrap in drainage fabric, overlapping sides and ends at least 6" (150 mm).
 1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

3.18 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency acceptable to Owner to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At sub-grade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100' (30 m) or less of wall length, but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150' (46 m) or less of trench length, but no fewer than two tests.
 - 4. Stormwater Basin Berms: At sub-grade and at each compacted backfill or fill layer, at least one test for every 50' or less of berm length, but no fewer than two tests per berm section.
- E. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.19 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and Re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

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**SECTION 31 31 16
TERMITE CONTROL**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the following: Soil treatment with termiticide.

1.3 PERFORMANCE REQUIREMENTS

- A. Service Life of Soil Treatment: Soil treatment by use of a termiticide that is effective for not less than five years against infestation of subterranean termites.

1.4 SUBMITTALS

- A. Product Data: For termiticide, include the EPA-registered Label for termiticide products.
- B. Product Certificates: For termite control products, signed by product manufacturer.
- C. Qualifications Data: For installer of termite control products.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
 - 1. Date and time of application
 - 2. Moisture content of soil before application
 - 3. Brand name and manufacturer of termiticide
 - 4. Quantity of undiluted termiticide used
 - 5. Dilutions, methods, volumes and rates of application used
 - 6. Areas of application
 - 7. Water source for application
- E. Warranty: Special warranty specified in this section
- F. Certificate of Compliance: The licensed pest control company shall issue a Certificate of Compliance to the authorities having jurisdiction stating the following: The building has received a complete treatment for the prevention of subterranean termites. Treatment is in accordance with rules and laws established by the Florida Department of Agriculture and Consumer Services.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label. Product listed as registered for use as a preventative treatment for termites for new construction by the Florida Department of Agriculture under authority of Chapter 487, Florida Statutes.
- B. Source Limitations: Obtain termite control products through one source.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.7 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Warranty Period: 1 year from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions and terms for agreement period and terms for future renewal options.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Termiticides:
 - a. Aventis Environmental Science USA LP; Termidor
 - b. Bayer Corporation; Premise 75
 - c. Syngenta; Demon TC

2.2 NOTICE OF TERMITE PROTECTION

- A. Provide a permanent sign which identifies the termite treatment provider and need for re-inspection and treatment contract renewal shall be provided. The sign shall be posted near the water heater or electrical panel.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen rake and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION

- A. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.
- B. The licensed pest control service shall be Massey Services, Preventech Jacksonville, 11283 Old St. Augustine Road, Jacksonville, Florida 32257 Tel: 904-273-0203

3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade: Underground-supported slab construction, including footings, building slabs and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along with both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab and around interior column footers; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - 3. Penetrations: At expansion joints, control joints and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping or other construction activities following application.

END OF SECTION

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**SECTION 31 50 00
EXCAVATION SUPPORT AND PROTECTION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes excavation support and protection systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Design, provide, monitor, and maintain an anchored and braced excavation support and protection system capable of resisting soil and hydrostatic pressure and supporting sidewalls of excavations.
 - 1. Work includes removing excavation support and protection systems when no longer needed.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

- A. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems. System design and calculations must be acceptable to authorities having jurisdiction.
 - 1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by excavation support and protection systems.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing excavation support and protection systems similar to those required for this Project and with a record of successful in-service performance.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services for designing excavation support and protection systems that are similar to those indicated for this Project in material, design, and extent.
 - 1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for the excavation support and protection system including drawings and comprehensive engineering analysis that shows the system's compliance with specified requirements.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Architect and then only after arranging to provide temporary utility services according to requirements indicated.
- B. Project Site Information: A geotechnical report has been prepared for this Project and is available for information only. The report is not part of the Contract Documents. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of the subsoil conditions,

tests, and results of analyses conducted by the geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.

1. Make additional test borings and conduct other exploratory operations as necessary.
 2. The geotechnical report is included elsewhere in the Project Manual.
 3. The geotechnical report is referenced elsewhere in the Project Manual.
- C. Survey adjacent structures and improvements, employing a qualified professional engineer or surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Materials need not be new but must be in serviceable condition.
- B. Structural Steel: ASTM A 36.
- C. Steel Sheet Piling: ASTM A 328 or ASTM A 572.
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches .

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Locate excavation support and protection systems clear of permanent construction and to permit forming and finishing of concrete surfaces.
- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 SOLDIER BEAMS AND LAGGING

- A. Install steel soldier piles before starting excavation. Space soldier piles at intervals indicated. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
- C. Install wales horizontally at centers indicated and secure to soldier piles.

3.3 SHEET PILING

- A. Install one-piece sheet piling and tightly interlock to form a continuous barrier. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

- A. Tiebacks: Drill for, install, tension, and grout tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

3.5 BRACING

- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing before removing original brace.
 1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Architect.
 2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and damaging structures, pavements, facilities, and utilities.
 1. Remove excavation support and protection systems to a minimum depth of 48" below overlying construction and abandon remainder.
 2. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION

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**SECTION 32 13 13
CONCRETE PAVING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 1. Driveways and roadways.
 2. Parking lots.
 3. Curbs and gutters.
 4. Walkways.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Samples: 10-lb (4.5-kg) sample of exposed aggregate.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
 1. Cementitious materials and aggregates.
 2. Steel reinforcement and reinforcement accessories.
 3. Fiber reinforcement.
 4. Admixtures.
 5. Curing compounds.
 6. Applied finish materials.
 7. Bonding agent or adhesive.
 8. Joint fillers
- F. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.
- G. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Obtain Architect's approval of mockups before starting construction.
 - 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
 - 5. Demolish and remove approved mockups from the site when directed by Architect.
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
 - 1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixes.
 - c. Ready-mix concrete producer.
 - d. Concrete subcontractor.

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.
- C. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.
- D. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- E. Epoxy-Coated Reinforcement Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars.
- F. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
- G. Plain Steel Wire: ASTM A 82, as drawn.

- H. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A coated, plain steel.
- I. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.
- J. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain steel bars.
- K. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- L. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer coated wire bar supports.
- N. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

- A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.
- B. Portland Cement: ASTM C 150, Type I or II.
 - 1. Fly Ash: ASTM C 618, Class F or C.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.
- D. Blended Hydraulic Cement: ASTM C 595M, Type IP portland pozzolan cement.
- E. Blended Hydraulic Cement: ASTM C 595M, Type I (PM) pozzolan-modified portland cement.
- F. Blended Hydraulic Cement: ASTM C 595M, Type I (SM) slag-modified portland cement.
- G. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
 - 1. Class: 4S.
 - 2. Maximum Aggregate Size: 1 inch (25 mm) nominal.
 - 3. Do not use fine or coarse aggregates containing substances that cause spalling.
- H. Exposed Aggregate: Selected, hard, and durable; washed; free of material that reacts with cementitious material or causes staining; from a single source, with gap graded coarse aggregate as follows:
 - 1. Aggregate Sizes: 3/8 to 5/8 inch (10 to 16 mm) nominal.
- I. Water: ASTM C 94.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1% water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- C. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Fibrillated Fibers:
 - a. Fibrasol F; Axim Concrete Technologies.
 - b. Fibermesh; Fibermesh, Div. of Synthetic Technologies.
 - c. Forta; Forta Corporation.
 - d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- G. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
- H. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- I. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Cimfilm; Axim Concrete Technologies.
 - b. Finishing Aid Concentrate; Burke Group, LLC (The).
 - c. Spray-Film; ChemMasters.
 - d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - e. Sure Film; Dayton Superior Corporation.
 - f. Eucobar; Euclid Chemical Co.
 - g. Vapor Aid; Kaufman Products, Inc.
 - h. Lambco Skin; Lambert Corporation.
 - i. E-Con; L&M Construction Chemicals, Inc.
 - j. Confilm; Master Builders, Inc.
 - k. Waterhold; Metalcrete Industries.
 - l. Rich Film; Richmond Screw Anchor Co.
 - m. SikaFilm; Sika Corporation.
 - n. Finishing Aid; Symons Corporation.
 - o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.
 - 2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:
 - a. AH Curing Compound #2 DR; Anti-Hydro International, Inc.
 - b. Res-X Cure All Resin; Burke Group, LLC (The).
 - c. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
 - d. Day-Chem Rez Cure; Dayton Superior Corporation.
 - e. Kurez DR; Euclid Chemical Co.
 - f. Nitocure S; Fosroc.
 - g. #64 Resin Cure; Lambert Corporation.

- h. L&M Cure DR; L&M Construction Chemicals, Inc.
- i. 3100-Clear; W. R. Meadows, Inc.
- j. Seal N Kure FDR; Metalcrete Industries.
- k. Rich Cure; Richmond Screw Anchor Co.
- l. Resi-Chem C309; Symons Corporation.
- m. Horncure 30; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
- n. Uni Res 150; Unitex.
- o. Certi-Vex RC; Vexcon Chemicals, Inc.
- 3. Clear Waterborne Membrane-Forming Curing Compound:
 - a. AH Curing Compound #2 DR WB; Anti-Hydro International, Inc.
 - b. Aqua Resin Cure; Burke Group, LLC (The).
 - c. Safe-Cure Clear; ChemMasters.
 - d. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
 - e. Day Chem Rez Cure (J-11-W); Dayton Superior Corporation.
 - f. Nitocure S; Fosroc.
 - g. Aqua Kure-Clear; Lambert Corporation.
 - h. L&M Cure R; L&M Construction Chemicals, Inc.
 - i. 1100 Clear; W. R. Meadows, Inc.
 - j. Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
 - k. Rich Cure E; Richmond Screw Anchor Co.
 - l. Resi-Chem Clear Cure; Symons Corporation.
 - m. Horncure 100; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
 - n. Hydro Cure; Unitex.
 - o. Certi-Vex Enviocure; Vexcon Chemicals, Inc.
- 4. White Waterborne Membrane-Forming Curing Compound:
 - a. AH Curing Compound #2 WB WP; Anti-Hydro International, Inc.
 - b. Aqua Resin Cure; Burke Group, LLC (The).
 - c. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
 - d. Thinfilm 450; Kaufman Products, Inc.
 - e. Aqua Kure-White; Lambert Corporation.
 - f. L&M Cure R-2; L&M Construction Chemicals, Inc.
 - g. 1200-White; W. R. Meadows, Inc.
 - h. White Pigmented Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
 - i. Rich Cure White E; Richmond Screw Anchor Co.
 - j. Resi-Chem High Cure; Symons Corporation.
 - k. Horncure 200-W; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
 - l. Hydro White 309; Unitex.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
- B. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.
 - 1. Color: Blue for handicapped requirements, white elsewhere.
- C. Glass Beads: AASHTO M 247.
- D. Wheel Stops: Precast, air-entrained concrete; 2500-psi (17.2-MPa) minimum compressive strength; approximately 6" (150 mm) high, 9" (225 mm) wide, and 84" (2130 mm) long. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter of 3/4" (19 mm), minimum length 10" (254 mm).
- E. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50% aluminum oxide and not less than 25% ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- F. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- G. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100% passing 3/8" (9.5-mm) sieve and 85% retained on a No. 8 (2.36-mm) sieve.
- H. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
 - 2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- I. Chemical Surface Retarder: Water-soluble, liquid set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (3 to 6 mm).
- J. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Chemical Surface Retarder:
 - a. True Etch Surface Retarder; Burke Group, LLC (The).
 - b. Exposee; ChemMasters.
 - c. Delay S; Conspec Marketing & Manufacturing Co., Inc.
 - d. Concrete Surface Retarders; Euclid Chemical Co.
 - e. Expose; Kaufman Products, Inc.
 - f. Surfard; Metalcrete Industries.
 - g. Crete-Nox TA; Nox-Crete Products Group, Kinsman Corporation.
 - h. Lithotex; L. M. Scofield Co.
 - i. Rugasol-S; Sika Corporation.
 - j. Certi-Vex Envioiset; Vexcon Chemicals, Inc.
 - 2. Colored Dry-Shake Hardener:
 - a. Conshake 600 Colortone; Conspec Marketing & Manufacturing Co., Inc.
 - b. Quartz Tuff; Dayton Superior Corporation.
 - c. Surfex; Euclid Chemical Co.
 - d. Colorhard; Lambert Corporation.
 - e. Quartz Plate; L&M Construction Chemicals, Inc.
 - f. Colorcron; Master Builders, Inc.
 - g. Floor Quartz; Metalcrete Industries.
 - h. Richmond Hard Top; Richmond Screw Anchor Co.
 - i. Lithochrome Color Hardener; L. M. Scofield Co.
 - j. Harcol; Sonneborn, Div. of ChemRex, Inc.
 - k. Hard Top; Symons Corporation.

2.8 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
 - 1. Do not use Owner's field quality-control testing agency as the independent testing agency.
- C. Proportion mixes to provide concrete with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 3 inches (75 mm).
 - a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8" (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.
- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Combined Fly Ash and Pozzolan: 25%

- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.
- G. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
- B. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.
- C. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixers of 1 cu. yd. (0.76 cu. m) or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixers of capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and sub-grade is ready to receive pavement.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
 - 1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap to adjacent mats.

3.4 JOINTS

- A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to center line, unless otherwise indicated.
 - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
 - 1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 3. Provide tie bars at sides of pavement strips where indicated.
 - 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - a. Radius: 1/4 inch (6 mm).
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
 - 1. Radius: 1/4 inch (6 mm).

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from sub-base surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten sub-base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

- D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery, at Project site, or during placement.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
 - 1. Compact sub-base and prepare sub-grade of sufficient width to prevent displacement of paver machine during operations.
- L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- M. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. When air temperature has fallen to or is expected to fall below 40°F (4.4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C) and not more than 80°F (27°C) at point of placement.
- N. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep Sub-grade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 SPECIAL FINISHES

- A. Monolithic Exposed Aggregate Finish: Expose coarse aggregate to pavement surfaces as follows:
1. Immediately after floating, spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
 2. Cover with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.
 4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.
- B. Seeded Exposed Aggregate Finish: Immediately after floating, broadcast a single layer of aggregate uniformly onto the pavement surface. Tamp seeded aggregate into plastic concrete, and float to entirely embed aggregate with mortar cover of 1/16 inch (1.6 mm).
1. Spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
 2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.
 4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.
- C. Slip-Resistant Aggregate Finish: Before final floating, apply slip-resistant aggregate finish to pavement surfaces according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened nonslip aggregate over the surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- D. Rock-Salt Finish: After initial floating, uniformly seed 5 lb/100 sq. ft. (0.2 kg/10 sq. m) over the concrete surface.
1. Cover surface with 1-mil- (0.025-mm-) thick polyethylene sheet and remove when concrete has hardened and seven-day curing period has elapsed.
 2. Embed rock salt into plastic concrete, power float concrete, and trowel finish.
 3. After seven-day curing period, saturate concrete with water and broom-sweep surface to dissolve remaining rock salt.
- E. Colored Dry-Shake Hardener Finish: After initial floating, apply colored dry-shake materials to pavement surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply colored dry-shake materials at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m), unless greater amount is recommended by manufacturer to match pavement color required.
 2. Uniformly distribute approximately two-thirds of colored dry-shake material over the concrete surface with mechanical spreader, and embed by power floating. Follow power floating with a second shake application, uniformly distributing remainder of dry-shake material to ensure uniform color, and embed by power floating.
 3. After final floating, apply a hand-trowel finish followed by a broom finish to concrete. Cure concrete with curing compound recommended by dry-shake material manufacturer. Apply curing compound immediately after final finishing.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12" (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12" (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4" (6 mm).
 - 2. Thickness: Plus 3/8" (9 mm), minus 1/4" (6 mm).
 - 3. Surface: Gap below 10' (3-m-) long, unlevelled straightedge not to exceed 1/4" (6 mm).
 - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1" (25 mm).
 - 5. Vertical Alignment of Tie Bars and Dowels: 1/4" (6 mm).
 - 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2" (13 mm).
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4" per 12" (6 mm per 300 mm).
 - 8. Joint Spacing: 3" (75 mm).
 - 9. Contraction Joint Depth: Plus 1/4" (6 mm), no minus.
 - 10. Joint Width: Plus 1/8" (3 mm), no minus.

3.10 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
 - 1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal. (0.72 kg/L).

3.11 WHEEL STOPS

- A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5" (125 mm) into wheel stop and lower portion a minimum of 5" (125 mm) into pavement.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- C. Testing Services: Testing shall be performed according to the following requirements:
 - 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40°F (4.4°C) and below and when 80°F (27°C) and above, and one test for each set of compressive-strength specimens.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
 - 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m). One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
 - 7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 8. When total quantity of a given class of concrete is less than 50 cu. yd. (38 cu. m), Architect may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.
 - 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
 - 10. Strength level of concrete will be considered satisfactory if averages of sets of 3 consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as the sole basis for approval or rejection.
- F. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.13 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

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**SECTION 33 05 00
COMMON WORK RESULTS FOR UTILITIES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following utility materials and methods to complement other utilities work:
 1. Piping materials and installation instructions common to most piping systems.
 2. Concrete base construction requirements.
 3. Equipment nameplate data requirements.
 4. Non-shrink grout for equipment installations.
 5. Field-fabricated metal and wood equipment supports.
 6. Utility piping demolition.
 7. Cutting and patching.
 8. Touchup painting and finishing.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. The following are industry abbreviations for plastic materials:
 1. ABS: Acrylonitrile-butadiene-styrene.
 2. CPVC: Chlorinated polyvinyl chloride.
 3. PE: Polyethylene.
 4. PVC: Polyvinyl chloride.

1.4 SUBMITTALS

- A. Product Data: For identification materials and devices.
- B. Samples of color, lettering style, and other graphic representation required for each identification material and device.
- C. Shop Drawings: Detail fabrication and installation for metal and wood supports, and anchorage for utility piping materials and equipment.
- D. Coordination Drawings: Detail major elements, components, and systems of utility equipment and materials in relation to other systems, installations, and building components. Show space requirements for installation and access. Indicate whether sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 2. Clearances for installing and maintaining insulation.
 3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 4. Equipment and accessory service connections and support details.
 5. Building, exterior wall, and foundation penetrations.
 6. Sizes and location of required concrete bases.
 7. Scheduling, sequencing, movement, and positioning of large equipment during construction.
 8. Floor plans, elevations, and details to indicate penetrations in floors and walls, and their relationship to other penetrations and installations.

- E. Welding Certificates: Copies of certificates indicating compliance of welding procedures and personnel with requirements specified in the "Quality Assurance" Article of this Section.

1.5 QUALITY ASSURANCE

- A. Qualify welding processes and operators for structural steel according to AWS D1.1, "Structural Welding Code--Steel."
- B. Qualify welding processes and operators for piping according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions of ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- D. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. If larger equipment is approved, no additional costs will be approved for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design requirements and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate equipment installation with other components.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the Work.
- D. Coordinate connection of piping systems with other exterior underground and overhead utilities and services. Comply with requirements of authorities having jurisdiction, franchised service companies, and controlling agencies.
- E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 22 Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

- A. Refer to individual Division 2 piping Sections for special joining materials not listed below.

- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250 cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metal: ASTM B 32.
 - 1. Alloy Sn95 or Alloy Sn94: Approximately 95% tin and 5% silver, with 0.10% lead content.
 - 2. Alloy E: Approximately 95% tin and 5% copper, with 0.10% maximum lead content.
 - 3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10% maximum lead content.
 - 4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10% maximum lead content.
 - 5. Alloy Sb5: 95% tin and 5% antimony, with 0.20% maximum lead content.
- F. Brazing Filler Metals: AWS A5.8.
 - 1. BCuP Series: Copper-phosphorus alloys.
 - 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
 - 1. ABS Plastic Piping: ASTM D 2235.
 - 2. CPVC Plastic Piping: ASTM F 493.
 - 3. PVC Plastic Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. ABS to PVC Plastic Piping Transition: ASTM D 3138.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron-Pipe Gaskets, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.
 - 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
 - 3. Gaskets: Rubber.
 - 4. Bolts and Nuts: AWWA C111.
 - 5. Finish: Enamel paint.

2.3 PIPING SPECIALTIES

- A. Dielectric Fittings: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and to stop corrosion.
 - 1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types; and matching piping system materials.
 - 2. Insulating Material: Suitable for system fluid, pressure, and temperature.
 - 3. Dielectric Unions: Factory-fabricated union assembly, for 250-psig minimum working pressure at 180°F.
 - 4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
 - 5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly; full-face or ring type. Components include neoprene or phenolic gasket, phenolic or PE bolt sleeves, phenolic washers, and steel backing washers.
 - a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.
 - 6. Dielectric Couplings: Galvanized-steel coupling; with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225°F.
 - 7. Dielectric Nipples: Electroplated steel nipple; with inert and noncorrosive, thermoplastic

lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225° F.

- B. Mechanical sleeve seals for pipe penetrations through exterior building walls are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- C. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast Iron: Cast or fabricated wall pipe equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.
 - 4. PVC Plastic: Manufactured, permanent, with nailing flange for attaching to wooden forms.
 - 5. PVC Plastic Pipe: ASTM D 1785, Schedule 40.
 - 6. PE Plastic: Manufactured, reusable, tapered, cup-shaped, smooth outer surface; with nailing flange for attaching to wooden forms.

2.4 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 2 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
 - 2. Location: An accessible and visible location.
- C. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but at least 1-1/4-inch- high letters for ductwork and at least 3/4-inch-high letters for access door signs and similar operational instructions.
 - 1. Material: Fiberboard.
 - 2. Material: Brass.
 - 3. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
 - 4. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.
- D. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semi-rigid, snap on, color-coded, complying with ASME A13.1.
- E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent-adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.
- F. Plastic Duct Markers: Manufacturer's standard color-coded laminated plastic. Comply with the following color-codes:
 - 1. Green: Cold air.
 - 2. Yellow: Hot air.
 - 3. Yellow/Green or Green: Supply air.
 - 4. Blue: Exhaust, outside, return, and mixed air.
 - 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
 - 6. Nomenclature: Include the following:
 - a. Direction of airflow.
 - b. Duct service.
 - c. Duct origin.
 - d. Duct destination.
 - e. Design cubic feet/minute.
- G. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
 - 1. Fabricate in sizes required for message.
 - 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.

3. Punch for mechanical fastening.
4. Thickness: 1/16 inch, unless otherwise indicated.
5. Thickness: 1/8 inch, unless otherwise indicated.
6. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches long; 1/8 inch for larger units.
7. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.

- H. Plastic Equipment Markers: Color-coded laminated plastic. Comply with the following color-codes:
1. Green: Cooling equipment and components.
 2. Yellow: Heating equipment and components.
 3. Yellow/Green: Combination cooling and heating equipment and components.
 4. Brown: Energy reclamation equipment and components.
 5. Blue: Equipment and components that do not meet any criteria above.
 6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
 7. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and revolutions/minute.
 8. Size: Approximate 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.
- I. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service.

2.5 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout; nonstaining; noncorrosive; nongaseous; and recommended for interior and exterior applications.
 2. Design Mix: 5000 psig, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 2 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at indicated slopes.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping free of sags and bends.
- F. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- G. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- H. Install fittings for changes in direction and branch connections.
- I. Install couplings according to manufacturer's written instructions.
- J. Sleeves are not required for core drilled holes.

- K. Permanent sleeves are not required for holes formed by PE plastic removable sleeves.
- L. Verify final equipment locations for roughing-in.
- M. Refer to equipment specifications in other Division 2 Sections for roughing-in requirements.
- N. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping Sections:
 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside pipe and fittings before assembly.
 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
 4. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
 5. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."
 6. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with corroded or damaged threads. Do not use pipe sections that have cracked or open welds.
 8. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 9. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
 10. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. ABS Plastic Piping: ASTM D 2235 and ASTM D 2661.
 - c. CPVC Plastic Piping: ASTM D 2846 and ASTM F 493.
 - d. PVC Plastic, Pressure Piping: ASTM D 2672.
 - e. PVC Plastic, Nonpressure Piping: ASTM D 2855.
 - f. ABS to PVC Plastic, Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.
 11. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 procedures and manufacturer's written instructions.
 - a. Plain-End Pipe and Fittings: Use butt fusion.
 - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
- O. Piping Connections: Make connections according to the following, unless otherwise indicated:
 1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- B. Install equipment level and plumb.
- C. Install equipment to facilitate service, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- D. Install equipment giving right of way to piping systems installed at required slope.

3.3 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - 1. Stenciled Markers: According to ASME A13.1.
 - 2. Plastic markers, with application systems. Install on insulation segment if required for hot non-insulated piping.
 - 3. Locate pipe markers on exposed piping according to the following:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
 - c. Near locations if pipes pass through walls or floors, or enter inaccessible enclosures.
 - d. At manholes and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
 - 1. Lettering Size: Minimum 1/4-inch-high lettering for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - 2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.4 PAINTING AND FINISHING

- A. Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.
- B. Apply paint to exposed piping according to the following, unless otherwise indicated:
 - 1. Ferrous Piping: Use semigloss, acrylic-enamel finish. Include 2 finish coats over rust-inhibitive metal primer.
 - 2. Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include 2 finish coats over galvanized metal primer.
 - 3. Ferrous Supports: Use semigloss, acrylic-enamel finish. Include 2 finish coats over rust-inhibitive metal primer.
- C. Do not paint piping specialties with factory-applied finish.
- D. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000 psig, 28-day compressive strength concrete and reinforcement as specified in Division 3 Section, "Cast-in-Place Concrete."

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports in location, alignment, and elevation to support and anchor utility piping materials and equipment.
- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor utility materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.8 DEMOLITION

- A. Disconnect, demolish, and remove work specified in Division 2 Sections.
- B. If pipe, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe in its entirety.
- D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from Project site.
- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.9 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for utility piping installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.10 GROUTING

- A. Install nonmetallic, nonshrink grout for equipment-support bearing surfaces, pump and other equipment support plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout on concrete bases to provide smooth bearing surface for equipment.
- F. Place grout around anchors.
- G. Cure placed grout according to manufacturer's written instructions.

END OF SECTION