PROJECT MANUAL

The City of Miami

Dorsey Memorial Library Restoration

Project No. B-30531

Department of Capital Improvements
444 SW 2nd Avenue – Miami, Florida 33130

PERMIT SET
February 24th, 2017
Rev. 2

Prepared by Consultant:

M.C. Harry & Associates, Inc.
Architecture – Planning – Interiors

SECTION 000110

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AVAILABLE PROJECT INFORMATION

PART 1 - GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of the Contract Documents, as follows:

1. Site Survey: Entitled “Boundary Survey”; prepared by Master Consulting, PA; dated 5/10/2016.

a. A copy of the Survey is included in the Drawings.

2. Geotechnical Report: Entitled “Report of Subsurface Exploration & Geotechnical Engineering”; prepared by NV5; dated 9/27/2016.

a. A copy of the Report is attached to this Section.

3. Designation Report: Entitled “Designation Report”; prepared by City of Miami Preservation Officer.

a. A copy of the Report is attached to this Section.

4. Wall Shoring Drawings: Entitled “Exterior Wall Shoring”; prepared by Rizo, Carreno & Partners; dated 3/29/2016.

a. A copy of the Drawings is attached to this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

Attachment(s):

Attachment A: Geotechnical Report (19 pages).

Attachment B: Designation Report (14 pages).

Attachment C: Wall Shoring Drawings (6 pages).

September 27, 2016

Mr. Javier O. Torres
Principal
MC Harry Associates
2780 SW Douglas Road, Suite 302
Miami, Florida 33133

Re: Report of Subsurface Exploration & Geotechnical Engineering
Dorsey Memorial Library
100 NW 17th Street
Miami, Florida
NV5 Project No. 15370

Dear Mr. Torres:

NV5, Inc. submits this final report in fulfillment of the scope of services described in our Proposal No. 16-0573 dated September 3, 2016. The work was authorized by acceptance of our Professional Services Agreement. This report presents our understanding of the project, presents our evaluations, and provides foundation recommendations.

Sincerely,
NV5, INC.

Alfredo Budik, P.E.
Senior Engineer
Florida License No. 43884

Distribution: 2 Copies to Addressee via U.S. Mail
1 Copy to Addressee via Email
1 Copy to NV5 File

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NV5

1.0 SITE AND PROJECT INFORMATION

The site is located at 100 NW 17th Street in Miami, Florida. It is bordered by NW 17th street to the north, 2-story residential buildings to the south, NW 1st Avenue to the east and an empty lot to the west. A boundary survey drawing prepared by Master Consulting, P.A. dated 05/10/2016 was provided. The drawing indicates that the site dimensions are 125 feet x 60 feet and grade elevations range from +14.2 to +15.1 feet with respect to the 1929 National Geodetic Vertical Datum (NGVD). A one story-residence occupies the site with a footprint of about 80 feet x 25.

The proposed development consists of a single-story structure to be used as a library with similar footprint as the structure to be demolished. We assume that construction will consist of masonry and reinforced concrete. Finished floor elevation will be at about Elevation +17.5 feet NGVD. No basement areas are planned. Structural loads were not provided. However we have assumed that column loads will be on the order of about 50 to 100 kips, and ground floor slabs are expected to be loaded to a maximum of 150 psf.

2.0 PURPOSE AND SCOPE OF WORK

The purpose of our services on this project is to explore the subsurface conditions at the site in order to provide recommendations for foundation design and construction. Specifically this report addresses:

- Drawings showing boring locations, a graphic summary of the generalized subsurface conditions, and boring logs with detailed descriptions of the materials encountered.
- Discussion of generalized subsurface conditions at the site including groundwater levels.
- Discussion of feasible foundation type(s) for the proposed construction.
- Design parameters for the recommended foundation type(s), including vertical and lateral load resistance.
- Estimates of foundation settlements.
- Recommendations for site preparation and grading, including the re-use of site-excavated materials for fill, fill placement and compaction, and slab subgrade preparation.
- Construction considerations including excavation support and dewatering, and impacts for adjacent structures.

3.0 FIELD EXPLORATION

The subsurface conditions at the site were explored with two (2) engineering test borings drilled to 20 feet below the existing grade at the approximate locations shown on Drawing 1. The test locations were marked and identified in the field by NV5. The borings were drilled with a track-mounted drill rig utilizing the rotary wash method. Samples of the subsurface materials were recovered at roughly 2-foot intervals within the upper 10 feet of the borings and at

approximately 5-foot intervals thereafter using a Standard Penetration Test split-spoon sampler (SPT) in substantial accordance with ASTM D-1586, "Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils." This test procedure drives a 1.4-inch I.D. split-tube sampler into the subsurface profile using a 140-pound hammer falling 30 inches. The total number of blows required to drive the sampler the second and third six-inch increments is the SPT N-value, in blows per foot, and is an indication of material strength. Upon completion of the borings, the lower portions of the boreholes were backfilled with the soil cuttings, and the remaining portions closed with cement grout.

The soil/rock samples recovered from the borings were classified by a geotechnical engineer. The collected samples were later re-examined to confirm field classifications. Visual soil classifications were made in accordance with ASTM D2487 and ASTM D2488. The results of the classification and consequent generalized stratification are shown in Drawing 2, the generalized subsurface profile, and in the records of test borings in Appendix A (sheets A-1 through A-5). Strata contacts shown on these drawings are approximate. The boring data reflect conditions at the specific test locations only, and at the time the borings were drilled.

4.0 LOCAL GEOLOGY AND GEOLOGIC HAZARDS

4.1 LOCAL GEOLOGY

Miami-Dade County is located on the southern flank of a stable carbonate platform on which thick deposits of limestones, dolomites and evaporites have accumulated. The upper two hundred feet of the subsurface profile is composed predominantly of limestone and quartz sand. These sediments were deposited during several glacial and interglacial stages when the ocean was at elevations higher than present.

In many portions of Miami-Dade County, surface sand deposits of the Pamlico Formation are encountered. The Pamlico sands overlie the Miami Limestone. In western Miami-Dade County, portions of the Everglades Region interfinger with the Pamlico sand. The Everglades soil consists of peat and calcareous silt (marl).

The Miami Limestone is a soft to moderately hard, white, porous to very porous, sometimes sandy, oolitic calcareous cemented grainstone. The formation outcrops in portions of Miami-Dade County. The Miami Limestone has a maximum thickness of about 35 feet along the Atlantic Coastal Ridge and thins sharply near the coastline and more gradually in a westerly direction. The Miami Limestone was formed about 130,000 years ago at a time when the sea level was twenty-five feet higher than it is today. This environment facilitated formation of concentrically layered sand sized carbonate grains called oolites. These grains formed by repeated precipitation of calcium carbonate around the nucleus of a sand or shell grain.

The Miami Limestone can be separated into two facies: the barrier bar oolitic facies and the tidal shoal limestone facies. The barrier bar facies is characterized by lenses of oolitic limestone separated by intermittent, 1-inch thick or less, uncemented sand layers (cross-bedded limestone). Zones of higher porosity are characteristic and parallel the bedding planes of the cross-bedded limestone. The tidal

shoal limestone facies is characterized by a distinct lack of bedding planes. In addition, burrowing organisms have churned previously deposited sediments, which have resulted in high porosity channels in the rock. These ancient channels give the rock an appearance of a hardened sponge in some areas.

The Fort Thompson Formation underlies the Miami Limestone, and includes sand, sandstone, and limestone. The upper zones of the Fort Thompson Formation consist of sand having a thickness ranging from 5 to 35 feet. The remainder of the formation consists of coralline limestone, quartz sandstone, sandy limestone and freshwater limestone. The type of soils within the formation and the degree of cementation vary with lateral extent and depth.

The Fort Thompson Formation is underlain by the Tamiami Formation. The Tamiami Formation consists of sands, silts, clays, and sometime fossiliferous limestone. The upper portions of the Tamiami Formation are permeable and make up the lower reaches of the Biscayne Aquifer. This formation ranges in thickness from zero to 300 feet in South Florida.

4.2 GEOLOGIC HAZARDS

The South Florida area is relatively free of geologic hazards. The region is not considered seismically active. Consequently hazards such as ground shaking, liquefaction, lateral spreading, and ground rupture that are normally associated with earthquakes and other seismic activity are generally not a factor for the design of structure foundations in South Florida. Based on the 2012 International Building Code, a Site Class D classification is considered appropriate for this site.

Karst topography that is associated with the formation of sinkholes and other underground discontinuities in carbonate rock formations in the central and northern portions of Florida is generally not found in South Florida. Any discontinuities in the limestone due to solutioning of the rock are typically very limited in vertical and lateral extent and are usually not considered a factor in the design of foundations in the local practice.

5.0 SUBSURFACE CONDITIONS

In general, the subsurface conditions encountered in the borings are generally consistent with the geology described above. The detailed subsurface conditions are presented graphically in the attached generalized subsurface profile and in more detail on the records of test boring sheets. The subsurface conditions disclosed by the borings can be generalized as described below.

Layer 1 – Fill and Sand
This layer consists of light brown changing to tan sand with some limestone fragments that is 10 feet thick in the borings. The layer is very loose to dense with SPT N-values that range 3 to 38 blows per foot (bpf) with an average of about 22 bpf.

Layer 2 – Limestone
This layer comprises tan limestone and extends to the termination depths of the borings. The limestone is soft to very soft with SPT N-values ranging 15 to 23 bpf with an average of 19 bpf.

For the layers described above, Table 1 below summarizes our estimates of engineering

parameters considered pertinent to the design of foundations for high-rise structures.

TABLE 1 - SUMMARY OF ESTIMATED PERTINENT ENGINEERING PARAMETERS

Layer ID	Description	Thickness (ft.)	SPT N-values		Modulus of Elasticity (ksf)	Unconfined Compressive Strength (ksf)	Allowable Side Shear (ksf)
			Range	Ave.			
1	Fill and Sand (Fill)	10	3 – 38	22	300	-	-
2	Limestone	10+	15 – 23	19	5,000	300	3

We note that the values of allowable side shear estimated in Table 1 above are based on our experience and laboratory data from similar materials that we have tested.

Groundwater

Groundwater was encountered in the borings at a depth of about 11.6 feet below the existing ground surface. This depth corresponds approximately to Elevation +3 feet NGVD. On average, groundwater levels in the general vicinity of the project are expected to vary between elevations +0 to +4 feet NGVD, the variations being primarily as a result of tidal fluctuations and seasonal rainfall. Storm and hurricane events and construction activities also result in variations in the groundwater levels. Notwithstanding the variations acknowledged, we anticipate that groundwater at the site will generally be encountered within the upper 10 feet of the existing ground surface.

6.0 EVALUATION AND DISCUSSION

6.1 FOUNDATION SUPPORT

Based on the results of the field exploration and our engineering analyses, we consider the site suitable for the proposed construction from a geotechnical engineering perspective. The proposed 1-Level structure can be supported on shallow foundations after the near-surface soils have been properly prepared as recommended herein. Our recommendations for foundation design and construction are presented in Section 7 of this report.

The primary concern for foundation design and construction include support of the proposed new structure loads without unacceptable settlement. Considering the relatively modest anticipated structure loads, the new building can be supported on shallow spread footings after the site is prepared as recommended herein.

6.2 ESTIMATED SETTLEMENT

We estimate that shallow foundations that are properly designed and constructed as recommended herein will experience total settlements of one (1) inch or less and maximum differential settlements of ½ to ¾ inch. Given the granular nature of the subsurface materials at the site, we predict settlement will occur coincidental with the application of the building dead and live loads and for a short time after. The above settlement estimates are for foundations that are designed and constructed as recommended herein.

6.3 MISCELLANEOUS ENVIRONMENTAL IMPACTS

Environmental forces consist of sinkholes, freeze thaw damage, shrinking and swelling soils, and hurricane scour can affect the performance of a foundation system. Sinkholes, freeze-thaw, and shrinking/swelling soils are generally not of concern in the South Florida area. While a detailed study of hurricane scour was outside the scope of this study, it is nonetheless our opinion that the foundation systems recommended herein when properly designed and constructed, will resist hurricane scour forces. It is therefore our opinion that these specific environmental forces have a low risk (on a scale of low, moderate, high) of adversely affecting foundation performance at this site provided the foundation system is designed and constructed as recommended herein.

7.0 RECOMMENDATIONS

Our recommendations for geotechnical design and construction of the proposed residence project are provided in the following sections.

7.1 SITE PREPARATION AND GRADING

1. Geotechnical site preparation for construction should consist of removal of all existing structures, foundations, pavements, underground utilities, and other deleterious materials within proposed structure and pavement footprints plus a five-foot perimeter. Any voids created by the removal of these deleterious materials should be properly backfilled as described in the paragraphs below.

   No information has been provided about previous or existing foundations at the site and we are not aware of the site development history beyond its current condition. Where old spread or other foundations are encountered, they should be removed and replaced with compacted fill if they interfere with new foundations or utilities. If the old foundations do not interfere with new construction they could be left in place. Backfilling of old foundation excavations should be performed in accordance with the recommendations provided in this report.

2. After site preparation as described above, areas for structures that will have slabs on grade or pavements should be proof rolled and densified. The proof rolling should be observed by NV5 to identify and mitigate any weak subgrade conditions evidenced by yielding of the compactor. Proof-rolling should include planned development footprints plus a five-foot perimeter. However, proofrolling is not required where the limestone layer is exposed.

3. In general fill soils should consist of either inorganic, non-plastic sand having less than 10 percent material passing the No. 200 sieve, or crushed limestone with a maximum rock size of six (6) inches. In particular, fill soils placed within the upper 12 inches of the subgrade of building slabs on grade should consist of either sand with less than 10 percent passing the number 200 sieve, or crushed limestone with a maximum particle size of three inches.

   Based on our boring data the near-surface sandy materials should satisfy the fill criteria, but might require localized sorting and moisture-conditioning prior to re-use. In any event, representative samples of the fill soils should be collected for classification and compaction

testing. The maximum dry density, optimum moisture content, gradation, and plasticity should be determined. These tests are needed for quality control of the compacted fill.

4. Fill soils should be placed with loose lift thicknesses of not more than 12-inches, moisture-conditioned to within two (2) percent of the optimum moisture content based on ASTM D-1557, and compacted to a minimum 95 percent relative compaction[1]. One test should be performed for each 2,500 square feet of fill area per lift of fill soils. If during the compaction process fill shows evidence of yielding under the weight of the roller, it should be removed and replaced with properly compacted granular fill as described herein. Fill particles exceeding one (1) inch in size should not be allowed to nest within the fill. Areas where the limestone layer is exposed do not require soil density tests.

   The vibrations produced by the operation of the compactor should be monitored for potential adverse effect on adjacent existing structures, pavements, and utilities. If nearby structures will be affected by the vibration of the compactor, the compaction procedure may require modification as approved by the geotechnical engineer.

7.2 FOUNDATION SUPPORT

1. After preparing the site as described above the proposed structure may be supported on shallow spread foundations designed for a maximum allowable bearing pressure of **2,500** pounds per square foot (psf).

2. The bottoms of footings should bear on the compacted fill and sand layers and embedded at 18 inches below lowest adjacent grade. The bottom of the footings should be probed by NV5 to check for any unsuitable or soft materials in the footing subgrade. Any such materials will need to be removed and replaced as described above.

3. To assure an adequate factor-of-safety against a general shearing failure, strip and continuous footings should be at least 18 inches wide, and isolated footings should be no less than 30 inches wide.

4. Lateral forces may be resisted by passive earth pressure acting on the vertical foundation faces and by friction acting between the bottoms of foundations and the supporting subgrade or lean concrete. We recommend using an equivalent fluid weight of 180 pounds per cubic foot (pcf) to compute passive resistance for moist soil above the water table, and 80 pcf to compute passive resistance in submerged soil. Passive resistance in the upper 12 inches of soil should be neglected unless it is confined by a slab or pavement. Frictional resistance may be computed using a factor of 0.30 times the sustained dead loads.

   The above values include a factor of safety of at least 1.5. These values of resistance assume that the foundations are: 1) in-situ soil densified by compaction, in-situ limestone, or clean sand

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1 Relative compaction refers to the in-place dry unit weight of a material expressed as a percentage of the maximum dry unit weight of the same material as determined in the laboratory using the Modified Proctor procedure (ASTM D1557).

fill which is compacted to 95 percent relative compaction, and 2) able to withstand horizontal movement on the order of ¼ to 3/8 inch.

5. Bottoms of footing excavations in granular fill should be compacted to 95 percent relative compaction prior to placement of steel reinforcement and concrete. Bottom of footings on the exposed limestone layer do not require compaction nor soil density tests.

7.3 GROUND FLOOR SLABS

1. Ground floor slabs may be supported on grade assuming the site is prepared as recommended herein.

2. A subgrade modulus of 150 pounds per cubic inch (pci) may be used for slab design.

3. Slabs should be reinforced for the loads that they will sustain and construction joints should be provided at frequent intervals.

4. Slabs in contact with soil are subject to movement of moisture from the soil upward through the slab. To prevent such moisture vapor transmission, a moisture barrier should be placed on the slab subgrade, and should be protected from damage during construction. Construction joints should be provided with water stops in any permanently submerged areas.

7.4 EXCAVATION AND DEWATERING

1. Shallow excavations into the near-surface materials will likely stand vertical for short periods of time only. The excavation sides will unravel over time as they are exposed to weather and construction traffic. In general, the Layer II limestone is expected to stand vertically unsupported if excavated. However localized weaker sandy zones within this layer could become loose if unsupported. Deeper excavations, especially those that extend below the groundwater table, as well as excavations that will remain open for longer periods of time will require support in the form of temporary shoring or sliding trench boxes to prevent instability of excavation walls and to protect workers from injury. All excavations should comply with Occupational Safety and Health Administration (OSHA) design and safety requirements. Shoring designs should be signed and sealed by a Florida-licensed professional engineer, and should be provided for the Owner's review.

2. Average groundwater elevation is expected to be between about Elevation +0 and +4 feet NGVD for this site. Dewatering is therefore not expected to be a significant factor for foundation construction. Nonetheless, dewatering could be required for the installation of deeper utilities and appurtenances such as sewers, storm drains, catch basins, and manholes. We judge that localized dewatering if required can be accomplished using pumps and sumps. Dewatering of larger excavations and larger volumes will require the installation of well points.

   It should be noted there are two components to the dewatering process. The first is extracting the water from the subsurface and the requirement of the project to maintain a dry excavation to allow construction to proceed. The other component is the ability to discharge the volume of water extracted. The contractor must ensure this capability exists for the site such that all

dewatering and consequent effluent discharge will meet the requirements of the local jurisdictional agencies including Miami-Dade County, Florida Department of Environmental Protection (FDEP), Florida Department of Transportation, and South Florida Water Management District (SFWMD) as appropriate. This study did not include specific testing or analysis to determine if dewatering is feasible or if adequate discharge is available.

During dewatering the adjacent properties must be monitored for adverse impacts from dewatering drawdown. The dewatering subcontractor should submit a proposed design for dewatering operations to the owner for review and approval prior to commencing work.

7.5 OTHER RECOMMENDATIONS

1. NV5 should participate in the design development phases of this project in order to modify the recommendations provided above as changes occur during the design development process.

2. NV5 should participate in the evaluation of field problems as they arise and recommend solutions. We should also be involved with site work activities so we can address needed changes to the foundation recommendations if site conditions different from those described herein are encountered. NV5 should observe and test the foundation installation to satisfy the requirements of the Florida Building Code and municipal agencies.

3. We should be provided the opportunity to review final foundation specifications and review foundation design drawings, in order to ascertain whether our recommendations have been properly interpreted and implemented. If NV5 is not afforded the opportunity to participate in construction related aspects of foundation installation as recommended in this report, we can accept no responsibility for the interpretation of our recommendations made in this report or for foundation performance

8.0 REPORT LIMITATIONS

This report has been prepared for the exclusive use of the Owner and other members of the design/construction team for the specific projects discussed in this report. This report has been prepared in accordance with generally accepted local geotechnical engineering practices; no other warranty is expressed or implied.

The evaluation and recommendations submitted in this report are based in part upon the data collected from the field exploration. The nature or extent of variations throughout the subsurface profile may not become evident until the time of construction. If variations then appear evident, it may be necessary to evaluate our recommendations as provided in this report. In the event changes are made in the nature, design or locations of the proposed project construction, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions modified or verified in writing by NV5.

The scope of services did not include any environmental assessment or investigation for the presence or absence of wetlands, sinkholes, chemically hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around the site.

9.0 CLOSURE

We appreciate the opportunity to provide specialized engineering services on this project and look forward to an opportunity to participate in construction related aspects of the development. If you have questions about information contained in this report contact the writer at 305.901-2151.

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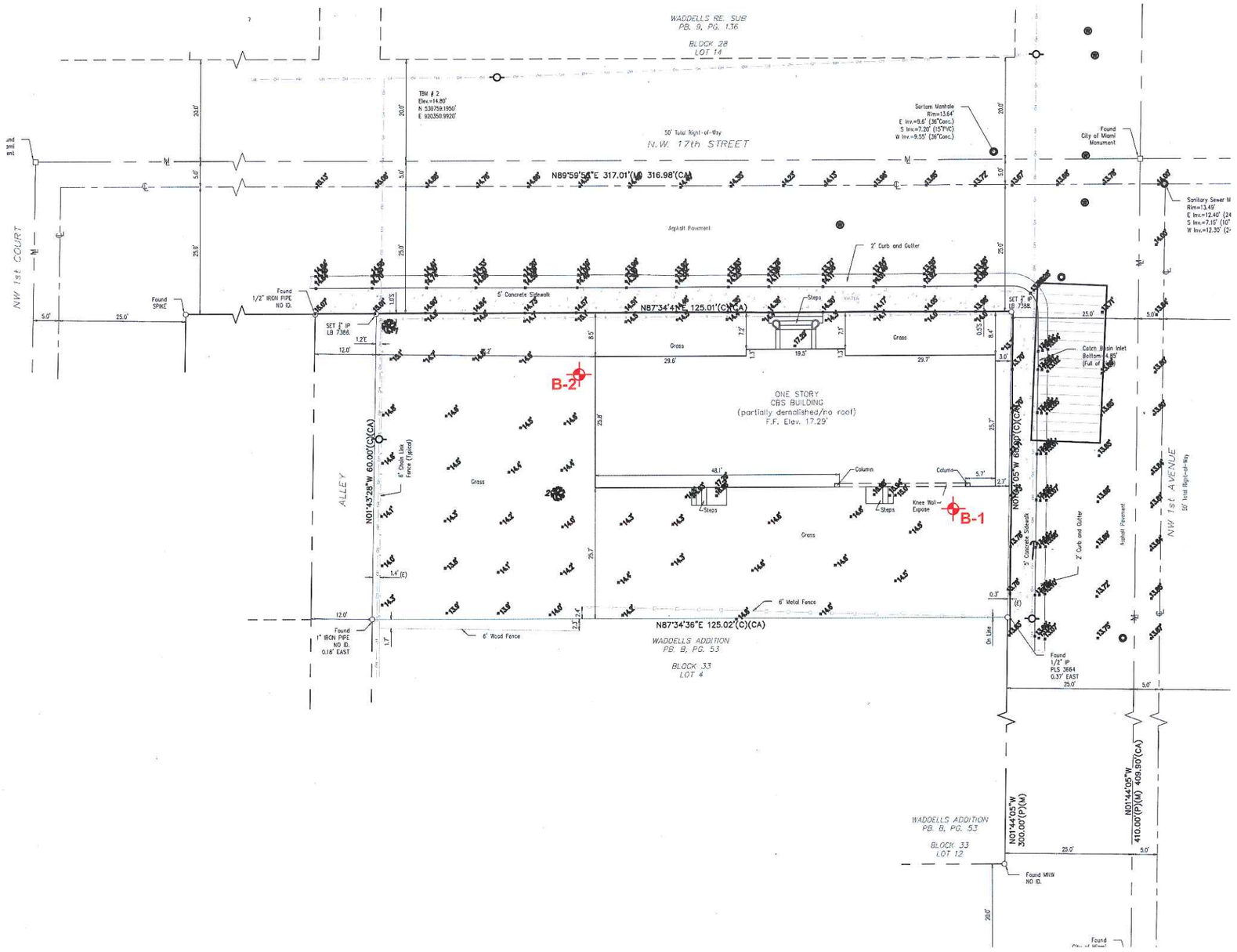
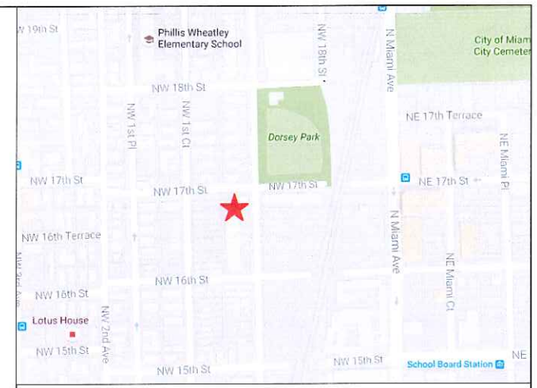
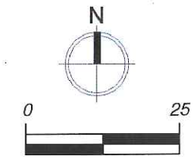
DRAWINGS





Site Vicinity Map



Approximate Scale in Feet

LEGEND:

B-1 - Number and Approximate Location of Soil Boring.

NOTES:

1. Test locations shown are approximate.
2. Test location symbols are not to scale.
3. Base for this drawing was taken from Sketch No. 10, Boundary Survey, provided by Maser Consulting, dated.05/10/16.

N|V|5	DRAWING TITLE: *Site Vicinity Map & Test Location Plan*				DWN BY: *A.S.*
	PROJECT NAME: *Dorsey Memorial Library*				CKD BY: *A.B*
	PROJECT LOCATION: *100 NW 17th Street, Miami, Florida*	PROJECT NO: *15370*	DATE: *09-27-16*	DWG NO: *1*	APD BY ___

GENERALIZED SUBSURFACE PROFILE

PROJECT NAME: Dorsey Memorial Library

PROJECT LOCATION: 100 NW 17th Street, Miami, Florida

PROJECT NUMBER: 15370 | **DATE:** 09-27-16

DRAWN BY: AS | **CHECKED BY:** GLW | **DRAWING NO:** 2

LEGEND

- Topsoil
- Sand
- Limestone
- Standard Penetration Test
- Water Level

APPENDIX A

BORING LOG DATA

BORING NUMBER B-1

NV5

PROJECT NAME Dorsey Memorial Library
PROJECT NUMBER 15370 **PROJECT LOCATION** 100 NW 17th Street, Miami, Florida
DATE STARTED 9/16/16 **COMPLETED** 9/16/16 **GROUND ELEVATION** 14.6 ft **HOLE SIZE** 3 inches
DRILLING CONTRACTOR J&R **GROUND WATER LEVELS:** 11.6 ft / Elev 3.0 ft
DRILLING METHOD Rotary drill with mud, wash & casing
LOGGED BY R. Jimenez **CHECKED BY** A.Sarsour
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NGVD)
0					0.3 3" of TOPSOIL	14.3
	SPT	2-3-4-2 (7)	SP		SAND, loose, light brown sand	
	SPT	1-6-7-10 (13)			SAND, medium dense, tan with limestone fragments (FILL)	
5	SPT	9-10-10-11 (20)			SAND, medium dense, tan with limestone fragments (FILL)	10
	SPT	12-12-14-16 (26)			SAND, medium dense, tan with limestone fragments (FILL)	
10	SPT	13-16-15-14 (31)			SAND, dense, tan with limestone fragments (FILL)	5
					10.0	4.6
			LS		▼	
15	SPT	6-8-8-11 (16)			LIMESTONE, very soft, tan	0
20	SPT	8-10-12-12 (22)			LIMESTONE, soft, tan	-5
					20.0	-5.4

Boring terminated at 20.0 feet.

BORING NUMBER B-2

NV5

PROJECT NAME Dorsey Memorial Library
PROJECT NUMBER 15370 **PROJECT LOCATION** 100 NW 17th Street, Miami, Florida
DATE STARTED 9/16/16 **COMPLETED** 9/16/16 **GROUND ELEVATION** 14.6 ft **HOLE SIZE** 3 inches
DRILLING CONTRACTOR J&R **GROUND WATER LEVELS:** 11.6 ft / Elev 3.0 ft
DRILLING METHOD Rotary drill with mud, wash & casing
LOGGED BY R. Jimenez **CHECKED BY** A.Sarsour
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NGVD)
0					8" of TOPSOIL (0.8)	13.8
	SPT	2-2-1-2 (3)	SP		SAND, very loose, dark brown to tan	
	SPT	13-18-20-15 (38)			SAND, dense, tan with limestone fragments (FILL)	10
5	SPT	12-8-13-16 (21)			SAND, medium dense, tan with limestone fragments (FILL)	
	SPT	12-14-20-14 (34)			SAND, dense, tan with limestone fragments (FILL)	
	SPT	12-13-18-22 (31)			SAND, dense, tan with limestone fragments (FILL)	5
10					(10.0)	4.6
			LS		▼	
	SPT	11-14-9-11 (23)			LIMESTONE, soft, tan	0
15						
	SPT	7-6-9-6 (15)			LIMESTONE, very soft, tan	-5
20					(20.0)	-5.4

Boring terminated at 20.0 feet.

KEY TO SYMBOLS

Symbol Description

Strata symbols

 Fill

 Concrete

 Silty sand

 Asphalt

 Limestone

 Sandstone

 Sand

 Gravel

 Peat

Misc. Symbols

 Groundwater level measured at boring completion. The date checked is indicated.

 Boring continues

 End of Boring

Soil Samplers

 Standard penetration test. 140 lb. hammer dropped 30"

 Hand Auger

 Rock Core

Notes:

1. Exploratory borings were drilled on 09/16/16 using a 3-inch diameter rotary drill with mud, wash & casing.

2. Groundwater was encountered at a depth of 5.6 feet below grade upon boring completion.

3. Boring locations were taped from existing features.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

NV5

NOTES RELATED TO RECORDS OF TEST BORING AND GENERALIZED SUBSURFACE PROFILE

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.

2. The boring location was identified in the field by offsetting from existing reference marks and using a cloth tape and survey wheel.

3. The borehole was backfilled to site grade following boring completion, and patched with asphalt cold patch mix when pavement was encountered.

4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.

5. The Record of Test Boring is subject to the limitations, conclusions and recommendations presented in the report text.

6. "Field Test Data" shown on the Record of Test Boring indicated as 11/6 refers to the Standard Penetration Test (SPT) and means 11 hammer blows drove the sampler 6 inches. SPT uses a 140-pound hammer falling 30 inches.

7. The N-value from the SPT is the sum of the hammer blows required to drive the sampler the second and third 6-inch increments.

8. The soil/rock strata interfaces shown on the Record of Test Boring are approximate and may vary from those shown. The soil/rock conditions shown on the Record of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.

9. Relative density for sands/gravels and consistency for silts/clays and limestone are described as follows:

SPT Blows/ Foot	Sands/Gravels Relative Density	SPT Blows/Foot	Silt/Clay Relative Consistency	SPT Blows/ Foot	Limestone Relative Consistency
0-4	Very loose	0-2	Very Soft	0-20	Very Soft
5-10	Loose	3-4	Soft	21-30	Soft
11-30	Medium Dense	5-8	Firm	31-45	Medium Hard
31-50	Dense	9-15	Stiff	46-60	Moderately Hard
Over 50	Very Dense	16-30	Very Stiff	61-50/2"	Hard
		Over 30	Hard	Over 50/2"	Very Hard

10. Grain size descriptions are as follows:

NAME	SIZE LIMITS
Boulder	12 inches or more
Cobbles	3 to 12 inches
Coarse Gravel	3/4 to 3 inches
Fine Gravel	No. 4 sieve to 3/4 inch
Coarse Sand	No. 10 to No. 4 sieve
Medium Sand	No. 40 to No. 10 sieve
Fine Sand	No. 200 to No. 40 sieve
Fines	Smaller than No. 200 sieve

11. Definitions related to adjectives used in soil/rock descriptions:

PROPORTION	ADJECTIVE	APPROXIMATE ROOT DIAMETER	ADJECTIVE
About 10%	with a trace	Less than 1/32"	Fine roots
About 25%	with some	1/32" to 1/4"	Small roots
About 50%	and	1/4" to 1"	Medium roots
		Greater than 1"	Large roots

NV5

DORSEY MEMORIAL LIBRARY
100 NW 17TH STREET

Designation Report

City of Miami

REPORT OF THE CITY OF MIAMI
PRESERVATION OFFICER
TO THE HISTORIC AND ENVIRONMENTAL PRESERVATION BOARD
ON THE POTENTIAL DESIGNATION OF THE
DORSEY MEMORIAL LIBRARY
AS A HISTORIC SITE

Prepared by Ellen J. Uguccioni for
Janus Research, Consultant

Prepared by Sarah E. Eaton, Preservation Officer

Passed and
Adopted on _____

Resolution No. _____

CONTENTS

I. GENERAL INFORMATION

Historic Names:

Dorsey Memorial Library

Current Name:

Vacant

Location:

100 NW 17th Street
Miami, Florida

Present Owner:

City of Miami
Asset Management Division
444 SW 2nd Avenue, Suite #325
Miami, Florida 33130-1910

Present Use:

Vacant

Zoning District:

R-3

Tax Folio Number:

01-3125-048-1150

Boundary Description:

Lot 1 of Block 33 of the plat of WADDELL'S ADDITION, as recorded in Plat Book B at Page 53, of the Public Records of Miami-Dade County, Florida.

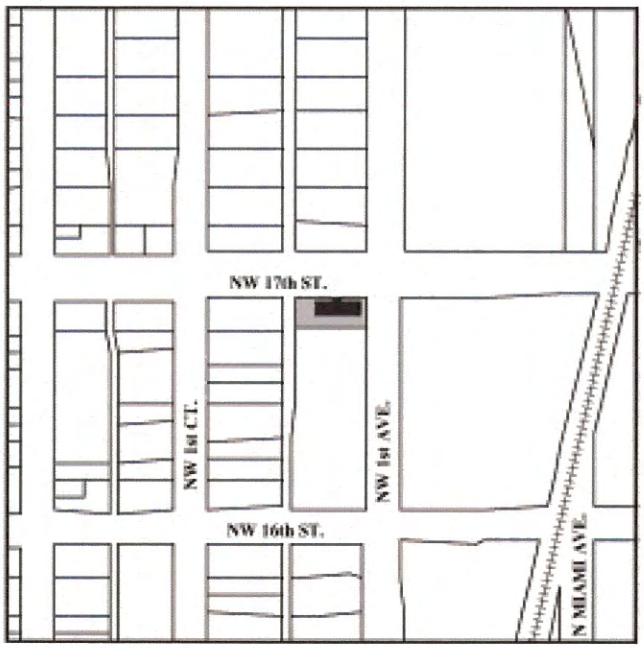
Classification:

Historic Site

DORSEY MEMORIAL LIBRARY

100 NW 17TH STREET

location



site plan

II. SIGNIFICANCE

Specific Dates:

1941

Architect:

Phineas Paist and Harold Steward

Builder/Contractor:

M.R. Harrison Construction Company

Statement of Significance:

The Dorsey Memorial Library is significant for its historical associations and stands as a testament to the segregation of the races, and in Miami, the lingering prejudice towards people of color. The building played a key role in the education of many African-American citizens who lived in the Overtown area during a time when there were few educational options. In the all-too-recent past, African-Americans in Miami suffered egregious treatment and limited civil rights, as they were severely limited in their choices of places to live, socialize, recreate and educate. Amazingly, it was not until 1938 that the first library in Miami was created to accommodate African-American citizens. The Dorsey Memorial Library, which opened in 1941, was the second to serve the African-American public and is located in Overtown, formerly known as "Colored Town." I t was the first city-owned building constructed specifically for library purposes, and was used for 20 years until the branch was relocated to newer and larger quarters and renamed the "Dixie Park Branch Library."

The earliest libraries in Miami-Dade County were organized in 1894 in the independent communities of Lemon City and Coconut Grove, before their incorporation into the City of Miami in 1925. The City of Miami's first library was founded due to the efforts of the Ladies Afternoon Club, later known as the Woman's Club of Miami. While it maintained a reading room as early as 1905, the club's first facility opened in 1913 at the corner of Flagler Street and SE 2nd Avenue on property donated by Henry Flagler. That building, which later was demolished, was actually the club's headquarters, but contained a public reading room as required by Flagler's donation. When the Woman's Club moved to its present location at 1737 North Bayshore Drive, the Flagler Memorial Library was established within its facilities.

In 1951, the City of Miami opened an impressive main library in Bayfront Park. In December 1965, the City of Miami agreed to offer its services to citizens in

unincorporated Metropolitan Dade County, and to other municipalities that did not offer library services. The current Miami-Dade County Public Library System was created in 1971 when the City of Miami transferred its library system to the County. The future of the new county library system was ensured by the passage of a $34.7 million bond issue in 1972 to construct additional libraries.

Gradually, the remaining independently operated libraries elected to join the County. By 1985, a new main library designed by the internationally renowned architect Phillip Johnson opened in Downtown Miami and the system grew to include 31 libraries.

As segregation was practiced in Miami into the 1950s, the government's provision of facilities for African-Americans was minimal. It was left to the African-American community to see to its educational, recreational and spiritual needs. The building of the Dorsey Memorial Library is testament to the energetic and determined leadership of the Black community.

The contributions of the African-American community to the City of Miami actually predate the City's incorporation in 1896. As early as 1880, Black Bahamians arrived in Coconut Grove and began a community that still thrives today.

In 1896, the vote to incorporate the City of Miami passed with 368 men voting. Of that number, 162 of the voters were Black, for the most part comprised of laborers working on Henry Morrison Flagler's Florida East Coast Railway, which made its appearance in Miami that same year.

Miami's original Charter called for a separate area to be set aside for African-Americans, first known as "Colored Town." The commercial spine of NW 2nd Avenue defined that area, which eventually became known as "Overtown." The population of Overtown soon expanded almost exponentially as migrants from northern Florida and other southern states arrived. Émigrés from the Bahamas, Cuba, Haiti, Jamaica, and Trinidad and Tobago expanded the growing settlement even further. Conditions deteriorated when the boundaries of the area did not increase in size to correspond to the expanding need.

Between 1910 and 1920, such disreputable businesses as juke joints, taverns, and houses of prostitution appeared along the northeastern edges of "Colored Town." By their very nature, these establishments had more than enough criminal incidents to keep the police occupied with a steady stream of transgressors. The Miami Police Department and the Dade County Sheriff's Office were responsible for keeping the peace. Stories of routine beatings and the torture of African-Americans, coupled with the openly espoused racist views of both then-Sheriff Dan Hardie and Police Chief Leslie Quigg, combined to create incendiary conditions.

African-American leadership fought back through the formation of the Colored Board of Trade and the Greater Miami Negro Civic League, which provided a

forum for their views and complaints. These leaders attended every City Commission meeting, making their presence known and arguing for services that included African-American policemen. While some progress was made, including the creation of the first Black high school in 1923, race relations themselves did not make the progress needed to fully ease tensions between the races.

In 1937, the name "Colored Town" was changed to Washington Heights, although it was more commonly referred to as Overtown. By the 1940s, the area called "Colored Town" had become an overcrowded slum, where residents had no access to running water or indoor plumbing, and even electricity was a luxury few could afford. As conditions worsened, African-Americans were relegated to an area north and west of Overtown that became known as Liberty City.

It was in this climate that the first library for African-Americans was created. In 1936, the Women's Society of Christian Services, an organization within the Trinity Methodist Episcopal Church joined with other civic-minded women in the Black community to found the Friendship Garden and Civic Club. Led by its president, Annie Coleman, the club's first project was to create a library for the residents of Overtown. Ms. Coleman offered the use of a grocery store building next to her home. That building, at 2059 NW 6th Court, was converted into a library largely through the combined efforts of the Overtown African-American community. That first library opened in 1936 and was called the Dunbar Library. In 1938, the facility became the Dunbar Branch Library, as it was now officially a part of the City of Miami's library system. The needs of the community would soon make that library obsolete, setting the stage for the construction of the Dorsey Memorial Library.

Dana Anderson Dorsey (1872–1940), often described as "Miami's first Black millionaire," was instrumental in providing for a new library that would be named the "Dorsey Memorial Library." Dorsey, a carpenter by trade, had arrived in Miami from Georgia and made his fortune in real estate and banking. He built many of the houses in Overtown and rented them to the burgeoning population of immigrating African-Americans. With that rental income, Dorsey continued to invest in the land, and at one time owned 21 acres of what is now Fisher Island near Miami Beach.

Dorsey's philanthropy helped to provide greatly needed facilities for African-Americans. In 1937, he donated the Liberty City land on which the Dorsey High School was built. He donated the land to build a new library on February 14, 1940 just 15 days before his death.

The deed conveying the land said this:

> That the grantee (Washington Heights Library Association), its successors or assigns, shall within 18 months from the date of this conveyance erect upon said real property a building suitable for use as a public library and shall at all times keep and maintain said public library for the free use,

benefit, education and enlightenment of the members of the Negro races...

Mrs. Coleman and the ladies of the Washington Heights Neighborhood Association and the Friendship Garden Club began to spearhead a request for donations to enable a new library to be constructed. Their fundraising campaign garnered $2,000 for the building, and the City of Miami donated $7,000 in order to pay for the building and meet the deadline imposed by Mr. Dorsey.

The library, suitably named after its benefactor Dana Dorsey, opened on August 13, 1941. The building was used for 20 years, well past the time of great social reforms that sought to integrate the races and prohibit discrimination.

The building is designed as a simple rectangular one-story block that contained two wings, each coming off the central main entrance. One of the wings was designated for adults, and the other for children. The library began its initial inventory with some 2,000 volumes that had been housed in the Dunbar Branch.

In 1961, the Dorsey Library was abandoned for the new Dixie Park Branch Library. In keeping with the policy of naming branch libraries after their geographic location, in 1983 the County Commission changed the name at that time to the Culmer/Overtown Branch Library.

Relationship to Criteria for Designation:

The Dorsey Memorial Library has significance in the historical heritage of the City of Miami; possesses integrity of design, setting, materials, workmanship, feeling and association; and is eligible for designation under the following criteria:

3. Exemplifies the historical, cultural, political, economical, or social trends of the community.

   The Dorsey Memorial Library reflects the historical, cultural, political and social trends of the City of Miami as the first city-owned building constructed as a library and only the second library in the City to serve the African-American public.

III. DESCRIPTION

Present and Original Appearance:

Setting:

The Dorsey Memorial Library is located at the southwest corner of NW 17th Street and NW 1st Avenue. The main elevation faces north onto NW 17th Street, and occupies a portion of a rectangular 60 x 125 foot lot. Dorsey Park, land also donated by Dorsey the year of his death, is located at northeast corner of the intersection on a diagonal with the Dorsey Memorial Library.

Description

The most distinctive architectural feature of the Dorsey Memorial Library is the central doorway. The plan shape of the building is rectangular with the long side of the rectangle running parallel to NW 17th Street.

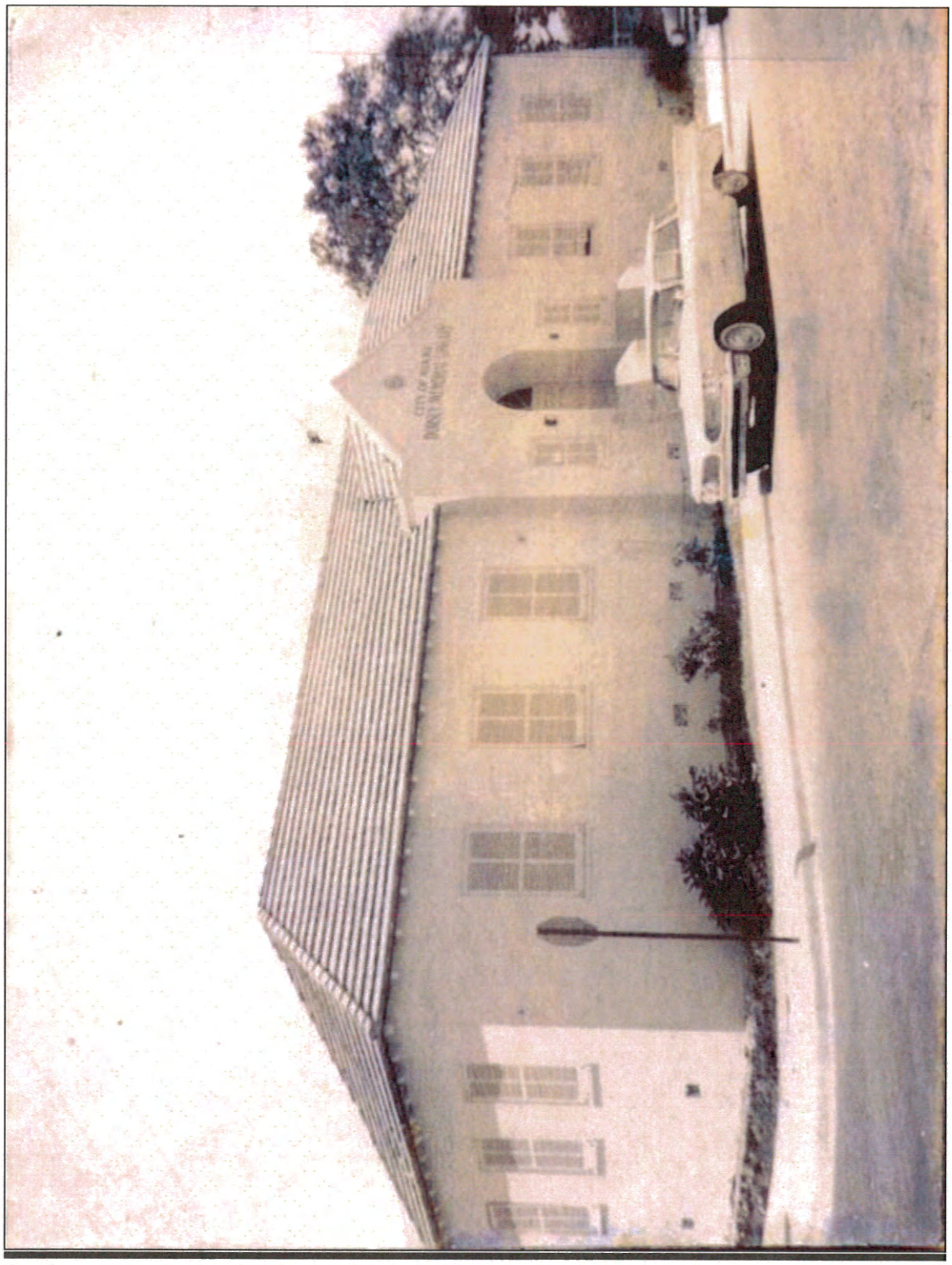
The roof is hipped and covered with flat, concrete tiles. The rectangular window openings are evenly spaced along the main (east), north and south (side) elevations. The rear (west) elevation contains doorways for access.

The entry bay, placed in the center of the east elevation, projects from the main wall mass and is approached by a series of risers that lead to a landing and vestibule area. The doorway itself is round-arched and the projecting entrance bay terminates in a gable. There is a minimal amount of ornament used in the design, and its decorative treatment is limited to the use of the staggered concrete roof tiles, the outrigger beams projecting below the roof line, and the classical references of the keystone, arch and bulls-eye window in the gable end of the entry bay.

Contributing Structures and/ or Landscape Features

The Dorsey Memorial Library is the only contributing structure on the site. There are no landscape features present on the site.

Dorsey Memorial Library
100 NW 17th Street
North (front) and east façades
2002



Dorsey Memorial Library
100 NW 17th Street
North (front) and east façades

IV. PLANNING CONTEXT

Present Trends and Conditions:

The Dorsey Memorial Library is abandoned and neglected. Previously, the City of Miami had declared the building unsafe. While the City has taken steps to secure the building by blocking the windows, without sufficient maintenance, it will continue to deteriorate. The community of Overtown has suffered major destruction of its historic resources in the past. The preservation of the Dorsey Memorial Library would be a particularly appropriate monument to the lives of its pioneering citizens.

Preservation Incentives:

The preservation of the library is integral to the interpretation of the African-American experience in South Florida. The preservation of the Dorsey Memorial Library is especially appropriate as it represents the enlightenment that education brings to ignorance.

IV. BIBLIOGRAPHY

"A Brief History." Found on Miami-Dade Public Library System page on Miami-Dade County Web site: http://www.mdpls.org/info/history.asp.

"Dorsey Memorial Branch of Miami Public Library Had Modest Start; Has Sub-Station Now in Liberty City." *Libraries*, 24 November 1953. Florida Collection, Miami-Dade County Public Library.

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Dunn, Marvin. *Black Miami in the Twentieth Century*. Gainesville: University Press of Florida, 1997.

"Ground Breaking for Negro Library Scheduled Today." *The Miami News*, 6 July 1941.

"Island Opposite Miami Sold for Colored Resort," *The Miami Metropolis*, 1 May 1918.

DORSEY MEMORIAL LIBRARY

EXTERIOR WALL SHORING

100 N.W. 17th STREET, MIAMI, FLORIDA 33136

100% CONSTRUCTION DOCUMENTS

CITY OF MIAMI PROJECT No. B-30531

CITY OF MIAMI OFFICIALS

Mayor Thomas P. Regalado	Commissioner Frank Carollo	City Manager Daniel J. Alfonso
Commissioner Wilfredo Gort	Commissioner Francis Suarez	City Attorney Victoria Mendez
Commissioner & Vice-Chairman Ken Russell	Commissioner & Chairman Keon Hardemon	City Clerk Todd B. Hannon

INDEX OF DRAWINGS

RC&P
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T. 954.641.0088 F. 954. 464.8607
www.rcpdesign.com

MARCH 29, 2016

TO THE BEST OF THE RCP'S KNOWLEDGE, THESE DOCUMENTS ARE COMPLETE, COORDINATED AMONG THE DIFFERENT DISCIPLINES AND COMPLY WITH THE FLORIDA BUILDING CODE AND THE APPLICABLE FIRE-SAFETY STANDARDS AS DETERMINED BY THE LOCAL AUTHORITY IN ACCORDANCE WITH SECTION 100 AND CHAPTER 633, FLORIDA STATUTES.

ALBERTO J. CARRENO, P.E.
ENGINEER OF RECORD
FLORIDA LICENSE # 26910

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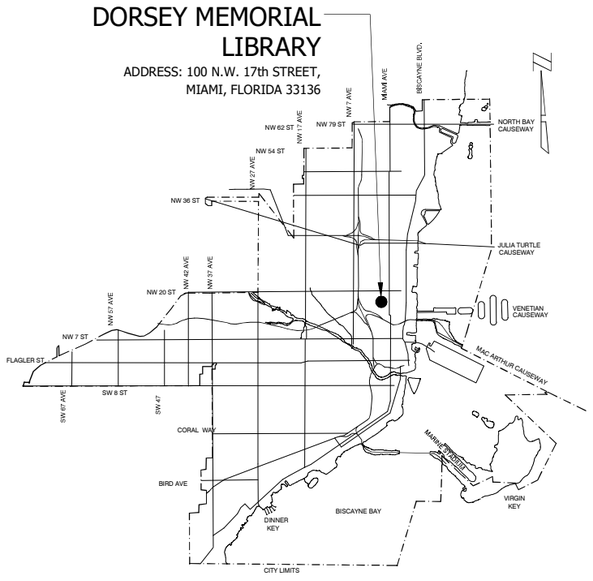
MIAMI, FLORIDA 33136



LOCATION MAP

RECEIVED
By Javier Torres at 4:31 pm, Apr 22, 2016

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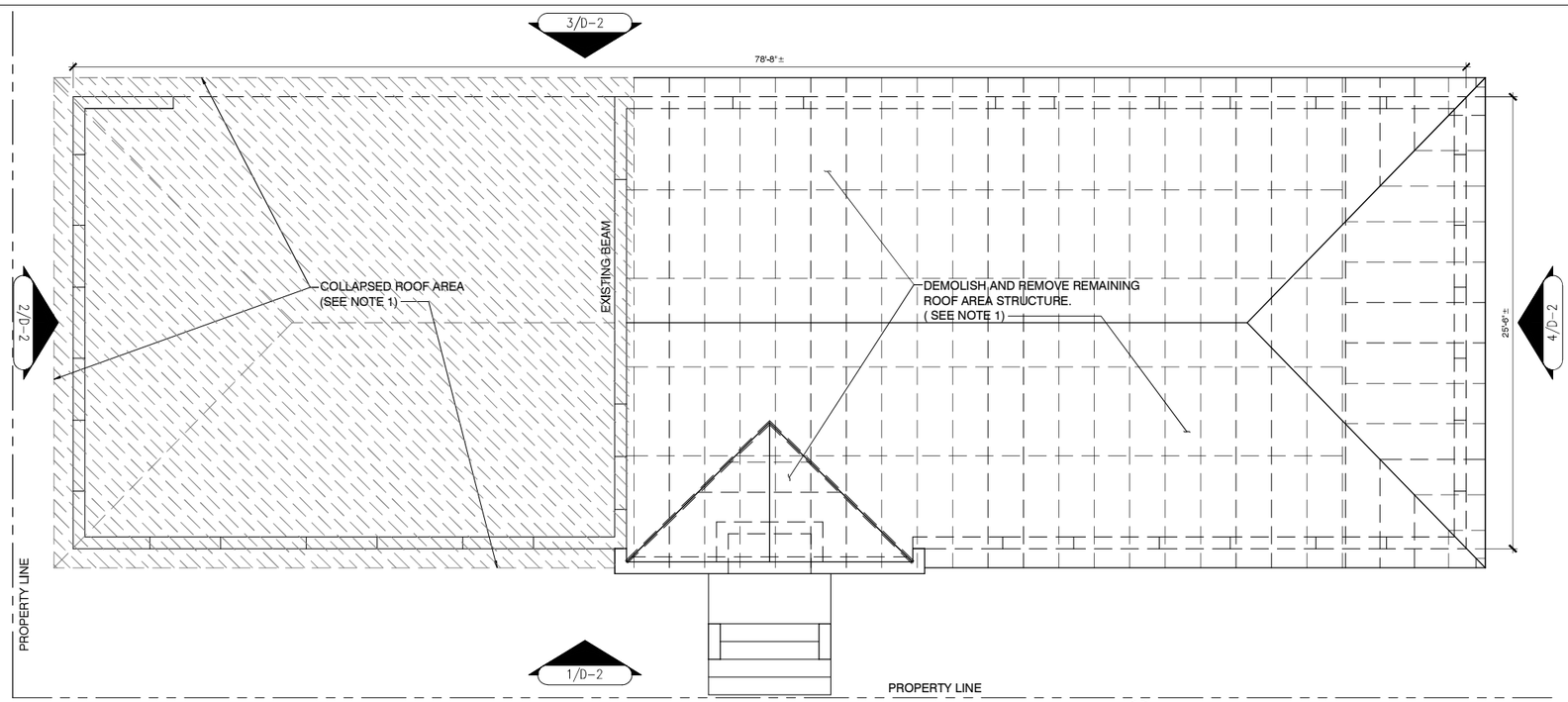
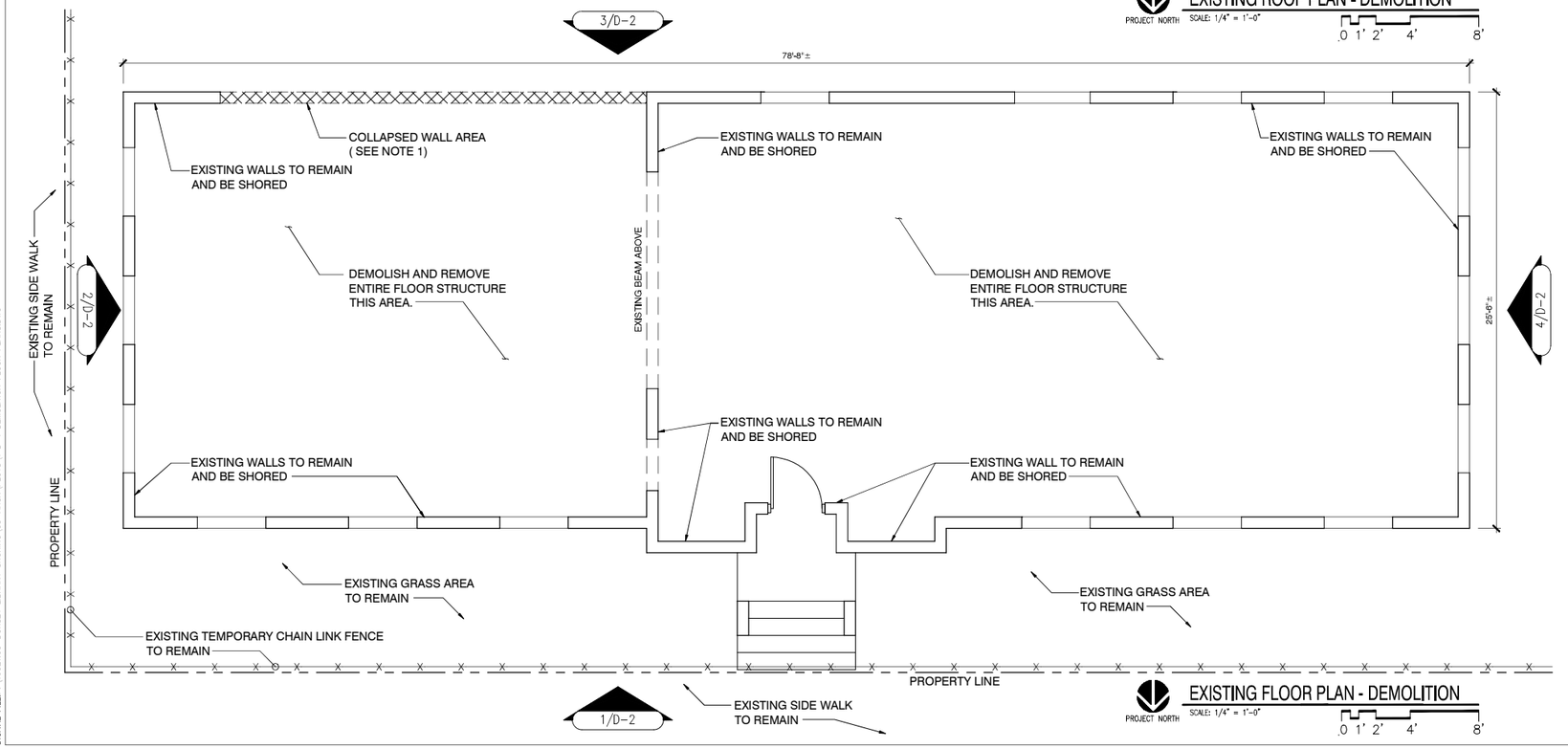
EXTERIOR WALL SHORING
100 N.W. 17th STREET, MIAMI, FLORIDA 33136
CITY OF MIAMI
CITY OF MIAMI PROJECT No B-30531



PROJECT NORTH SCALE: 1/4" = 1'-0" 0 1' 2' 4' 8'

EXISTING ROOF PLAN - DEMOLITION



PROJECT NORTH SCALE: 1/4" = 1'-0" 0 1' 2' 4' 8'

EXISTING FLOOR PLAN - DEMOLITION

DEMOLITION NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL ALL DEBRIS FROM THE AREA OF WORK. DEMOLITION DEBRIS SHALL BE DISPOSED STRICTLY IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL AUTHORITIES REQUIREMENTS.
2. PERFORM ALL DEMOLITION AS INDICATED FOR NEW EXTERIOR WALL SHORING. SEE SHEET SH-1.
3. ALTHOUGH THE DRAWINGS PRODUCED BY ENGINEERS ARE BELIEVED TO BE SUBSTANTIALLY CORRECT. THE ENGINEERS, AND OWNER DO NOT GUARANTEE THE LOCATION OR EXISTENCE OR CONDITION OF ANY CONCEALED ITEMS. CONTRACTORS MUST PROCEED WITH CAUTION DURING THE WORK AND MUST MAKE THEIR OWN DETERMINATION, MEASUREMENTS, AND EVALUATION OF THE WORKING CONDITION OF EXISTING CONCEALED ITEMS. ANY ENVIRONMENTALLY SENSITIVE MATERIAL ENCOUNTERED DURING DEMOLITION SHALL BE IMMEDIATELY REPORTED IN WRITING TO THE OWNER AND DISPOSED OF IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS.

GENERAL DEMOLITION NOTES:

1- CONTRACTOR SHALL INCLUDE IN HIS/HER CONTRACT THE COMPLETE COSTS OF DEMOLITION, INCLUDING BUT NOT LIMITED TO REMOVAL FROM SITE, HAULING, TRUCKING AND PROPER DISPOSAL OF ALL DEBRIS TO AN APPROVED DISPOSAL SITE INCLUSIVE OF ALL FEES, LABOR AND COSTS.

2- ALL DEMOLITION SHALL BE CONDUCTED IN FULL ACCORDANCE WITH ALL MANDATED BUILDING AND ENVIRONMENTAL REGULATIONS AND REQUIREMENTS. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL FINES OR FEED RESULTING FROM VIOLATION OF BUILDING OR REQUIREMENT STANDARD CONSTRUCTION LAWS AND POLICIES.

LEGEND

- 1 — PHOTOGRAPHS FOR VISUAL REFERENCE. SEE SHEET PH-1
- EXISTING WALL TO REMAIN AND BE SHORED
- COLLAPSED WALL AREA (SEE NOTE 1)
- COLLAPSED ROOF AREA (SEE NOTE 1)
- 1/ A-3 — ELEVATION TAG; REFERENCE DRAWING NUMBER WHERE ELEVATION IS DRAWN

RC&P
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AA13001842

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HIALEAH, FLORIDA 33015
954 670 6378

PROPERTY OWNER:
City of Miami

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ENGINEER OF RECORD
FLORIDA REGISTRATION NO. 26910

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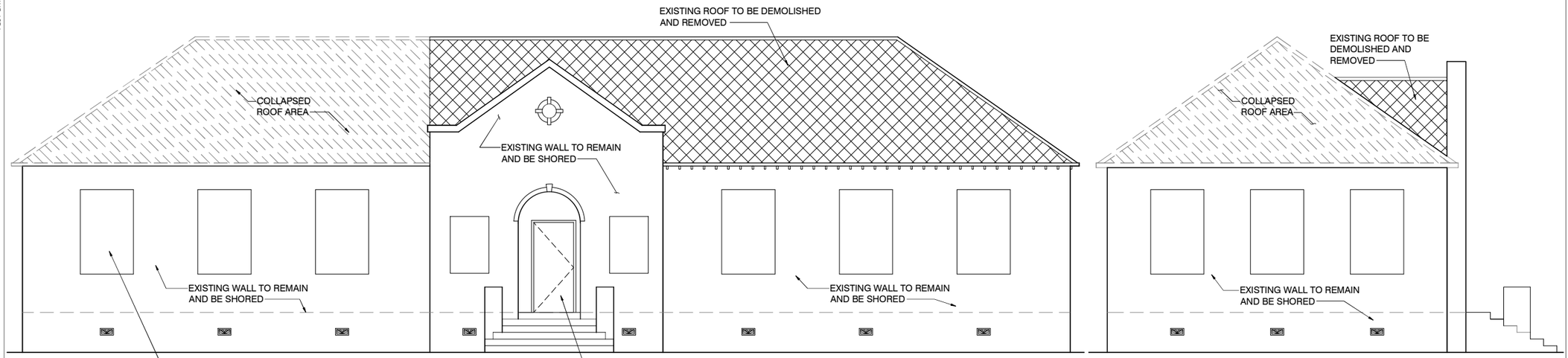
RC&P PROJECT No. 16021.00

ISSUE DATE: 03/29/2016

REVISION:	DESCRIPTION	DATE

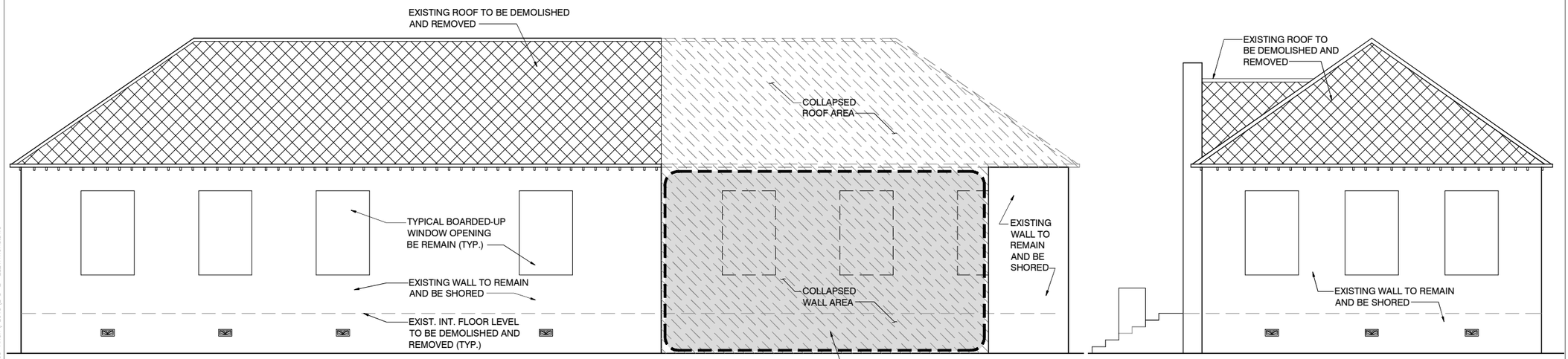
DEMOLITION FLOOR PLANS

D-1



1/D-2 FRONT ELEVATION (NORTH)
SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

2/D-2 EAST ELEVATION
SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'



3/D-2 REAR ELEVATION (SOUTH)
SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

4/D-2 WEST ELEVATION
SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

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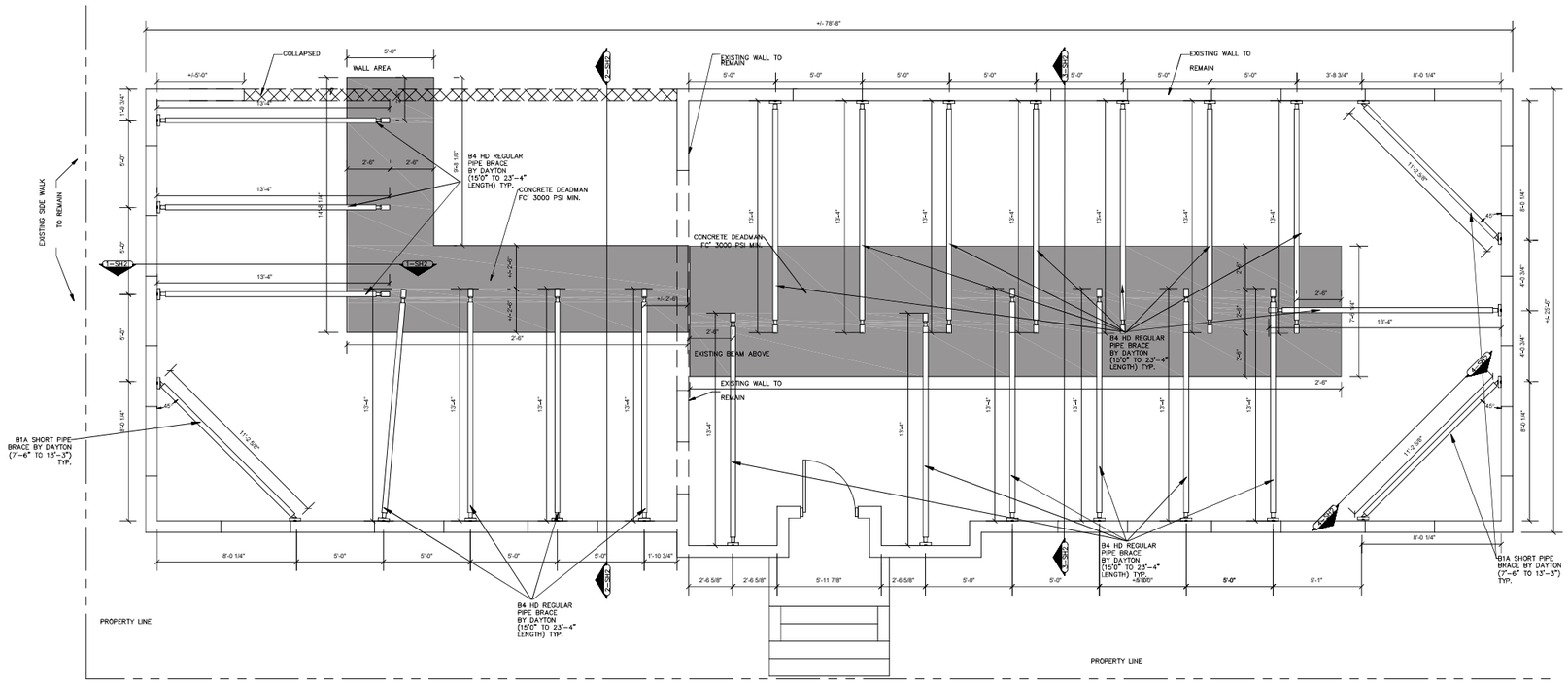
REVISION:	DESCRIPTION	DATE

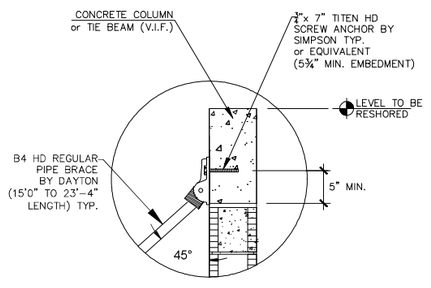
ELEVATIONS

D-2

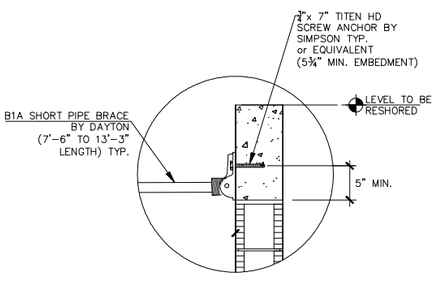


WALL BRACING PLAN VIEW

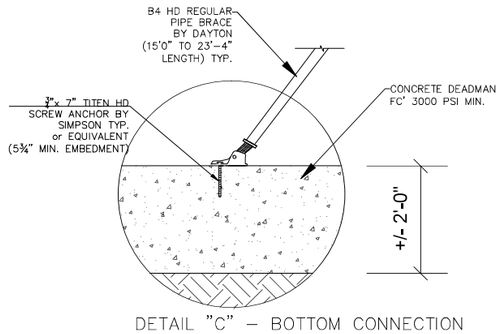
SCALE: 1/4" = 1'-0"



DETAIL "A" – TOP CONNECTION
INCLINGE WALL BRACING



DETAIL "B" – TOP CONNECTION
HORIZONTAL WALL BRACING



DETAIL "C" – BOTTOM CONNECTION
INCLINE WALL BRACING AT DEADMAN

WALL BRACING NOTES

1.– OSHA & FEDERAL REGULATIONS MUST BE FOLLOW BY THE CONTRACTOR DURING WALL BRACING EQUIPMENT ERECTION & EQUIPMENT DISMANTLE.
2.– WALL BRACING WILL REMAIN IN PLACE TILL THE NEW STRUCTURE BE CAPABLE TO SUPPORT THE LATERAL LOADS DUE TO THE WIND FORCE.
3.–THIS DESIGN IS PREPARED ACCORDING WITH THE FLORIDA BUILDING CODE 2014 AND THE ASCE/SEI 7–10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.
4.– EQUIVALENT WALL BRACINGS, CAN BE USED IN COORDINATION WITH THE SHORING ENGINEER, WHERE TENSION/COMPRESSION CAPACITY SHOULD BE AT LEAST THE MINIMAL SHOWN IN THE CALCULATIONS.
5.– IN CASE OF NON REINFORCED WALLS, STRONG BACK AT WALL BRACING LOCATION IS REQUIRED. CONSULT WITH SHORING ENGINEER IN CASE OF THE EXISTENCE OF THIS CONDITION.
6.–DEMOLITION ACTIVITIES WILL NOT HAVE TO PRODUCE MECHANICAL IMPACT ON THE WALLS TO REMAIN.
7.– ANY DISCREPANCY WITH THESE WALL BRACING DRAWINGS SHOULD BE COMMUNICATED TO THE SHORING ENGINEER.
8.– COLUMNS, BEAMS & WALLS TO REMAIN AND TO BE SUPPORTED WITH THE WALL BRACINGS SHOULD BE IN A GOOD STRUCTURAL CONDITION FOR THIS WALL BRACING SYSTEM. CONTRACTOR VERIFY THIS CONDITION.

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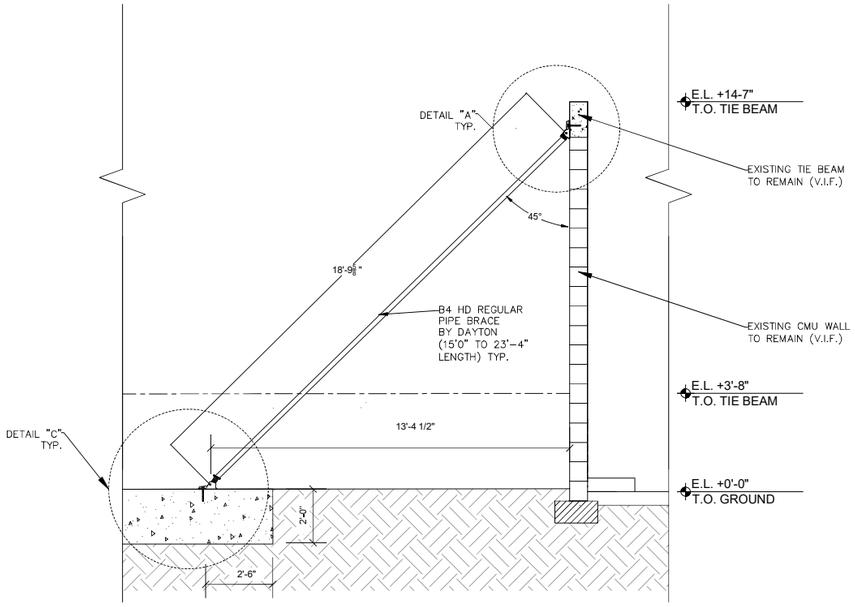
ISSUE DATE: 03/29/2016

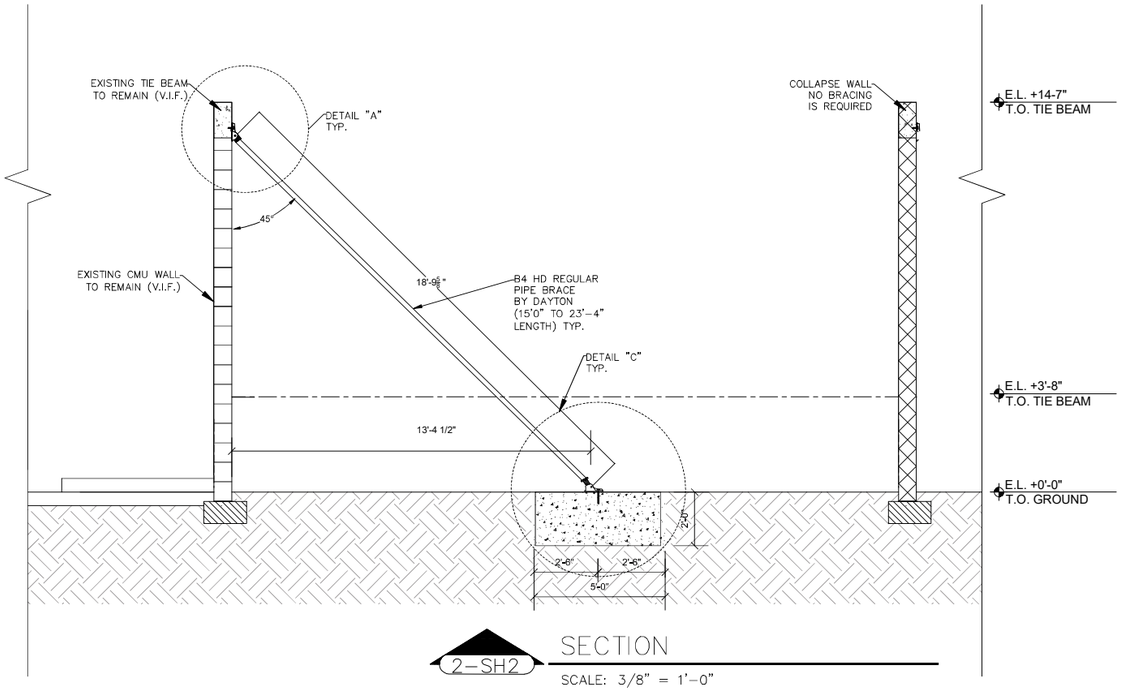
REVISION:	DESCRIPTION	DATE

SH-1



1—SH2 SECTION

SCALE: 3/8" = 1'—0"



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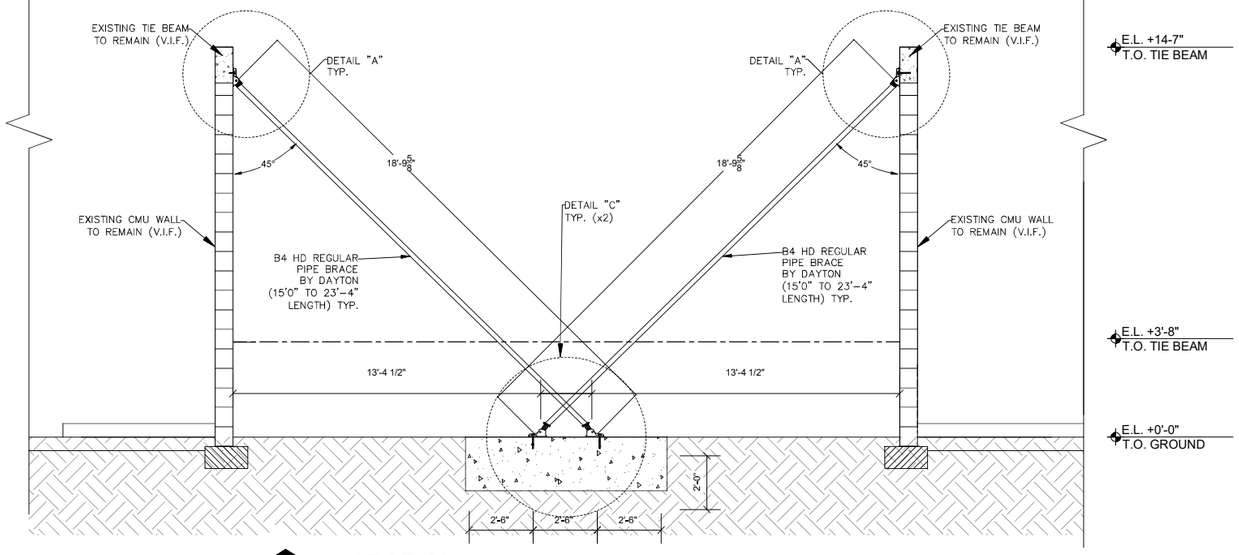

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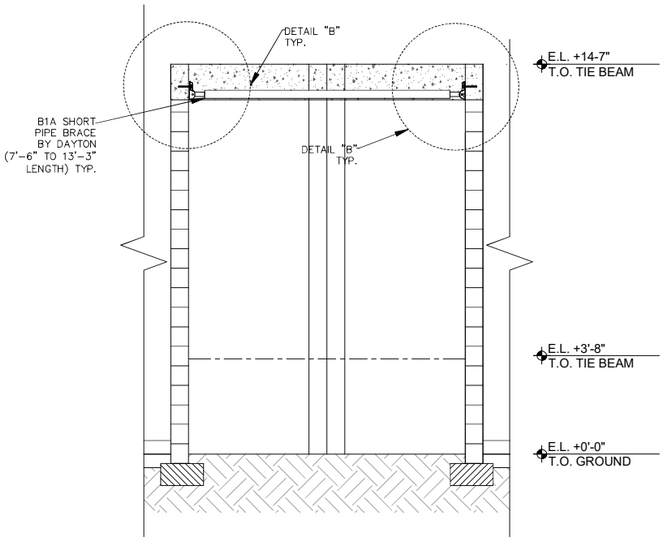

4—SH2 SECTION

SCALE: 3/8" = 1'—0"

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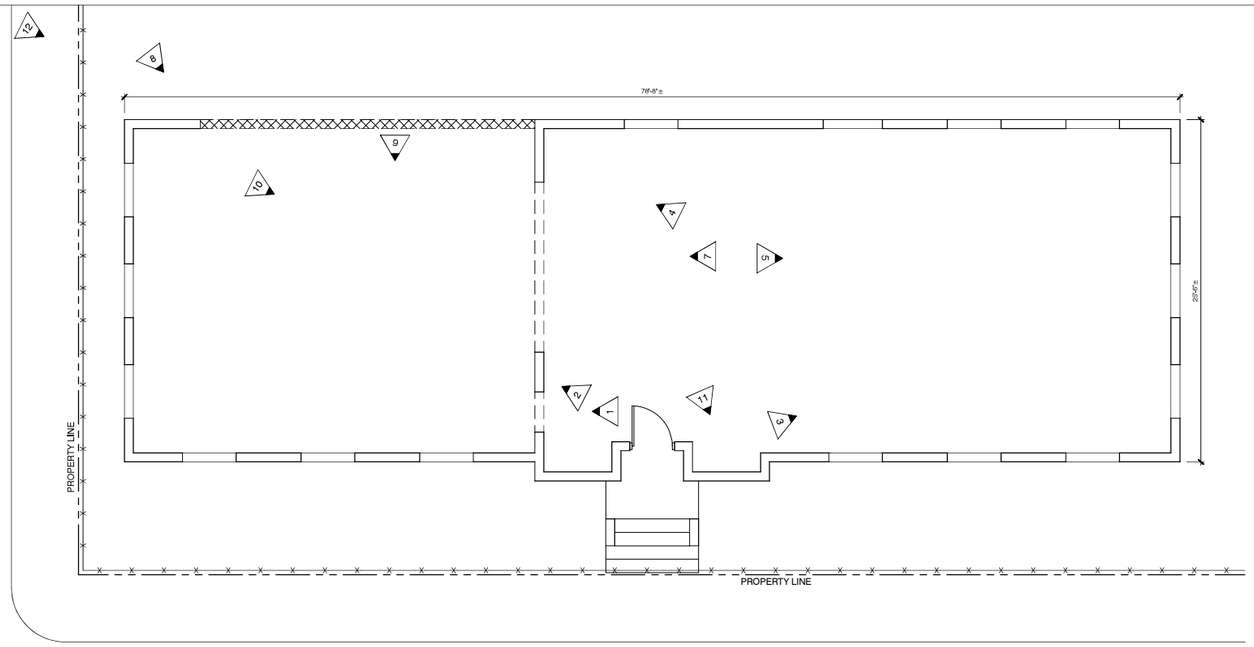
100% CONSTRUCTION DOCUMENTS
CITY OF MIAMI PROJECT No. B-
RC&P PROJECT No. 16021.00

ISSUE DATE: 03/29/2016

REVISION:	DESCRIPTION	DATE

SH-2

PLOT DATE: 3/31/2016 9:17 AM



PROJECT NORTH

EXISTING FLOOR PLAN - PHOTO LOG

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'


3


4


5


6


7


8


9


10


11


12


1


2

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FLORIDA REGISTRATION NO. 26910

100% CONSTRUCTION DOCUMENTS
CITY OF MIAMI PROJECT No. B-
RC&P PROJECT No. 16021.00

ISSUE DATE: 03/29/2016

REVISION:	DESCRIPTION	DATE

FLOOR PLAN & PHOTOS

PH-1

DIGITAL FILE: X:\16021.00-DORSEY LIBRARY SHORING\03-ARCH\PLOTS\5 PH-1 PHOTOS SURVEY.DWG

SECTION 011000

SUMMARY

PART 1 - GENERAL

1.01 PROJECT

A. Project Name: Dorsey Memorial Library Restoration.

B. Owner's Name: City of Miami, FL.

C. Architect's Name: M.C. Harry & Associates, Inc.

D. The Project consists of repairs and alterations, including but not limited to:

1. Selective demolition of building elements for alteration purposes.

2. Reconstruction of existing building, including restoration of historic elements.

3. Other repairs and alterations as indicated on the drawings.

1.02 SCOPE OR ALTERATIONS WORK

A. Scope of demolition and removal work is shown on drawings and specified in Section 024100 - Demolition.

B. Scope of repairs and alterations work is shown on drawings.

1.03 OWNER OCCUPANCY

A. Owner intends to occupy the building and premises upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

D. For additional requirements, refer to Section 2 - General Terms and Conditions and Section 3 - Supplemental Terms and Conditions of the City of Miami Capital Improvements Program Standard Contract.

1.04 CONTRACTOR USE OF SITE AND PREMISES

A. General:

1. Refer to Article 36 of Section 2 - General Terms and Conditions and Section 3 - Supplemental Terms and Conditions of the City of Miami Capital Improvements Program Standard Contract.

B. Construction Operations: Limited to areas noted on Drawings.

C. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits during Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.

2. Do not obstruct roadways, off-street parking areas, sidewalks, or other public ways without permit.

D. Existing building spaces and public site areas may not be used for storage, except as authorized by Owner.

E. Construction Work Hours:

1. No construction, alteration or general repair of the building, structure, or other item for which a permit is required shall be performed within the City during days/hours when such work is prohibited by applicable regulatory requirements (e.g., City of Miami Code of Ordinances), except as may be specifically authorized and permitted by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014100

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Regulatory requirements applicable to this project include but are not limited to the following:

1. Building Code: The governing building code for this project is the 5th edition (2014) of the Florida Building Code (FBC), which includes the following referenced codes:

a. FBC-B -- Florida Building Code, Building.

b. FBC-EB -- Florida Building Code, Existing Building.

c. FBC-A -- Florida Building Code, Accessibility.

d. FBC-EC -- Florida Building Code, Energy Conservation.

e. FBC-M -- Florida Building Code, Mechanical.

f. FBC-P -- Florida Building Code, Plumbing.

g. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

2. Fire Prevention Code: FBC-B CHAPTER 36 and the 5th edition (2014) of the Florida Fire Prevention Code (FFPC), which includes the following codes by reference:

a. National Fire Protection Association (NFPA):

(1) NFPA 1(FL) -- Fire Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

(2) NFPA 101(FL) -- Life Safety Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

(3) NFPA 70 -- National Electric Code; 2011 edition; adopted per FAC Rule 69A-60.005.

(4) NFPA 241 -- Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2009 edition; adopted per FAC Rule 69A-60.005.

3. Electrical Code: FBC-B CHAPTER 27, which includes the following codes by reference:

a. National Fire Protection Association (NFPA):

(1) NFPA 70 -- National Electric Code; 2011.

4. Florida Administrative Code (FAC):

a. FAC 62-4 -- Department of Environmental Protection, Permits.

b. FAC 64E -- Rule 64E, Sewage Disposal.

c. FAC 69A-60 -- Florida Fire Prevention Code.

(1) FAC Rule 69A-60.005 -- Publications Referenced in NFPA 1, the Florida 2012 Edition, and NFPA 101, the Florida 2012 Edition, added to the Florida Fire Prevention Code (effective date 12/31/2014).

6. Florida Department of Environmental Protection (FDEP).

a. FDEP (SESCIM) -- FDEP Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.

1.02 QUALITY ASSURANCE

A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract, provide the direct supervision of a qualified Professional Engineer experienced in design of this type of work and licensed in the State of Florida.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014219

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements relating to referenced standards.

1.02 RELATED REQUIREMENTS

A. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

a. FBC-B CHAPTER 35 – Referenced Standards.

2. FBC-A -- Florida Building Code, Accessibility.

a. FBC-A SECTION 105 – Referenced Standards.

3. FBC-EC -- Florida Building Code, Energy Conservation.

a. FBC-EC CHAPTER 5 – Referenced Standards.

4. FBC-M -- Florida Building Code, Mechanical.

a. FBC-M CHAPTER 15 – Referenced Standards.

4. FBC-P -- Florida Building Code, Plumbing.

a. FBC-P CHAPTER 14 – Referenced Standards.

5. FBC-EB -- Florida Building Code, Existing Building.

a. FBC-EB CHAPTER 16 – Referenced Standards.

B. Florida Fire Prevention Code, 5th edition - 2014 (FFPC).

C. National Fire Protection Association (NFPA):

1. NFPA 1(FL) -- Fire Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

a. NFPA 1(FL) CHAPTER 2 – Referenced Publications.

2. NFPA 101(FL) -- Life Safety Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

a. NFPA 101(FL) CHAPTER 2 – Referenced Publications.

D. Section 2 - General Terms and Conditions and Section 3 - Supplemental Terms and Conditions of the City of Miami Capital Improvements Program Standard Contract.

1. Article 41 -- Reference Standards.

1.03 QUALITY ASSURANCE

A. Citation of Standards: Each citation listed in the specifications includes:

1. Name of promulgating technical society, organization or agency of the standard.
2. Standard identification, as used in the various sections of these specifications.
3. Title of the standard.

B. Edition Date of Standards: Reference to the standards of any technical society, organization or body shall be construed to mean the latest standard adopted and published (including all revisions, amendments, supplements, and updates) at the date the Solicitation for Bids was issued, except as follows:

1. When a standard listed in the specifications is also listed in an applicable code, the effective date of that standard as listed in the applicable code shall apply.
2. When the citation for a standard listed in the specifications includes a specific edition date, the effective date of such standard as listed in the citation shall apply.

C. Where differences occur between provisions of these specifications and referenced codes and standards, the provisions the most stringent requirement shall apply.

1. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

D. The codes and standards referenced in the specifications shall be considered part of the contract requirements to the prescribed extent of each such reference.

1. Such reference is hereby made a part of the Contract Documents, the same as if herein repeated in full.

E. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

F. When required by the Contract Documents, Contractor shall obtain copies of designated reference standard document(s) and maintain at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

G. Neither the contractual relationships, duties or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 016302

USE OF SUBSTITUTE MATERIALS ON HISTORIC EXTERIORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Unless expressly permitted or allowed by the Contract Documents, substitutions of materials, articles, systems, equipment, or other components of the Work will not be considered.

1. Where substitutions are expressly permitted or allowed by the Contract Documents, the Contractor must demonstrate to both the Architect and the Owner that a proposed substitution is equal in substance, quality and function to the material, article, or piece of equipment identified in the Contract Documents.

2. The Owner shall have no obligation to accept a proposed substitution and no substitution shall be allowed without the prior written approval from both the Architect and the Owner.

3. If the substitution results in a savings to the Contractor, the Owner shall be entitled to a credit for the amount saved as a result of the substitution.

B. Requirements Pertaining to the Use of Substitute Materials that Imitate Historic Materials:

1. Whenever possible, the historic materials shall be used.

2. Substitute materials (i.e., those products used to imitate historic materials) may be used only after all other options for repair and replacement in kind have been ruled out.

a. Because there are so many unknowns regarding the long-term performance of substitute materials, their use should not be considered without a thorough investigation into the proposed materials, the fabricator, the installer, the availability of specifications, and the use of that material in a similar situation in a similar environment.

b. Generally, substitute materials are permitted only when the historic materials or craftsmanship are no longer available, if the original materials are of a poor quality or are causing damage to adjacent materials, or if there are specific code requirements that preclude the use of historic materials.

(1) Use of these materials should be limited, since replacement of historic materials on a large scale may jeopardize the integrity of an historic resource.

(2) Every means of repairing deteriorating historic materials or replacing them with identical materials should be examined before turning to substitute materials.

c. The importance of matching the appearance and physical properties of historic materials and, thus, of finding a successful long-term solution cannot be overstated.

1.02 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. Florida Building Code, 5th edition; 2014 (FBC):

1. FBC-EB - Florida Building Code, Existing Building.

a. FBC-EB APPENDIX B -- The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

C. U.S. Department of the Interior (DOI):

1. DOI (REHAB) -- The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

D. U.S. General Services Administration (GSA):

1. GSA 0163002S -- Use of Substitute Materials on Historic Building Exteriors.

1.03 GENERAL REQUIREMENTS

A. In accordance with FBC-EB APPENDIX B / DOI (REHAB), deteriorated architectural features should be repaired rather than replaced, wherever possible. In the event that replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual properties. Substitute materials should be used only on a limited basis and only when they will match the appearance and general properties of the historic material and will not damage the historic resource.

1.04 WHEN TO CONSIDER USING SUBSTITUTE MATERIALS IN PRESERVATION PROJECTS

A. General:

1. Because the overzealous use of substitute materials can greatly impair the historic character of an historic structure, all preservation options should be explored thoroughly before substitute materials are used.

a. It is important to remember that the purpose of repairing damaged features and of replacing lost and irreparably damaged ones is both to match visually what was there and to cause no further deterioration.

b. For these reasons it is not appropriate to cover up historic materials with synthetic materials that will alter the appearance, proportions and details of an historic building and that will conceal future deterioration.

2. Repairs are preferable to replacement whether or not the repairs are in kind or with a synthetic substitute material.

3. In general, four circumstances warrant the consideration of substitute materials:

    a. the unavailability of historic materials;

    b. the unavailability of skilled craftsmen;

    c. inherent flaws in the original materials; and

    d. code-required changes (which in many cases can be extremely destructive of historic resources).

4. Cost may or may not be a determining factor in considering the use of substitute materials.

B. Unavailability of the Historic Material: The most common reason for considering substitute materials is the difficulty in finding a good match for the historic material (particularly a problem for masonry materials where the color and texture are derived from the material itself). This may be due to the actual unavailability of the material or to protracted delivery dates (e.g., the local quarry that supplied the stone for a building may no longer be in operation).

1. Prior to replacement, all efforts must be made to locate another source that could supply a satisfactory match.

2. If this approach fails (i.e., another source that could supply a satisfactory match cannot be found), then substitute materials may be a suitable substitute if care is taken to ensure that the detail, color and texture of the original historic material are matched.

C. Unavailability of Historic Craft Techniques and Lack of Skilled Artisans: These two reasons complicate any preservation or rehabilitation project. This is particularly true for intricate ornamental work, such as carved wood, carved stone, wrought iron, cast iron, or molded terra cotta.

1. Prior to replacement, all efforts must be made to seek out artisans who might be able to repair ornamental elements and thereby save the historic features in place.

2. If this approach fails, it may possible to cast substitute replacement pieces using aluminum, cast stone, fiberglass, polymer concretes, glass fiber reinforced concretes and terra cotta.

    a. Mold making and casting takes skill and craftsmen who can undertake this work must be available.

D. Poor Original Building Materials: Some historic building materials were of inherently poor quality or their modern counterparts are inferior. In addition, some materials were naturally incompatible with other materials on the building, causing staining or galvanic corrosion.

1. In some cases, more durable materials might be available as substitutes that can produce a more durable yet visually compatible replacement.

E. Code-Related Changes: Sometimes referred to as life and safety codes, building codes often require changes to historic buildings.

1. In some cases, the extent of historic fabric removed may be so great as to diminish the integrity of the resource.

a. This could affect the significance of the structure and jeopardize National Register status.

b. DOI regulations make clear that DOI (REHAB) takes precedence over other regulations and codes in determining whether a project is consistent with the historic character of the building undergoing rehabilitation.

2. Secondary reasons for considering the use of substitute materials are their lighter weight and, for some materials, a reduced need of maintenance.

a. These reasons can become important if there is a need to keep dead loads to a minimum or if the feature being replaced is relatively inaccessible for routine maintenance.

1.05 CAUTIONS AND CONCERNS

A. In dealing with exterior features and materials, it must be remembered that moisture penetration, ultraviolet degradation, and differing thermal expansion and contraction rates of dissimilar materials make any repair or replacement problematic.

1. To ensure that a repair or replacement will perform well over time, it is critical to understand fully the properties of both the original and the substitute materials, to install replacement materials correctly, to assess their impact on adjacent historic materials, and to have reasonable expectations of future performance.

B. Many high tech materials are too new to have been tested thoroughly. It is therefore difficult to recommend substitute materials if the historic materials are still available.

1. As previously noted, consideration should always be given first to using traditional materials and methods of repair or replacement in lieu of unproven techniques, materials or applications.

C. Substitute materials must meet three basic criteria before being considered:

1. they must be compatible with the historic materials in appearance;

2. their physical properties must be similar to those of the historic materials, or be installed in a manner that tolerates differences; and

3. they must meet certain basic performance expectations over an extended period of time.

1.06 MATCHING THE APPEARANCE OF THE HISTORIC MATERIALS

A. In order to provide an appearance that is compatible with the historic material, the new material should match the details and craftsmanship of the original as well as the color, surface texture, surface reflectivity and finish of the original material. The closer an

element is to the viewer, the more closely the material and craftsmanship must match the original.

B. Matching the color and surface texture of the historic material with a substitute material is normally difficult.

1. To enhance the chances of a good match, it is advisable to clean a portion of the building where new materials are to be used.

2. If pigments are to be added to the substitute material, a specialist should determine the formulation of the mix, the natural aggregates and the types of pigments to be used.

3. As all exposed material is subject to ultra-violet degradation, if possible, samples of the new materials made during the early planning phases should be tested or allowed to weather over several seasons to test for color stability.

C. Fabricators should supply a sufficient number of samples to permit on-site comparison of color, texture, detailing, and other critical qualities.

1. In situations where there are subtle variations in color and texture within the original materials, the substitute materials should be similarly varied so that they are not conspicuous by their uniformity.

D. Substitute materials, notably the masonry ones, may be more water absorbent than the historic material.

1. If this is visually distracting, it may be appropriate to apply a protective vapor-permeable coating on the substitute material. However, these clear coatings tend to alter the reflectivity of the material, must be reapplied periodically, and may trap salts and moisture, which can in turn produce spalling. For these reasons, they are not recommended for use on historic materials.

1.07 MATCHING THE PHYSICAL PROPERTIES

A. While substitute materials can closely match the appearance of historic ones, their physical properties may differ greatly.

1. The chemical composition of the material (i.e., presence of acids, alkaline, salts, or metals) should be evaluated to ensure that the replacement materials will be compatible with the historic resource.

2. Special care must therefore be taken to integrate and to anchor the new materials properly.

3. The thermal expansion and contraction coefficients of each adjacent material must be within tolerable limits.

4. The function of joints must be understood and detailed either to eliminate moisture penetration or to allow vapor permeability.

5. Materials that will cause galvanic corrosion or other chemical reactions must be isolated from one another.

B. To ensure proper attachment, surface preparation is critical.

1. Deteriorated underlying material must be cleaned out.

2. Non-corrosive anchoring devices or fasteners that are designed to carry the new material and to withstand wind, snow, and other destructive elements should be used.

3. Properly chosen fasteners allow attached materials to expand and contract at their own rates.

4. Caulking, flexible sealants or expansion joints between the historic material and the substitute material can absorb slight differences of movement.

5. Since physical failures may result from poor anchorage or improper installation techniques, Contractor shall provide the services of a qualified Delegated Structural Engineer to provide necessary structural engineering design services associated with major repairs of load carrying components or assemblies.

C. Some of the new high tech materials such as epoxies and polymers are much stronger than historic materials and generally impermeable to moisture. These differences can cause serious problems unless the new materials are modified to match the expansion and contraction properties of adjacent historic materials more closely, or unless the new materials are isolated from the historic ones altogether.

1. When stronger or vapor impermeable new materials are used alongside historic ones, stresses from trapped moisture or differing expansion and contraction rates generally hasten deterioration of the weaker historic material. For this reason, a conservative approach to repair or replacement is recommended, one that uses more pliant materials rather than high-strength ones.

2. Since it is almost impossible for substitute materials to match the properties of historic materials perfectly, the new system incorporating new and historic materials should be designed so that if material failures occur, they occur within the new material rather than the historic material.

1.08 PERFORMANCE EXPECTATIONS

A. The tight controls necessary to ensure long-term performance extend beyond having written performance standards and selecting materials that have a successful track record.

1. It is important to select qualified fabricators and installers who know what they are doing and who can follow up if repairs are necessary. Installers and contractors unfamiliar with specific substitute materials and how they function in the project's local environmental conditions should be avoided.

B. The surfaces of substitute materials may need special care once installed (e.g., chemical residues or mold release agents should be removed completely prior to installation, since they attract pollutants and cause the replacement materials to appear dirtier than the adjacent historic materials). Also, substitute materials may require more frequent cleaning or special cleaning products.

1. Substitute materials must be identified as part of the historical record of the building so that proper care and maintenance of all the building materials continue to ensure the life of the historic resource.

END OF SECTION

SECTION 017329

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work.

B. Core-drilling of existing structural members.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary.

B. Section 024100 - Demolition.

C. Individual Specifications Sections:

1. Cutting and patching incidental to work of the section.

2. Advance notification to other sections of openings required in work of these sections.

3. Limitations on cutting structural members.

1.03 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Cutting and Patching Work Plan:

1. Submit written request in advance of cutting or alteration which affects:

a. Structural integrity of any element of Project.

b. Integrity of weather-exposed or moisture-resistant element.

c. Efficiency, maintenance, or safety of any operational element.

d. Visual qualities of sight-exposed elements.

e. Work of Owner or separate contractor.

2. Include in request:

a. Identification of Project.

b. Location and description of affected work.

c. Necessity for cutting or alteration.

d. Description of proposed work and products to be used.

(1) Extent: Describe cutting and patching, show how they will be

performed, and indicate why they cannot be avoided.

(2) Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

(3) Products: List products to be used and firms or entities that will perform the Work.

e. Alternatives to cutting and patching.

f. Effect on work of Owner or separate contractor.

g. Written permission of affected separate contractor.

h. Date and time that work will be executed.

i. Utility Services and Mechanical/Electrical Systems:

(1) List services/systems that cutting and patching procedures will disturb or affect.

(2) List services/systems that will be relocated and those that will be temporarily out of service.

(3) Indicate how long services/systems will be disrupted.

j. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

k. Architect/Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching.

(1) Approval does not waive right to later require removal and replacement of unsatisfactory work.

C. Shop Drawings: In addition to requirements for Cutting and Patching Work Plan, submit shop drawings for proposed core-drilling of existing structural concrete members (e.g., concrete beam).

1. For each proposed core hole, submit shop drawings showing the following:

a. Size and location of proposed core hole, and location, size and type of M/E/P component that will penetrate the affected structural component.

b. Size, quantity, location and coverage of all embedded reinforcing within existing structural member (e.g., rebar) in the vicinity of the proposed core location. Include non-destructive testing report prepared by testing laboratory, with all substantiating data.

c. Size of the proposed core hole, and distance (i.e., concrete coverage) to be maintained between the proposed core hole and the existing reinforcing.

2. For each proposed core drilling location, submit a Non-Destructive Testing (NDT) Report, prepared by the testing laboratory; the NDT Report is to be attached to shop drawings for proposed core hole.

1.04 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that will result in reducing their capacity to perform as intended, or in a manner that will result in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. List below is an example only. Revise to suit Project's operating systems. With advice of counsel, delete below if Architect's approval is not required. If list is deleted, delete option in paragraph above.

Primary operational systems and equipment.

2. Air or smoke barriers.

3. Fire-suppression systems.

4. Mechanical systems piping and ducts.

5. Control systems.

6. Communication systems.

7. Electrical wiring systems.

C. Miscellaneous Elements:

1. Do not cut and patch a miscellaneous element or related component in a manner that results in:

a. Reducing the element’s load-carrying capacity;

b. Reducing the element’s capacity to perform as intended;

c. Increasing the element’s maintenance requirements; or

d. Decreasing the element’s operational life or safety.

2. Miscellaneous elements include but are not limited to:

a. List below is an example only. Revise to suit Project. With advice of counsel, delete below if Architect’s approval is not required. If list is deleted, delete option in paragraph above.

Water, moisture, or vapor barriers.

b. Membranes and flashings.

c. Exterior curtain-wall construction.

d. Equipment supports.

f. Piping, ductwork, vessels, and equipment.

g. Noise- and vibration-control elements and systems.

D. Visual/Aesthetic Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect/Engineer's opinion, result in visual evidence of cutting and patching or in reducing the building's aesthetic qualities.

1. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting / Core-Drilling of Existing Structural Members: In addition to the requirements specified above, the following shall apply to cutting and core-drilling of existing structural members (e.g., concrete beam, roof deck, joist, etc.):

1. Testing Laboratory Qualifications: Employ the services of a qualified and experienced testing laboratory to locate and describe the reinforcement, piping and conduits in the vicinity of the proposed cores.

a. Testing laboratory shall have at least 10 years experience in Non-Destructive Testing methods of the type required for this project, including but not limited to use of a suitable non-destructive testing device to determine placement, depth, quantity and depth of embedded steel reinforcing in existing structural concrete members.

b. Testing laboratory shall prepare Non-Destructive Testing Report for each proposed core-drilling location. Submit report with shop drawings.

2. Core Drilling Contractor Qualifications: Employ the services of a qualified and experienced core drilling contractor for drilling of cores through existing structural concrete elements.

a. Core drilling contractor shall have at least 10 years experience in core drilling of the type required for this project.

b. The individuals performing core-drilling work (e.g., core drillers) shall have not less than 7.5 years experience in the practice of concrete cutting and core drilling, and shall be thoroughly familiar with the types of equipment used for such work.

3. Equipment Requirements:

a. Drilling equipment shall have a ground fault interrupter (GFI) so that if there is contact between the drill blade and any other metal (i.e., steel reinforcing) while drilling is in progress the equipment will automatically stop working.

b. The non-destructive testing device used for non-destructive testing of structural concrete elements shall be a microprocessor-controlled rebar locator, size detector, and cover depth recorder, and shall be capable of

accurately detecting embedded reinforcing steel (e.g., rebar) cover to a maximum depth of 12 in (30cm) and bar size to an 8 in (20.3cm) depth.

4. Inspection: Subject to authorization by the Owner, all core drilling will be inspected by a Special Inspector in order to provide assurance to the Owner that for all situations encountered the criteria stated in the Contract Documents are being followed as the Work proceeds.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Those required for original installation.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

2. For any change in material, submit request for substitution under provisions of General Conditions.

PART 3 - EXECUTION

3.01 GENERAL

A. Execute cutting, fitting, and patching, to complete Work, and to:

1. Fit the several parts together, to integrate with other work.

2. Uncover work to install ill-timed work.

3. Remove and replace defective and non-conforming work.

4. Remove samples of installed work for testing.

5. Provide openings in elements of Work for penetrations of mechanical and electrical work.

6. Minimize the size and quantity of cut or core-drilled holes through structural components.

7. Locate proposed cut or core-drilled holes so as to avoid contact with existing reinforcing within the structural member, and to maintain required concrete coverage.

3.02 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

B. Survey of Existing Conditions: Where cutting or core-drilling of existing structural concrete members (e.g., concrete beam, roof deck, joist, etc.) is

proposed, locate the existing reinforcing within the structural member (e.g., rebar) in the vicinity of the proposed core location, the size of the proposed core hole, and the distance (i.e., concrete coverage) to be maintained between the proposed core hole and the existing reinforcing.

1. Coordinate locations of proposed core-drilled holes with requirements of M/E/P components (e.g., piping, conduit).
2. Survey existing conditions and correlate with requirements indicated to determine exact location and extent of core-drilling work required.
3. Coordinate with Survey of Existing Conditions requirements specified in Section 024100 - Demolition.

C. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

D. After uncovering, inspect conditions affecting performance of work.

E. Beginning of cutting or patching means acceptance of existing conditions.

3.03 PREPARATION

A. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas that may be exposed by uncovering work; maintain excavations free of water.

C. Existing Utility Services and Mechanical/Electrical/Plumbing Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

D. At least 2 working days prior to performing any core drilling of a structural element, inform Owner, A/E and Special Inspector; provide location, date and time for core drilling.

1. Core-drilling operations shall be scheduled during Restricted Work Hours only, except as otherwise authorized by Owner and A/E.

3.04 PERFORMANCE

A. General:

1. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
    a. Cut in-place construction to provide for installation of other components

or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

2. Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.

3. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

4. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval.

5. Restore work with new products in accordance with requirements of Contract Documents.

6. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

7. Refinish surfaces to match adjacent finishes.

   a. Where cutting and patching of continuous surfaces (e.g., plaster or gypsum board wall planes, ceiling planes, etc.) is required, refinish the entire continuous surface area to intersection of adjacent planes (e.g., corner), reveals, or other edge-defining elements (e.g., expansion joint cover). Each continuous surface area where refinishing is required shall be refinished as necessary to achieve uniform appearance over the entire continuous surface area, and shall match adjacent finishes.

   b. For an assembly, refinish entire unit.

B. Cutting: Cut in-place construction by sawing, drilling, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed, unless otherwise indicated. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

4. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable

seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.

    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

    b. At penetrations of fire rated walls, partitions, ceilings or floor construction, completely seal void with fire rated materials to full thickness of the penetrated element.

4. Delete or revise first subparagraph below to suit Project.

Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance, unless otherwise indicated.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 024100

DEMOLITION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of designated building elements for alterations purposes.

B. Removal and salvage of identified items and materials, and removal of resulting rubbish and debris.

1.02 RELATED REQUIREMENTS

A. Section 016302 - Use of Substitute Materials on Historic Building Exteriors.

B. Section 017419 - Construction Waste Management: Limitations on disposal of removed materials; requirements for recycling.

C. Division 31 - Earthwork: Site clearing, grading, and fill.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. Florida Building Code, 5th edition - 2014 (FBC).

1. FBC-B -- Florida Building Code, Building.

2. FBC-EB -- Florida Building Code, Existing Building.

a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

C. Florida Fire Prevention Code, 5th edition - 2014 (FFPC).

D. National Fire Protection Association (NFPA):

1. NFPA 1(FL) -- Fire Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

2. NFPA 101(FL) -- Life Safety Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

3. NFPA 241 -- Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2009 edition; adopted per FAC Rule 69A-60.005.

E. U.S. Code of Federal Regulations (CFR):

1. 29 CFR 1926 -- U.S. Occupational Safety and Health Standards.

a. 29 CFR 1926.1101 -- Asbestos.

2. 40 CFR 61 -- National Emission Standards for Hazardous Air Pollutants (NESHAP).

a. 40 CFR 61 Subpart M -- National Emission Standards for Asbestos.

F. U.S. Environmental Protection Agency (EPA).

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Work Plan: Describe the demolition and salvage procedures proposed for the accomplishment of the work.

1. Identify areas for temporary construction and field office, and for temporary and permanent placement of removed materials.

2. Indicate extent of demolition, removal sequence, and location and construction of barricades and fences.

3. Include a summary of safety procedures.

4. Include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Building demolition, selective demolition, and salvage work shall comply with applicable federal, state and local regulatory requirements, including but not limited to FBC-B SECTION 3303, FBC-EB CHAPTERS 12 and 15, FBC-EB APPENDIX B, and NFPA 1(FL) CHAPTER 16.

1. Demolition Documents: Demolition documents, asbestos removal documents, and a schedule for demolition must be submitted when required by the building official.

a. When such information is required, no work shall be done until the documents and schedule are approved.

2. Pedestrian Protection: The work of demolishing existing building shall not be commenced until pedestrian protection is in place as required by governing building code and authority having jurisdiction.

a. Pedestrian protection shall comply with requirements of FBC-B SECTIONS 3306, 3307 and 3308, and FBC-EB SECTIONS 1502 and 1503.

3. Water Accumulation: Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

4. Utility Connections: Service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the authority having jurisdiction.

5. Identification and Abatement of Asbestos-Containing-Materials:

    a. Contractor shall employ a qualified Florida-licensed Asbestos Consultant, who shall be responsible for conducting an asbestos survey, developing an operation and maintenance plan, monitoring and evaluating asbestos abatement, and preparing asbestos abatement specifications.

    b. Contractor shall employ a qualified Florida-licensed Asbestos Contractor, who shall be responsible for conducting asbestos abatement work in accordance with the asbestos abatement specifications developed by the Asbestos Consultant.

    c. Work performed under this contract shall comply with applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding identification, handling, storing, transporting, and disposing of asbestos waste materials.

        (1) Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work.

        (2) Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

    d. Demolition activities shall be conducted in accordance with 40 CFR 61 (NESHAP).

    e. Contractor personnel who perform demolition activities must comply with the OSHA construction standard for Occupational Exposure to Asbestos (29 CFR 1926.1101) and other applicable federal, state and local requirements; and a NESHAP competent person must be present on the project during demolition to note changes in the condition of ACM impacted during wet demolition.

    f. Asbestos Contractor and Contractor shall comply with State of Florida and City of Miami Building/Licensing Department requirements for permitting and for notification of intent to renovate or demolish.

6. Identification and Abatement of Lead-Based Paint (LBP) Materials:

    a. Contractor shall employ a qualified Lead-Based Paint Risk Assessor, who shall be responsible for conducting a lead-based paint (LBP) survey, developing an operation and maintenance plan, monitoring and evaluating LBP abatement, and preparing LBP abatement specifications.

    b. Contractor shall conduct Lead-Based Paint (LBP) abatement work in accordance with the LBP abatement specifications developed by the EPA LBP Risk Assessor.

    c. Work performed under this contract shall comply with applicable federal, state,

and local laws, ordinances, criteria, rules and regulations regarding identification, handling, storing, transporting, and disposing of lead-based paint (LBP) waste materials.

(1) Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work.

(2) Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

d. Contractor shall comply with State of Florida and City of Miami Building/Licensing Department requirements for permitting and for notification of intent to renovate or demolish.

7. Identification and Remediation of Mold Materials:

a. Contractor shall employ a qualified Mold Assessor, who shall be responsible for conducting a mold survey, developing an operation and maintenance plan, monitoring and evaluating mold remediation, and preparing mold remediation specifications.

b. Contractor shall conduct mold remediation work in accordance with the mold remediation specifications developed by the Mold Assessor.

c. Work performed under this contract shall comply with applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding identification, handling, storing, transporting, and disposing of mold waste materials.

(1) Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work.

(2) Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

d. Contractor, Mold Assessor, and Mold Remediator shall comply with State of Florida and City of Miami Building/Licensing Department requirements for permitting and for notification of intent to renovate or demolish.

B. Demolition Contractor Qualifications: Company specializing in the type of work required.

1. Minimum of 5 years of documented experience.

C. Asbestos Consultant Qualifications: Person or business organization who holds a current, valid, active Asbestos Consultant license issued by the Florida Department of Business and Professional Regulation in accordance with Section 469 Florida Statutes.

D. Asbestos Contractor Qualifications: Person or business organization who holds a current, valid, active Asbestos Contractor license issued by the Florida Department of Business and Professional Regulation in accordance with Section 469 Florida Statutes; and who is approved by State of Florida and City of Miami Building/Licensing

Department as qualified to perform the asbestos abatement work required for this project.

E. Lead-Based Paint Assessor: Person who holds a current certificate as an EPA Lead-Based Paint Risk Assessor, and who is certified by the EPA to conduct LBP activities in the State of Florida.

F. Mold Assessor: Person who holds a current, valid, active Florida license as a Mold Assessor and carries the minimum State-required Errors & Omissions and Liability insurance.

G. Mold Remediator: Person who holds a current, valid, active Florida license as a Mold Remediator and carries the minimum State-required Errors & Omissions and Liability insurance.

H. Demolition and salvage procedures shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged or recycled, dust control, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials to be salvaged or recycled shall be stored daily in areas and manner specified by the Architect and Owner's Representative.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Dust Control: The amount of dust resulting from removal, salvage and demolition operations shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area.

1. Use of water to control dust will not be permitted when it will result in, or create, damage to existing building materials and hazardous or objectionable conditions such as flooding or pollution.

1.07 PROTECTION

A. General:

1. Before beginning any removal, salvage or demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work.

2. The Contractor shall take necessary precautions to avoid damage to existing items that are to remain in place, to be reused, or to remain the property of the Owner.

3. Items damaged by the Contractor shall be repaired and restored to original condition, or replaced, as approved by the Architect.

4. The Contractor shall coordinate the work of this section with all other work, and shall construct and maintain shoring, bracing and supports, as required.

5. The Contractor shall ensure that structural elements are not overloaded and shall provide additional supports as may be required as a result of any cutting, removal, or demolition work performed under this Contract.

B. Protection from Weather:

1. Salvageable materials shall be protected from the weather at all times.

2. Salvaged materials shall be stored out of contact with the ground and under weather-tight covering.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fill Material: Refer to Division 31 - Earthwork.

PART 3 - EXECUTION

3.01 SCOPE

A. Building Demolition: As indicated on drawings.

B. Items designated to be removed for salvage:

1. T&G Wood plank/strip floor and roof deck lumber.

2. Wood framing (floors, walls, ceilings) and truss lumber.

3. Five (5) historic steel windows

4. Any other item or building element which is uncovered and subsequently deemed to be a contributing feature to the existing Historic structure, as directed by Architect.

B. Asbestos abatement, including but not limited to: asbestos survey, sampling and analysis of suspected asbestos-containing-materials; development of an operation and maintenance plan; preparation of asbestos abatement plans and specifications; notification and permitting related to asbestos abatement; monitoring and evaluation of asbestos abatement work; and removal of asbestos-containing-materials.

1. Upon receipt of Notification to Proceed, Contractor shall file all notices to applicable regulatory agencies and obtain all required permits to perform asbestos abatement work.

a. Contractor shall submit to Architect and Owner’s Representative a notarized affidavit stating that notifications have been sent to the applicable regulatory agencies, as well as a copy of the notification of asbestos abatement.

b. Upon commencement of work, Contractor shall complete the asbestos abatement within the time specified in the contract and schedule of work of the project.

C. Lead-based paint removal.

D. Mold remediation.

E. Remove paving and curbs as required to accomplish new work.

F. Within area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.

G. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.

H. Remove concrete slabs on grade as indicated on drawings.

I. Remove other items indicated, for salvage, relocation, and recycling.

J. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.

2. Comply with applicable requirements of NFPA 241.

3. Use of explosives is not permitted.

4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.

5. Provide, erect, and maintain temporary barriers and security devices.

6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

8. Do not close or obstruct roadways or sidewalks without permit.

9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Architect or Owner's Representative.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

E. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.

2. Prevent movement or settlement of adjacent structures.

3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 IDENTIFICATION AND REMOVAL OF ASBESTOS-CONTAINING-MATERIALS

A. Asbestos Consultant shall develop an operation and maintenance plan, prepare asbestos abatement plans and specifications, and monitor and evaluate asbestos abatement.

1. For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, Contractor shall order Asbestos Consultant to perform additional survey, sampling and analysis services. When such additional analysis indicates the presence of asbestos containing materials, Contractor shall order the Asbestos Consultant to revise or develop additional asbestos abatement plans and specifications, and shall submit same to State of Florida and City of Miami Building/Licensing Department.

B. Asbestos Contractor shall conduct asbestos abatement work in accordance with the asbestos abatement plans and specifications developed by the Asbestos Consultant.

C. Identification and removal of asbestos-containing-materials shall comply with applicable federal, state, and local laws, ordinances, criteria, rules and regulations including but not limited to:

1. Rule 62-257, Florida Administrative Code.

2. Section 376.60, Florida Statutes.

3. 40 CFR 61 Subpart M.

4. Florida Department of Environmental Protection (DEP), Division of Air Resources Management.

3.04 IDENTIFICATION AND REMOVAL OF LEAD-BASED PAINT (LBP) MATERIALS

A. Lead-Based Paint Assessor shall develop an operation and maintenance plan, prepare LBP abatement plans and specifications, and monitor and evaluate LBP abatement.

1. For any previously untested building components suspected to contain LBP and located in areas impacted by the work, Contractor shall order Lead-Based Paint Assessor to perform additional survey, sampling and analysis services. When such additional analysis indicates the presence of LBP materials, Contractor shall order the Lead-Based Paint Assessor to revise or develop additional LBP abatement plans and specifications, and shall submit same to State of Florida and City of Miami Building/Licensing Department.

B. Contractor shall conduct LBP abatement work in accordance with the LBP abatement plans and specifications developed by the Lead-Based Paint Assessor.

C. Identification and removal of LBP materials shall comply with applicable federal, state, and local laws, ordinances, criteria, rules and regulations.

3.05 IDENTIFICATION AND REMOVAL OF MOLD

A. Mold Assessor shall develop an operation and maintenance plan, prepare mold remediation plans and specifications, and monitor and evaluate mold remediation

1. For any previously untested building components suspected to contain mold and located in areas impacted by the work, Contractor shall order Mold Assessor to perform additional survey, sampling and analysis services. When such additional analysis indicates the presence of mold materials, Contractor shall order the Mold Assessor to revise or develop additional mold remediation plans and specifications, and shall submit same to State of Florida and City of Miami Building/Licensing Department.

B. Contractor shall conduct mold remediation work in accordance with the mold remediation plans and specifications developed by the Mold Assessor.

C. Identification and removal of mold materials shall comply with applicable federal, state, and local laws, ordinances, criteria, rules and regulations.

3.06 SALVAGED ITEMS

A. Salvage items shall include items designated for careful removal, and:

1. storage and reinstallation in the finished Work; or

2. transportation and delivery to storage location as directed by Owner's Representative.

B. Prior to any demolition work, designated salvage items shall be removed from the existing structure.

C. Removal of salvageable items shall be accomplished by hand labor to the maximum extent possible. Care shall be taken to not damage portions of the existing structure to remain or items identified for salvage.

D. Maintain a complete recording of all salvaged materials including the condition of such materials before, and after, salvage operations.

3.07 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Architect, Owner's Representative and Authorities Having Jurisdiction.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Architect, Owner's Representative.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using

substantial barricades if necessary.

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

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.08 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as shown.

2. Report discrepancies to Consultant before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.

1. Remove items indicated on drawings.

C. Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.

3. Repair adjacent construction and finishes damaged during removal work.

4. Patch as specified for patching new work.

3.09 DEBRIS AND WASTE REMOVAL

A. Remove waste materials, rubbish, debris, junk, and trash from site, in accordance with requirements of Article 83 of Section 2 - General Terms and Conditions and Section 3 - Supplemental Terms and Conditions of the City of Miami Capital Improvements Program Standard Contract.

B. Remove from site all materials not to be reused on site.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 030505

UNDERSLAB VAPOR BARRIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

B. Sheet vapor retarder under exterior concrete slabs on grade.

1.02 RELATED REQUIREMENTS

A. Section 031000 - Concrete Forming and Accessories: Placement of formwork and accessories for concrete slabs on grade and foundations.

B. Section 032000 - Concrete Reinforcing: Placement of reinforcing for concrete slabs on grade and foundations.

C. Section 033000 - Cast-in-Place Concrete: Preparation of sub-grade, granular fill, placement of concrete for concrete slabs on grade and foundations.

D. Division 22 - Plumbing: Piping penetrations through slab on grade.

E. Division 26 - Electrical: Conduit penetrations through slab on grade.

F. Division 31 - Earthwork:

1. Fill: Filling, backfilling, and compacting for building volume below grade.

2. Chemical Termite Control: Application and protection of soil treatment used for subterranean termite prevention, prior to installation of underslab vapor barrier materials.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM E1643 -- Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

2. ASTM E1745 -- Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Shop Drawings: Submit shop drawings, including manufacturer's standard details for the following conditions:

1. Include construction drawings details showing perimeter, penetrations, and joint conditions, and indicate locations for such details on plan view(s).

2. Indicate all materials to be used, including barrier/retarder sheet membrane and accessory materials.

1.05 QUALITY ASSURANCE

A. Comply with applicable requirements of the governing building code, including but not limited to FBC-B SECTION 1907 and FBC-B APPENDIX E, CHAPTER E301.

B. Coordinate work of this Section with Related Requirements specified in other sections, including but not limited to:

1. Placement of formwork and accessories for concrete slabs on grade.

2. Placement of reinforcing for concrete slabs on grade.

3. Preparation of sub-grade, granular fill, placement of concrete.

4. Application and protection of soil treatment used for subterranean termite prevention.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. Materials shall meet or exceed:

a. Applicable requirements of the governing building code, including but not limited to FBC-B SECTION 1907 and FBC-B APPENDIX E, CHAPTER E301.

b. Requirements specified in this Section.

2. Provide all materials and accessory products necessary for a complete installation in accordance with manufacturer's recommended installation details.

B. Underslab Vapor Barrier: Puncture-resistance single-layer membrane, to provide a continuous vapor barrier layer between compacted fill and concrete slab on grade, with the following characteristics:

1. Acceptable Manufacturers / Products:

a. Insulation Solutions, Inc.: www.insulationsolutions.com.

(1) Product: VIPER® VAPORCHECK® II, 15-mil.

b. Stego Industries LLC; www.stegoindustries.com.

(1) Product: Stego Wrap Vapor Barrier, 15-mil.

c. W.R. Meadows, Inc.: www.wrmeadows.com.

(1) Product: PERMINATOR®, 15 mil.

2. Material: Extruded polyolefin.

a. Thickness: 15 mils (0.4 mm).

3. Performance Requirements:

a. Water Vapor Permeance (ASTM E1745): Not more than 0.018 perms (1.0 ng/(s m2 Pa)), maximum.

b. Strength (ASTM E1745): Class A.

C. Underslab Vapor Retarder: Sheet membrane, to provide a continuous vapor retarder layer between compacted fill and concrete floor slab on grade.

1. Material: Extruded polyolefin.

a. Thickness: 10 mils (0.25 mm).

D. Accessory Products:

1. Vapor barrier manufacturer's recommended tape, adhesive, mastic, termination bar, etc., for sealing edges, seams and penetrations in vapor barriers and vapor retarders.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surface over which underslab vapor barrier / underslab vapor retarder will be installed is complete and ready before proceeding with installation.

B. Verify that soil treatment for termite control is completed and approved in accordance with Section 313116 - Chemical Termite Control and FBC-B SECTION 1816.

3.02 INSTALLATION

A. General:

1. Installation shall comply with:

a. Applicable requirements of the governing building code, including but not limited to FBC-B SECTION 1907 and FBC-B APPENDIX E, CHAPTER E301.

b. Manufacturer’s installation requirements and recommendations.

c. ASTM E1643.

d. Requirements specified in this Section.

B. Underslab Vapor Barrier: Install vapor barrier under interior slabs on grade (i.e., concrete slab areas located within the enclosing walls of the building); lap sheet over

footings and seal to foundation walls.

1. Lap joints minimum 6 inches (150 mm).
2. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
3. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities, and such reinforcing steel and permanent utility penetrations must be sealed in accordance with manufacturer's recommended products and follow manufacturer's written instructions.
4. Repair damaged vapor retarder before covering with other materials.

C. Underslab Vapor Retarder: Install vapor retarder under exterior slabs on grade (i.e., concrete slab areas located completely outside of the enclosing walls of the building, including driveways, walks, patios and other flatwork that are not designated to be enclosed at a later date).

END OF SECTION

SECTION 03 10 00

CONCRETE FORMWORK

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, but is not limited to, the design, engineering, construction and removal of formwork required for cast-in-place concrete as shown on the drawings and specified herein.

B. Related Sections include, but are not limited to, the following:

1. Section 033000 “Cast-In-Place Concrete” for finishes.

C. Work Installed and Furnished by Others:

1. Install built-in anchors, inserts, and bolts for connection of other materials; sleeves, thimbles, and dovetail anchor slots, plates, frames, seats and all other embedded items including Owner furnished items.

1.3 ACTION SUBMITTALS

A. Product Data: Submit, for record only, not for approval, data for each type of product and material indicated including others as requested by Architect. Substitutions for specified items or manufacturers are to be submitted in accordance with Section 1 and will be subject to approval, rejection or other appropriate action.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with the following, unless more stringent provisions are indicated:

1. Florida Building Code, 2014 Edition.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3. ACI 301, "Specifications for Structural Concrete.”

4. ACI-318, “Building Code Requirements for Structural Concrete and Commentary.”

5. ACI 347, “Guide to Formwork for Concrete.”

6. ACI SP-4, “Formwork for Concrete.”

7. American Forest and Paper Association, “National Design Specifications for Wood Construction.”

8. American Plywood Association (APA), “Plywood Design Specification” (Form Y-510); “Concrete Forming: (Form V345)

9. National Institute of Standards and Technology (NIST), "Voluntary Product Standard PS 1-95 for Construction and Industrial Plywood" (Form V995).

1.5 JOB CONDITIONS AND COORDINATION OF TRADES

A. General: It is the Contractor's sole responsibility to coordinate with all trades for the setting of sleeves, anchor bolts, dovetail slots, inserts, frames, flashing, reglets, pipes, ducts and other embedded items and provide all openings required for installation of other work in accordance with the Contractor's shop drawings and the Contract Documents.

B. Structural Integrity: Provide no sleeves or openings in structural members unless shown on the structural drawings or approved by the Architect.

C. Inspection: Architect may inspect formwork at any time and may reject formwork if forms do not conform to the lines, levels, and tolerances as required in this Section, the shop drawings or the Design Drawings. If formwork is rejected, the Contractor must repair or replace the rejected portion with no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Stable Soil: In the event stable soil is encountered and straight-line embankments can be maintained, concrete foundations may be placed into accurately excavated earth trenches, free from water, debris, or loose dirt. Excavations shall be minimum 2" wider and longer than specified.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. 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.

F. 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 the exposed concrete surface.

2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.

G. Accessories: Provide necessary anchors, form ties, shores, construction joints, scaffolds, and bracing as required to install forms. Provide construction joints, control joints, expansion joints and waterstops where indicated on the drawings.

1. Form Joint Gasket: Closed cell rubber sponge. Take care that form joints are sealed from leakage of cement paste and moisture.

2. Material to form drips, reveals, rustification strips or weep holes shall be extruded plastic.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 and 347, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete 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 347R as abrupt or gradual, as follows:

1. Class B, 1/4 inch: Rough-formed finished surfaces intended to receive plaster.

2. Class C, 1/2 inch: Other rough-formed finished surfaces.

3. Class D, 1 inch: Permanently concealed 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. Kerf wood inserts for forming 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.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

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."

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 as indicated.

3.3 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil and rocks and compact to specified density prior to placing reinforcing or concrete. Moisten sides and bottom immediately prior to concrete placement. Comply with OSHA’s “Trench Safety Act”.

3.4 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 provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

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. The Architect’s approval is required for reusing forms for exposed surfaces. Apply new form-release agent.

C. Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete. 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.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

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, but is not limited to, concrete reinforcement, and necessary accessories.

1.3 ACTION SUBMITTALS

A. Product Data: Submit, for record only, not for approval, data for each type of product and material indicated including others as requested by Architect. Indicate manufacturing process used for steel reinforcing. Substitutions for specified items or manufacturers are to be submitted in accordance with Division 1 and will be subject to approval, rejection or other appropriate action.

B. Steel Reinforcement Shop Drawings: Complete details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement" and ACI SP-66 “Detailing Manual”. Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement.

1. Do not reproduce Structural Drawings for use as shop or placement drawings without prior approval of the Architect.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: Signed by manufacturers and contractor certifying that the steel reinforcement and reinforcement accessories comply with requirements of the Contract Documents. Unidentifiable steel is prohibited.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with the following, unless more stringent provisions are indicated:

1. Florida Building Code, 2014 Edition.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3. ACI 301, "Specifications for Structural Concrete.”

4. ACI 315, “Details and Detailing of Concrete Reinforcement.”

5. ACI-318, “Building Code Requirements for Structural Concrete and Commentary.”

6. “CRSI Manual of Standard Practice.”

B. Installer Qualifications: An experienced installer who has completed concrete 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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Deliver reinforcement to the job site bundled, tagged and marked. Use durable metal or embossed plastic tags indicating bar size, lengths, and reference information corresponding to markings shown on placement drawings.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.

C. Plain-Steel Wire: ASTM A 82, as drawn.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets. Rolls are not acceptable.

2.2 REINFORCEMENT ACCESSORIES

A. 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. For concrete surfaces where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

2. For welded wire fabric in slabs on grade use precast slab bolsters, concrete brick or sand plate chairs spaced no farther than 3’-0” c/c.

2.3 REINFORCEMENT FABRICATION

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

B. Shop bend and fabricate reinforcing bars to conform with shapes and dimensions indicated on drawings. In case of errors, do not bend or straighten reinforcement without prior approval of Structural Engineer. Make all bends cold.

PART 3 - EXECUTION

3.1 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover specified on the drawings. Do not tack weld crossing reinforcing bars.

D. Tie bars and bar supports together with 16 gauge wire and set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging (3'-0"o.c. max.). Lap edges and ends of adjoining sheets at least two mesh spacings. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with 16 gauge wire.

F. Splices: Locate only where indicated on the drawings or approved shop drawings except with prior approval of Engineer.

1. For standard splices, lap ends, placing bars in contact, and tightly wire tie. See drawings for lap lengths.

2. Do not weld splices.

G. Provide template for all column dowels.

H. Do not bend bars embedded in hardened or partially hardened concrete without approval from the Structural Engineer.

I. Do not weld reinforcing bars unless specifically shown. Where shown comply with AWS D1.4. Bars to be welded shall conform to ASTM A706.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

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, but is not necessarily limited to, concrete, concrete materials, mix design, placement procedures, curing and finishes.

B. Related Sections include, but are not necessarily limited to, the following:

1. Division 03 Section 031000 “Concrete Formwork”.

2. Division 03 Section 030505 “Underslab Vapor Barrier”.

3. Division 31 Section 313116 “Termite Control”.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 ACTION SUBMITTALS

A. Product Data: Submit, for record only, not for approval, data for each type of product and material indicated including admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by Architect. Substitutions for specified items or manufacturers are to be submitted in accordance with Division 01 and will be subject to approval, rejection or other appropriate action.

B. Submit field or laboratory test records used to document that the proposed mixture will achieve the required average compressive strength and other specified requirements in Section 2.13 for each class of concrete. Field test records must be from concrete supplied from the same production facilities proposed for the work. Test data shall be from concrete mixtures containing similar materials proposed for the work.

C. Submit properties of mix design for each class of concrete including:

1. Mixture Identification by class

2. Specified compressive strength, f’c, that is applicable for the class.

3. Specified exposure class.

4. Documentation of strength test results of similar class of concrete mixtures used to establish the standard deviation in accordance with ACI 218, when test records exist.

5. Required average compressive strength, f’cr for each class of concrete

6. Average compressive strength of proposed mixture(s).
7. Placement method.
8. Slump or slump flow
9. Air content.
10. w/cm ratio
11. Maximum aggregate size

D. Alternate Mix Designs: Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Substantiating data to be no older than one year from date of submittal for each mix design.

1. Indicate amounts of mix water to be withheld for later addition at Project site.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in the successful manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production and delivery, facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's “Certification of Ready Mixed Concrete Production Facilities”.

B. Source Limitations: For each placement, obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

C. Codes and Standards: Comply with the following, unless modified by requirements in the Contract Documents:

1. Florida Building Code, 2014 Edition.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 211.1 “Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.”
4. ACI 301, "Specification for Structural Concrete for Buildings.”
5. ACI-304, “Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.”
6. ACI-308, “Recommended Practice for Curing Concrete.”
7. ACI-309, “Recommended Practice for Consolidation.”
8. ACI-311, “Guide for Concrete Inspection.”
9. ACI-318, “Building Code Requirements for Reinforced Concrete.”

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

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

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 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

2. Hydraulic Cement: ASTM C 1157.

3. Blended Hydraulic Cement: ASTM C 595.

4. Ground Granulated Blast-Furnace Slag: ASTM C 989.

B. Pozzolans:

1. Fly Ash: ASTM C 618.

C. Silica Fume: ASTM C 1240.

D. Normal-Weight Aggregate: Provide aggregates from a single source.

1. Fine Aggregate: Natural quartz sand or manufactured sand from local stone aggregates conforming to ASTM C33, produced from F.D.O.T. approved sources, with fineness modulus not less than 2.4, and having a proven service record.

2. Coarse Aggregate: Clean, washed, sound, crushed natural stone products produced from F.D.O.T. approved sources. Free from salt, clay, mud, loam or other foreign matter. Conform to ASTM C33; sizes No. 67 (3/4 inch) or No. 57 (1 inch), No. 8 or No. 89 (3/8 inch), and No. 467 (1 1/2 inch). Use largest size practical for members being cast.

E. Water: Potable and complying with ASTM C 94.

2.3 CONCRETE ADMIXTURES

A. General: Provide admixtures produced by acceptable manufacturers and used in compliance with the manufacturer’s printed directions. Use only admixtures which have been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by the Architect. Do not use admixtures which increase the shrinkage properties of concrete. Submit substantiating data, if requested.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-reducing admixture: ASTM C 494.

D. High Range Water Reducing Admixture: ASTM C 494.

E. Admixture for Flowing Concrete: ASTM C 1017.

F. Calcium Chloride: Do not use calcium chloride in concrete. Do not use any admixtures which contribute free chloride ions to the concrete mix.

2.4 PLASTIC VAPOR RETARDER

A. See Section 030505 – Underslab Vapor Barrier..

2.5 CURING MATERIALS

A. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, (or Type 2) Class B, dissipating. The film must chemically break down in a 4 to 6 week period after application.

1. Available Products:

a. Dayton Superior Corporation; Day-Chem Rex Cure (J-11-W).

b. Edoco by Dayton Superior; Aqua Resin Cure.

c. Euclid Chemical Company (The) an RPM company; Kurez D.R.

d. Lambert Corporation ; AQUA KURE – CLEAR.

e. L&M Construction Chemicals, Inc. ; L&M Cure R.

f. Meadows, W.R., Inc. ; 1100-CLEAR.

g. Nox-Crete Products Group ; Resin Cure E.

B. Liquid Membrane-Forming Cure and Seal Compound: VOC Compliant, conforming to ASTM C309, Type 1, Class B and ASTM C1315, Type 1, Class A or B. The compound shall be a clear styrene acrylate type, 25% solids content minimum, and have test data from an independent testing laboratory indicating to a maximum moisture loss of .040 grams per square cm. When applied at a coverage rate of 200 sq. ft. per gallon.

1. Available Products:

a. BASF Construction Chemicals – Building Systems; Kure-N-Seal 25 LV.

b. Dayton Superior Corporation ; Day-Chem Cure and Seal (J-22UV).

c. Edoco by Dayton Superior; Cure Seal 1315; Spartan Cote VOC.

d. Euclid Chemical Company (The) an RPM company; Super Diamond Clear; Super Aqua-Cure VOX.

e. L&M Construction Chemicals, Inc.; Dress & Seal 25; Dress & Seal WB.

f. Meadows. W.R., Inc.; CS-309-25; VOCOMP-25.

g. Nox-Crete Products Group; Cure & Seal 250E.

h. Symons by Dayton Superior;

C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

2.6 RELATED MATERIALS

A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

1. Available Products:

a. BASF Construction Chemicals – Building Systems; AcrylSet; Thoro Acryl 60.

b. Dayton Superior Corporation; J-40 Bonding Agent.

c. Euclid Chemical Company (The) an RPM company; SBR Latex.

d. Lambert Corporation; Acrylbond.

e. Larsen Products Corp.; Acrylic Ad-Mix 101.

f. Sika Corporation; Sika Latex.

B. Reglets: Fabricate reglets of not less than 0.0217-inch thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

C. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.7 CEMENT GROUT AND DRYPACK

A. Prepackaged Non-Shrink Non-Metallic Non-Gaseous Grout: ASTM C 1107, Grade B or C at a fluid consistency (flow cone) of 20 to 30 seconds. Grout shall be bleed free and attain 7500 psi compressive strength in 28 days at fluid consistency. Use for structural repairs.

1. Available Products:

a. BASF Construction Chemicals – Building Systems ; Masterflow 928.

b. Euclid Chemical Company (The) an RPM company; Euco NS Grout.

c. Five Star Products, Inc.; Five Star Fluid Grout 100.

d. Fosroc; Conbextra HF.

e. Lambert Corporation; Vibropruf #20.

f. L&M Construction Chemicals, Inc.; Crystex.

g. Sika Corporation; Sikagrout 212.

B. Cement Grout: Mix one part Portland cement, 2-1/2 parts fine aggregate, and enough water and liquid bonding agent in a 50/50 mix for required consistency depending on use. Consistency may range from mortar consistency to a mixture that will flow under its own weight. Use for leveling, preparing setting pads of beds, for filling non-structural voids, and similar uses. Do not use for grouting under bearing plates or structural members in place.

C. Drypack: Mix one part Portland cement, 2 parts fine aggregate, and enough water and liquid bonding agent in a 50/50 mix to hydrate cement and provide a mixture that can be molded with hands into a stable ball (a stiff mix). Do not mix more than can be used in 30 minutes. Use for patching tie holes and large surface defects in concrete.

Retain paragraph and subparagraphs below as a repair material for floor or slab areas remaining exposed and not receiving floor coverings.

2.8 CONCRETE MIXES

A. Concrete for all parts of the concrete work shall be homogenous, and when hardened, possess the required strength, durability, watertightness, appearance, resistance to deterioration and abrasion, and other qualities as specified or required.

B. Provide concrete which will develop ultimate compressive strength at 28 days equal to that noted on drawings and listed below.

C. Prepare design mixtures for each class of concrete on the basis of laboratory trial mixtures or field test data, or both according to ACI 318, Chapter 5.3. Proportion with complete statistical data, not more than one year old from date of submittal. Design mixtures shall meet the requirements listed below.

Concrete Mixtures							
Application	Exposure Class[5]	f'c (psi)	Nominal Maximum Aggregate Size[1]	Content[3]	Maximum w/cm by weight	Cementitious Materials	Admixtures
Slabs and Beams	F0	4000	3/4"	N/A[2]	N/A	See Section 2.2A, B, & C	See Section 2.3
Columns & Walls	F0	See Draw-ings	3/4"	N/A	N/A	See Section 2.2A, B, & C	See Section 2.3
Slabs on Grade	F0	3500	3/4"	N/A	N/A	See Section 2.2A, B, & C	See Section 2.3
Foundations	F0	4000	1"	N/A	N/A	See Section 2.2A, B, & C	See Section 2.3

Notes:

1. A smaller nominal maximum aggregate size may be used at the discretion of the contractor and manufacturer with substantiating data that increased shrinkage has been accounted for in the mix design or offset by the use of a shrinkage reducing admixture.

2. No air entrainment is required. Air content of concrete for slabs with hard trowel finish shall not exceed 3 percent.

3. Air content indicated in the table is for concrete with matching nominal maximum aggregate size indicated. If smaller maximum aggregate size is selected, air content shall be adjusted upwards in accordance with ACI 318 Table 4.2.1.

4. Limits on the amount of fly ash, slag , and silica fume by mass of total cementitious materials:

   a. Fly Ash: Maximum 25 percent.

   b. Slag: Maximum 50 percent.

   c. Silica Fume: Maximum 10 percent.

   d. Total of fly ash, slag, and silica fume: Maximum 50 percent.

      1) Fly ash or other pozzolans and silica fume shall constitute no more than 25 percent and 10 percent, respectively, of the total weight of the cementitious materials.

   e. Total of fly ash and silica fume: Maximum 35 percent

      1) Fly ash or other pozzolans and silica fume shall constitute no more than 25 percent and 10 percent, respectively, of the total weight of the cementitious materials.

5. Letter in Exposure Category denotes Exposure Class:

   a. F - Freezing and thawing.

D. The installer and manufacturer shall coordinate to establish properties of the fresh concrete to facilitate placement and finishing with minimal segregation and bleeding. Factors shall include but are not limited to slump or slump flow, set time, method of placement, rate of placement, hot and cold weather placement, curing and concrete temperature.

E. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

B. Mixing and Delivery Time: When air temperature is between 95 and 100 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 100 degrees F, reduce mixing and delivery time to 60 minutes.

1. Concrete Containing Corrosion Inhibitor: Reduce mixing and delivery time to one hour.

C. Provide batch ticket for each ready-mixed batch discharged and used in the Work, indicating Project identification name and number, date, mix type and number, batch time, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 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 bolts, 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".

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 as indicated.

4. Do not provide sleeves or openings in structural members unless shown on the structural drawings or approved by the Architect.

3.2 VAPOR BARRIER / RETARDER

A. Plastic Vapor Barrier/Retarder: Place, protect, and repair vapor barrier/retarder according to ASTM E 1643 and manufacturer's written instructions. Use below interior floor slabs only.

1. Lap joints in accordance with manufacturer's instructions, and seal with manufacturer's recommended tape.

2. For additional requirements, refer to Section 030505 - Underslab Vapor Barrier.

B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

3.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

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. Provide dowels as shown on drawings or as required by Architect. Do not continue reinforcement through sides of strip placements of slabs.

2. For members 5” thick or more, form keys from preformed galvanized steel, plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete. Submit detail to Architect for review.

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. Allow 4 hours (minimum) between when column or wall is cast and when concrete supported by column or wall is cast.

5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces. In beams and girders use epoxy-bonding adhesive at locations when fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated on drawings. If requested, the contractor shall prepare and submit to the Architect a joint layout. Construct contraction joints as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades using the “Soff-Cut” early entry dry-cut saws. Cut 1/8 inch wide and 1 inch deep joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. This is usually within 2 hours of final finish at each control joint but not more than 8 hours after completion of concrete pour.

2. 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.

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. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Coordinate construction and control joints with requirements of finish material joints.

3.4 WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints at locations indicated, according to manufacturer's written instructions, adhesive bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.5 CONCRETE PLACEMENT

A. Complete the following before placing concrete:

1. Excavate and compact subgrade, arrange for compaction testing, place vapor barrier and remove excess water.

2. Secure all formwork. Verify that shoring and reshoring has been inspected and accepted by Delegated Engineer. Moisten wood forms except where form coatings are used.

3. Accurately locate all steel reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, expansion joint materials and other embedded items and secure against shifting during concrete placement or consolidation.

4. Accurately locate bearing pads on true, level, and uniform surfaces and secure against shifting during concrete placement.

5. Cooperate with other trades and verify that their work is installed.

6. Notify testing agency to test concrete.

7. Ensure that all required inspections are performed.

B. Comply with ACI 301, ACI 304, ACI 308 and ACI 318.

C. Measure, batch, mix, deliver, and provide delivery ticket for each batch of concrete in accordance with ASTM C 94.

D. Jobsite Tempering: Place concrete within 1-1/2 hours after introduction of water to mix. Submit time stamped batching tickets upon delivery of concrete to job site.

1. Do not add water to ready-mix concrete except as provided in ASTM C 94, Paragraph 11.7. When so allowed, limit addition of water to amount withheld at plant as indicated on batch ticket. Addition of water may only be authorized by Architect, the concrete producer's quality control representative, a preapproved representative of Contractor, or the Special Inspector. Water shall be added prior to initial discharge of concrete. No water may be added once concrete placement has started.

2. Concrete produced with high range water reducer may only be tempered with additional high range water reducer.

E. 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 specified. Deposit concrete to avoid segregation.

1. Maximum height of concrete free fall is 4 feet. Columns up to 8 feet in height may be poured in one lift. Concrete in columns and walls over 8 feet may be poured full height with the use of drop chutes or tremies or up to a maximum of 16 feet if HRWR admix concrete is used.

F. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators 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 mix constituents to segregate.

3. Concrete in columns and walls shall be cast at least twenty four (24) hours before horizontal members they support are cast. Exception: Concrete in tie columns and grout in masonry cells shall be cast at least four (4) hours before beams or slabs are cast on top of masonry.

G. Deposit and consolidate concrete for 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 highway bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

H. Pumping: Slumps in excess of six (6) inches at the pump will not be permitted except for concrete produced with HRWR. If placing by means of pump, a specifically designed concrete mix shall be submitted to the Architect for review. No pump lines smaller than 4 inches will be permitted. Exception: A 3” pump line may be used for 8” wide beams and columns cast on top of or between masonry walls or for filling masonry cells.

I. Do not place concrete in exposed conditions when it is raining unless adequate protection is provided.

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections

exceeding 1/4" rubbed down or chipped off. Use for concrete surfaces not exposed to view in the finished work.

B. Rubbed Finish: Apply the following to smooth-formed finished concrete:

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.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

C. Wall Surfaces Exposed to Public: Provide elastomeric form liner or steel forms for cast-in-place concrete wall surfaces exposed to the general public.

D. 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.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Slope surfaces to drains.

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 surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power driven floats. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten 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 indicated and to floor and slab 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

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. When concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and 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. Coordinate required final finish with Architect before application.

3.8 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

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.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and 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.

3.9 CONCRETE PROTECTION AND CURING

A. General: Comply with ACI 308 “Recommended Practice for Curing Concrete” and ACI 301. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. 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.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Curing Compound: Apply to all concrete surfaces that are not permanently exposed. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Provide a second coat applied at 90 degrees to initial application within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Curing and Sealing Compound: Apply to permanently exposed concrete surfaces. Apply uniformly 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.

3. 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.

4. 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

3.10 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 six months. 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.

3.11 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. 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 but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. If reinforcing steel is exposed, remove concrete to provide a minimum of 3/4” clearance all around. Prior to patching allow the Architect and Threshold Inspector adequate time to review prepared areas. Clean, dampen with water, and brush-coat prepared surfaces with bonding agent or slurry coat. Fill and compact with dry pack grout or non-shrink non-metallic grout before bonding agent has dried. Fill form-tie voids with cement grout, dry pack grout 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.

C. Repairing Unformed Surfaces: Test unformed surfaces, such as slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according

to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with dry pack grout or non-shrink non-metallic grout. 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.

D. Perform structural repairs of concrete, not covered herein, only with Architect's and Structural Engineer’s approval, using repair procedures they recommend.

E. Other repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting 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.

B. Testing Services: Sample concrete after all water and admixtures have been added. 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 at least one composite sample for each concrete mix placed each day.

2. Slump: ASTM C 143; one test at point of placement for each composite sample. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F and below and when 85 degrees F and above, and one test for each composite sample.

5. Density: ASTM C 138; one test for each composite sample.

6. Compression Test Specimens: ASTM C 31

    a. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample. For pumped concrete, take sample at point of placement.

    b. Cast and field cure one set of four standard cylinder specimens for each composite sample that is laboratory cured and tested.

7. Compressive-Strength Tests of Laboratory Cured Specimens: ASTM C 39; test one specimen at 7 days for information and three at 28 days for acceptance. If one of the first two 28 day tests falls below specified strength, test the remaining specimen at 56 days.

    a. Test two of field cured specimens at 7 days and two specimens at 28 days.

    b. 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.

C. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests (3 sets of 2 cylinders each) equals or exceeds specified compressive strength and no compressive-strength test (1 set of 2 cylinders) value falls below specified compressive strength by 10% or 500 psi, whichever is less.

D. Strength tests that are not satisfactory indicate questionable concrete. The testing agency and Contractor shall submit to the Architect a report of the questionable concrete plus the two test reports immediately prior to and after (5 reports total) for evaluation.

1. If the questionable concrete is not accepted by the Architect, the testing agency shall take core tests per ACI 301 and ASTM C 42 minimum diameter of cores is 4 inches. Concrete will be considered structurally adequate if average of 3 cores is at least 85% f'c and no single core is less than 75% f'c.

2. Concrete not considered adequate by core testing shall be removed and replaced or load tested per ACI 318, Chapter 20.

E. Test results shall be reported in writing to Architect, 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 and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for each test.

F. Additional Tests: Testing and inspecting 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 and inspecting

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.

G. The contractor may be required to pay all costs of additional testing or evaluation of questionable concrete and provide a credit to the Owner for acceptance of questionable concrete.

H. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

END OF SECTION

SECTION 042200

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Mortar and grout.

C. Reinforcement and anchorage.

D. Lintels.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 032000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

B. Section 033000 - Cast-In-Place Concrete.

C. Section 042900 - Reinforced Unit Masonry.

D. Section 092400 - Portland Cement Plastering: Cement plaster (stucco) on masonry base.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Concrete Institute International (ACI):

1. ACI 530/530.1 -- Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

C. American Society of Civil Engineers (ASCE):

1. ASCE 6 -- Specification for Masonry Structures; 2011.

D. American Society for Testing and Materials (ASTM):

1. ASTM A1064/A1064M -- Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

2. ASTM C90 -- Standard Specification for Loadbearing Concrete Masonry Units; 2011b

3. ASTM C91/C91M -- Standard Specification for Masonry Cement; 2005.

4. ASTM C129 -- Standard Specification for Nonloadbearing Concrete Masonry

Units; 2011.

5. ASTM C140/C140M -- Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2008a.
6. ASTM C143/C143M -- Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
6. ASTM C144 -- Standard Specification for Aggregate for Masonry Mortar; 2011.
7. ASTM C150/C150M -- Standard Specification for Portland Cement; 2007.
8. ASTM C207 -- Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
9. ASTM C270 -- Standard Specification for Mortar for Unit Masonry; 2008a.
10. ASTM C387/C387M -- Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.
11. ASTM C404 -- Standard Specification for Aggregates for Masonry Grout; 2011.
12. ASTM C476 -- Standard Specification for Grout for Masonry; 2002.
13. ASTM C780 -- Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.

E. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

F. Florida Concrete Products Association, Inc. (FCPA):

1. FCPA TB-ST 01 -- Technical Bulletin, Choosing the Right Block for Stucco; 2007.
2. FCPA TB-ST 02 -- Technical Bulletin, Stucco on Block.

G. The Masonry Society (TMS):

1. TMS 602/ACI 530.1/ASCE 6 -- Specification for Masonry Structures; 2011.

1.03 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.

a. Comply with ACI 315.

3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

D. Informational Submittals:

1. Qualification Data: For testing agency.

2. Material Certificates: For each type and size of the following:

a. Masonry Units.

(1) Include data on material properties.

(2) For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

b. Cementitious materials. Include name of manufacturer, brand name, and type.

c. Mortar admixtures.

d. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.

e. Grout mixes. Include description of type and proportions of ingredients.

f. Reinforcing bars.

g. Joint reinforcement.

h. Anchors, ties, and metal accessories.

3. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

a. For masonry units include material test reports substantiating compliance with requirements. Include certification on fire-resistant ratings as required per type.

b. For different cement product required for mortar and grout.

c. Each type and size of joint reinforcement.

d. Each type and size of anchors, ties and metal accessories.

4. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

a. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

b. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

5. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive

strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

6. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.04 QUALITY ASSURANCE

A. Comply with provisions of TMS 602/ACI 530.1/ASCE 6, except where exceeded by requirements of the contract documents.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.02 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:

1. Load-Bearing Units: ASTM C90, normal weight.

a. Hollow block, as indicated.

b. Surface: Rough or Medium texture per FCPA TB-ST 01, to provide optimal substrate for plaster/stucco adhesion; for additional information, refer to Section 092400 - Portland Cement Plastering.

2. Non-Loadbearing Units: ASTM C129.

a. Hollow block, as indicated.

b. Surface: Rough or Medium texture per FCPA TB-ST 01, to provide optimal substrate for plaster/stucco adhesion; for additional information, refer to Section 092400 - Portland Cement Plastering.

3. Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depth of 8 inches (200 mm).

4. Special Shapes: Provide non-standard blocks configured for corners, columns, and other detailed conditions, including but not limited to the following:

a. Column block units with nominal face dimensions of 16 x 8 inches (400 x 200 mm), to match standard units, and nominal depth of 16 inches (400 mm); single cell.

2.03 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

B. Portland Cement: ASTM C150/C150M, Type I.

1. Not more than 0.60 percent alkali.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Grout Aggregate: ASTM C404, fine.

F. Water: Clean and potable.

G. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.

1. Color: Standard gray.

2. Water-repellent mortar for use with water repellent masonry units.

H. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

2.04 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: Type specified in Section 032000 - Concrete Reinforcing; size as indicated on drawings; uncoated finish.

B. Horizontal Joint Reinforcement: Ladder type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure.

1. In addition, horizontal joint reinforcement shall comply with requirements of governing building code including but not limited to FBC-B SECTIONS 2121 and 2122 (as applicable), TMS 602/ACI 530.1/ASCE 6 Sections 2.4C through 2.4F, and the following:

a. Unit Masonry (except Reinforced Unit Masonry): TMS 602/ACI 530.1/ASCE 6 Section 3.4B.7.

b. Reinforced Unit Masonry: TMS 602/ACI 530.1/ASCE 6 Section 3.4B.10.

2.05 REINFFORCED CONCRETE LINTELS

A. Type: Precast or formed-in-place concrete lintels complying with requirements in Section 033000 - Cast-in-Place Concrete, and with reinforcing bars indicated on Structural Drawings.

1. Size: As indicated on Structural Drawings.

2. Strength: As indicated on Structural Drawings.

2.06 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: Mortar for use in masonry construction shall conform to ASTM C270 (using the Proportion Specification) and Articles 2.1 and 2.6 A of TMS 602/ACI 530.1/ASCE 6.

1. Type: As indicated on Structural Drawings; or, if not otherwise indicated, then as follows:

a. Masonry Walls at or Below Grade (Interior or Exterior): Type M.

b. Reinforced Masonry (Interior or Exterior): Type S.

c. Above-Grade Load-Bearing Walls (Interior or Exterior): Type S.

d. Above-Grade Non-Load-Bearing Walls (Interior or Exterior): Type S.

e. Parapet Walls: Type S.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting.

1. Use grout of type indicated on Structural Drawings; or, if not otherwise indicated, of type that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

2. Minimum Compressive Strength: As indicated on Structural Drawings; or, if not otherwise indicated, not less than 2,500 psi at 28 days.

3. Slump (ASTM C143/C143M): As indicated on Structural Drawings; or, if not otherwise indicated, then 8 to 10 inches.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 - EXECUTION

3.01 EXAMINATION

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

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of ACI 530/530.1 or applicable building code, whichever is

more stringent.

1. Cold Weather Construction: The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature falls below 40 degrees F (5 degrees C).
2. Hot Weather Construction: The hot weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 D, shall be implemented when the ambient air temperature exceeds 100 degrees F (37.8 degrees C), or 90 degrees F (32.2 degrees C) with a wind velocity greater than 8 mph (12.9 km/hr).

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:

1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
3. Mortar Joints: Concave, except as follows:
    a. Where Portland Cement Plaster (Stucco) Finish is Designated: Flush.
    b. Where Cement Parging is Required: Flush.
    c. Where Bitumen Dampproofing/Waterproofing is To Be Applied: Flush.

3.05 PLACING AND BONDING

A. Remove excess mortar and mortar smears as work progresses.

B. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

C. Interlock intersections and external corners.

D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches (150 mm).

3.07 LINTELS

A. Install reinforced concrete lintels over openings.

3.08 GROUTED COMPONENTS

A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.

B. Place and consolidate grout fill without displacing reinforcing.

C. At bearing locations, fill masonry cores with grout for a minimum 12 inches (300 mm) either side of opening.

3.09 TOLERANCES

A. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch (6 mm).

B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch (1.6 mm).

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.

D. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch (6 mm).

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Comply with requirements specified in Section 042900 - Reinforced Unit Masonry.

B. Testing Frequency: Comply with requirements specified in Section 042900 - Reinforced Unit Masonry.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel un-cleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.12 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 042900

REINFORCED UNIT MASONRY

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 grouted, reinforced masonry consisting of grout and reinforcing steel.

B. Related Sections:

1. Section 032000 "Concrete Reinforcement" for reinforcing steel.

2. Section 033000 "Cast-In-Place Concrete" for concrete.

3. Section 042200 "Concrete Unit Masonry" for all other elements of masonry construction.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE AND PRECONSTRUCTION TESTING REQUIRMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28-days. Contractor shall determine the net-area compressive strength of masonry based on 1.4B. Mortar for unit masonry shall comply with ASTM C270. Contractor shall meet ASTM C270 requirements based on the Property or Performance Specification.

B. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.

2. Reinforcing Steel: Show fabrication and installation details Reinforcing Steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show bar schedules, bent bar diagrams and other arrangements as required for fabrication and placement. Show elevations of reinforced walls.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Grout mixes complying with material and compressive strength requirements of ASTM C 476 for fine grout. Include description of type and proportions of grout ingredients and design slump.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency

B. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements

b. Include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.

3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

4. Grout mixes. Include description of type and proportions of ingredients

5. Reinforcing bars.

6. Joint reinforcement.

7. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirements.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges, accepted for these characteristics, from single source manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry Standard: Comply with the Florida Building Code, 2014 Edition and ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Refer to Section 042200 “Concrete Unit Masonry” for masonry materials and accessories and grout materials not included in this section.

2.2 CONCRETE MASONRY UNITS

A. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,500 psi.

2. Density Classification: Medium weight.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces, matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for corners, jambs, sashes, control joints, lintels, bond beams and other special conditions.

2.3 CONCRETE LINTELS

A. General: Provide lintels as shown on the structural drawings.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Cement: ASTM C 1329.

E. Aggregate for Mortar: ASTM C 144

F. Aggregate for Grout: ASTM C 404 for fine grout.

G. Water: ASTM C 94.

2.5 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60. Shop fabricate bent bars.

B. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Mill galvanized, carbon steel.

2. Exterior Walls: Hot-dip galvanized, carbon, ASTM A 153 with a coating thickness of 1.50 oz/sf steel.

3. Wire Size for Side Rods: 0.148-inch diameter.

4. Wire Size for Cross Rods: 0.148-inch diameter.

5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.

6. Provide in lengths of not less than 10 feet (3 m)**,** with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication.

1. Provide units with either two loops or four loops as needed for number of bars indicated.

2.6 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site

C. Mortar for Unit Masonry: Comply with ASTM C 270 Proportion or Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type M.

2. For all other masonry, use Type S.

D. Grout for Unit Masonry: Comply with ASTM C 476 with a minimum compressive strength of 2500 psi in 28 days.

1. Use fine grout with a slump of 8 to 10 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that foundations are within tolerances specified.

2. Verify that reinforcing dowels are properly placed.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Refer to Section 042200 “Concrete Unit Masonry” for general installation requirements of unit masonry.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment ot be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units which are not in multiples of 8 inches. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Allow wet masonry units to dry prior to placement.

3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, reinforcement, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern: Unless otherwise indicated, lay masonry in one-half running bond with vertical joint in each course centered on units in courses above and below, unless otherwise indicated on Drawings. Interlock each course at corners.

C. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

D. Place clean units while the mortar is soft and plastic. Remove and relay in fresh mortar any unit disturbed to the extent that initial bond is broken after initial positioning.

E. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

F. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

G. Design, provide and install bracing that will assure stability of masonry during construction. Include provisions to project against wind or other natural or construction forces that might collapse or otherwise damage a partially or completely built masonry wall in a partially completed structure.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated “L” and “T” sections.

D. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO CONCRETE

A. Anchor masonry to concrete where masonry abuts or faces concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and concrete unless otherwise indicated. Keep open space free or mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors at 16 inches o.c. vertically and 36 inches.

3.8 LINTELS

A. Provide masonry lintels where shown and where openings of more than 24 inches are shown. Reinforce and grout lintels as shown on the Drawings.

B. Install steel lintels where indicated.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

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

B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 and as follows:

1. Place reinforcement and accessories as indicated.

2. Support and fasten reinforcement together to prevent displacement by construction loads or by placement of grout.

3. Clean reinforcement by removing mud, oil, or other materials that will reduce the bond at the time grout is placed. Reinforcement with tightly bound rust and/or mill scale is acceptable without cleaning provided the dimensions and weights, including heights of deformations, of the cleaned sample are not reduced.

4. Place all reinforcement prior to grouting. Tie vertical reinforcement to dowels at base of masonry with tie wire and thread masonry units over or around reinforcement. Support vertical reinforcement at 10 feet o.c. Extend vertical bars the specified lap length above top of pour and support bar in proper position at top of grout pour. Where vertical bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of bar, pull loops and bar to proper position and tie free ends.

5. Do not bend reinforcement after it is embedded in grout.

6. Splice bars only where indicated. Provide 48 bar diameter lap splices, unless otherwise noted. Place bars in contact and wire tie. Bars spliced by noncontact lap splices shall be spaced 6 inches apart (maximum).

7. Bar placement tolerance is ±1/2 inches perpendicular to wall and 2 inches along wall. The clear distance between parallel bars that are not contact lap spliced shall be not less than 1 inch in walls and 1-1/2 inches in columns and pilasters. Maintain ¼ inch clear between bars and any face of masonry.

C. Laying Masonry Walls: Construct masonry walls as follows:

1. Lay masonry units to top of grout pour prior to placing grout. Maximum grout pour height is 12 feet or top of bond beam, whichever is lower.

2. Construct wall such that vertical cells to be grouted are aligned and unobstructed openings for grout are 3 inches x 4 inches (minimum). Construct grout spaces free of mortar droppings, debris, loose aggregates, and any material deleterious to grout;

or, clean the cells prior to grouting. Remove masonry protrusions extending 1/2 inch or more into cells to be grouted.

3. Do not lay masonry until grouted masonry below is cured.

4. In bond beams, use special units or modify regular units to allow placement of horizontal bars. Place small mesh, expanded metal lath or wire screening in mortar joints under bond beam courses over cells of non-reinforced vertical cells.

D. Cleanouts: Provide cleanout openings at each vertical bar at the base of walls in which one of the following applies:

1. Grout pour height exceeds 5 feet.

2. Vertical bars are not otherwise fastened to prevent displacement. In this case, use cleanout to securely tie bar in position.

3. To remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from cell and top of support in cells to be grouted.

4. Construct cleanout by cutting opening in face shell. Construct cleanouts with openings of sufficient size to permit removal of debris and tying of bars. Minimum size is 3 inches x 3 inches. After cleaning and inspection, close cleanout opening and brace closure to resist grout pressure.

E. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602.

2. Place grout within 1 1/2 hours from introducing water in the mixture and prior to initial set.

3. Confine grout to the areas indicated.

4. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.

5. Place grout continuously in lintels and bond beams. Grout walls in lifts not exceeding 5 feet or the elevation of top of bond beam, whichever is lower.

6. If grout pour during one day exceeds 5 feet, grout in lifts 5 feet each or less, with not less than 30 minutes and not more than 1 hour between lifts.

7. Terminate grout 1-1/2 inches below bond beam course or where cell above is to be grouted.

8. Place grout in bond beam course before filling vertical cores above bond beam.

9. Consolidate grout with mechanical vibrators having a 3/4 inch diameter head. Vibrate each lift and reconsolidate after 10 minutes. Grout pours 12 inches high or less may be puddled in lieu of mechanical vibration.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

3. Place grout only after inspectors have verified proportions of site-prepared grout.

B. Testing Frequency: Four grout cubes will be sampled and tested for compressive strength per ASTM C 1019 for each 5000 sq. ft. of wall surface.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained or otherwise damaged or that do not match the adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Remove all mortar fins larger than 1/2 inch within cells to be reinforced.

END OF SECTION

SECTION 055213

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Ramp railings and guardrails.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 042000 - Unit Masonry: Placement of anchors in masonry.

C. Section 323119 - Decorative Metal Fences and Gates.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Architectural Manufacturers Association (AAMA):

1. AAMA 2604 -- Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. American Society for Testing and Materials (ASTM):

1. ASTM B211 -- Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012.

2. ASTM B211M -- Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric); 2012.

3. ASTM B241/B241M -- Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2012.

4. ASTM B429/B429M -- Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2010.

5. ASTM B483/B483M -- Standard Specification for Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications; 2013.

6. ASTM E935 -- Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.

7. ASTM E985 -- Standard Specification for Permanent Metal Railing Systems and

Rails for Buildings; 2000 (Reapproved 2006).

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. Samples: Submit two, 12 inch (300 mm) long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Handrails and Railings:

1. Alumi-Guard: www.alumi-guard.com/sle.

2. C.R. Laurence Co., Inc.: www.crl-arch.com.

3. KaneSterling: www.sterlingdula.com.

4. The Wagner Companies: www.wagnercompanies.com.

2.02 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot (730 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

1. Top Rails and Wall Rails: 1-1/2 inches (38 mm) diameter, round.

2. Posts: 1-1/2 inches (38 mm) diameter, round.

3. Balusters: 1/2 inch (12 mm) square solid bar.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

G. Provide mechanical and welding fittings where indicated to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.03 MATERIALS

A. Aluminum:

1. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.

2. Solid Bars and Flats: ASTM B211 (ASTM B211M).

3. Non-Weld Mechanical Fittings: Slip-on cast aluminum, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

4. Welding Fittings: No exposed fasteners; cast aluminum.

5. Straight Splice Connectors: Concealed spigot; cast aluminum.

B. Exposed Fasteners: No exposed bolts or screws.

2.04 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:

1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.05 ALUMINUM FINISHES

A. High Performance Organic Coating System: AAMA 2604 multiple coat, thermally cured fluoropolymer system.

1. Color: As selected by Architect, to match color of decorative metal fence specified in Section 323119 - Decorative Metal Fences and Gates.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip aluminum where site welding is required.

B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with FBC-A requirements for accessible design at applicable locations.

D. Anchor railings securely to structure.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.

B. Maximum Offset from True Alignment: 1/4 inch (6 mm).

C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

SECTION 060340

CONSERVATION TREATMENT FOR PERIOD ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Exterior period architectural woodwork (e.g., wood rafter tails, glazed wood transom), including but not limited to:

1. Repair and rehabilitation of salvaged wood rafter tails, for reinstallation in roof construction.

2. Fabrication of new wood rafter tails to match existing, where the available quantity of salvaged wood rafter tails is insufficient for complete installation.

3. Repair and rehabilitation of salvaged glazed wood transom, for reinstallation above new wood door assembly.

B. Interior period architectural woodwork, including but not limited to finish carpentry elements fabricated from salvaged lumber (e.g., window sills).

1.02 RELATED REQUIREMENTS

A. Section 016302 - Use of Substitute Materials on Historic Building Exteriors.

B. Section 061000 - Rough Carpentry: Dimensional wood framing for roof construction; roof sheathing; concealed wood blocking, nailers, and supports.

C. Section 061100 - Reclamation of Historic Lumber: Remilling of salvaged historic lumber for reuse as wood wall paneling.

D. Section 061753 - Shop-Fabricated Wood Trusses: Attachment of historic wood rafter tails to new wood roof trusses.

E. Section 062000 - Finish Carpentry: Exterior finish carpentry, including installation of new and restored wood rafter tails; interior finish carpentry, including installation of wood window sills fabricated from lumber salvaged from original wood roof trusses.

F. Section 064216 - Wood Wall Paneling: Installation of custom wood paneling fabricated from reclaimed historic lumber.

G. Section 081423 - Exterior Stile & Rail Wood Doors: Reuse of original historic glazed wood transom above new wood door.

H. Section 099000 - Painting and Coating: Site finishing of period architectural woodwork, including but not limited to new and restored wood rafter tails, wood window sills, and other finish carpentry elements..

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

    a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

    b. Section 014219 - Reference Standards.

B. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-EB -- Florida Building Code, Existing Buildings.

    a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

C. U.S. Federal Specifications (FS):

1. FS TT-P-781A -- Putty and Elastic Compound.

D. U.S. General Services Administration (GSA):

1. GSA TP -- Historic Preservation - Technical Procedures.

    a. GSA TP 06300-01-R -- Epoxy Repair for Deterioration and Decay in Wooden Members.

    b. GSA TP 06300-01-S -- Primers and Paints for Wood.

    c. GSA TP 06300-02-R -- Surface Preparation for Painting Wood.

    d. GSA TP 06300-03-R -- Applying a Semi-Transparent or Opaque Stain to Wood.

    e. GSA TP 06310-01-P -- Applying a Water-repellent Preservative to Wood.

    f. GSA TP 06310-01-S -- Preparing a Non-toxic Water-repellent Preservative.

    g. GSA TP 06400-02-S -- Supplemental Guidelines for Removing Paint from Interior and Exterior Wood Surfaces.

    h. GSA TP 06400-07-R -- Chemically Removing Paint From Wood Features.

    i. GSA TP 06400-09-R -- Removing Paint from Wood Features Using Thermal Methods.

    j. GSA TP 06400-10-R -- Refinishing Interior Wood.

    k. GSA TP 06440-01-R -- Repairing Cracks and Checks in Wood Wall Ornament.

    l. GSA TP 06440-03-R -- Closing Open Joints in Wood Wall Ornament.

    m. GSA TP 06440-04-R -- Repairing Scratches, Gouges and Dents in Wood Wall Ornament.

    n. GSA TP 09900-07-S -- General Guidelines for Painting Exterior and Interior Surfaces.

1.04 SYSTEM DESCRIPTION

A. This section includes guidance for rehabilitation, replacement and supplementation of interior and exterior period architectural woodwork, including but not limited to wood rafter tails and wood window sills.

1. Each step is cross-referenced to one or more procedures which covers the particular problem. The cross-referenced procedures should be reviewed prior to beginning wood repairs and should be followed along with recommendations from the A/E.

B. The steps in the repair of salvaged wood members include but are not limited to the following:

1. Examination, survey and condition assessment of salvaged wood members.

2. Removal of existing nails.

3. Repair of deteriorated wood through the use of epoxies and/or the replacement with new wood to match the existing appearance.

4. Re-milling of salvaged lumber for use as window sills.

5. Painting/refinishing assemblies and trim.

6. Re-installation of repaired wood members.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit product data for each material and product to be used.

1. Include explanation describing how and where the material/product is to be used, and include manufacturer’s instructions for use.

C. Shop Drawings:

1. Coordinate details of exterior period architectural woodwork (e.g., wood rafter tails) in shop drawings required for roof construction, including submittal requirements specified in Section 061000 - Rough Carpentry, Section 062000 - Finish Carpentry, and Section 061753 - Shop-Fabricated Wood Trusses.

2. Coordinate details of wood elements fabricated from salvaged lumber (e.g., window sills) in shop drawings required for interior finish carpentry, including submittal requirements specified in Section 062000 - Finish Carpentry.

D. Samples: Provide samples of the following:

1. Lumber Samples: Provide samples of lumber to be used for fabrication of new wood rafter tails.

2. Restoration Samples: Provide samples of new wood rafter tail showing finished

fabrication to match original.

3. Fabrication Samples:

    a. Provide samples of salvaged wood rafter tail, showing finished product after repair and rehabilitation wood.

    b. Provide samples of new wood window sill showing finished fabrication to match dimensions indicated in shop drawings.

1.06 QUALITY ASSURANCE

A. Repairs, alterations, and restoration work shall be guided by the recommended approaches in rehabilitation set forth in FBC-EB APPENDIX B and referenced GSA TP procedures.

    1. When repairing existing wood doors, repairs shall match the size, shape, texture, configuration, craftsmanship and details that characterize the original historic elements.

B. Work of this section shall be performed by a Restoration Contractor with minimum of ten (10) years of documented experience in types of work specified in this Section.

    1. Project experience shall include full service restoration of deteriorated historic exterior finish carpentry elements in at least three locally designated or National Register listed properties located within the State of Florida.

    2. Restoration crew shall consist of experienced woodworkers and apprentices.

    3. Restoration contractor shall have an office and shop located within 300 miles of the project site.

    4. Pre-qualified Restoration Contractor(s):

        a. Conservation Solutions, Inc.: 8905 Ballard Lane; Clinton, MD 20735; Tel. 866-895-2079; https://conservationsolutionsinc.com.

        b. CCS Restoration LLC: 200 North Laurel Avenue; Sanford, FL 32771; Tel 407-928-8620; www.ccsrestoration.com.

        c. Rosa Lowinger & Associates, Inc.: 5418 Packard Street; Los Angeles, CA 90019; Tel 305-573-7011; www.rlaconservation.com.

C. Coordinate work of this Section with work specified in Section 061000 - Rough Carpentry, Section 062000 - Finish Carpentry, and Section 061753 - Shop-Fabricated Wood Trusses, and related requirements specified in other sections.

1.07 SEQUENCING AND SCHEDULING

A. Rehabilitation of salvaged wood rafter tails shall be completed before fabrication of new wood rafter tails to ensure that new and existing will match.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber: Longleaf pine (pinus palustris), heartwood; reclaimed.

B. Wood Treatment (fungicide/pesticide): Wood preservative for protection and prevention treatment of wood against decay fungi and wood-destroying insects

1. Product: "Tim-Bor Professional" by Nisus Corporation, or equal.

C. Wood Replacement Compound: Lightweight, thixotropic, epoxy adhesive, putty wood replacement compound, designed specifically for use in any thickness in structural and decorative applications to replace, repair, extend, or fill wood and other materials.

1. Product: "WoodEpox" by Abartron, or equal.

D. Wood Consolidant: Low viscosity, penetrating epoxy compound, designed specifically for use in regenerating and waterproofing rotted, dried-out or spongy wood.

1. Product: "LiquidWood" by Abartron, or equal.

E. Paint: As specified in Section 099000 - Painting and Coating.

F. Other Materials: As specified in applicable GSA TP procedures.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect salvaged wood members, to identify the specific work needs of each wood rafter tail.

B. For each salvaged wood rafter tail, the survey should include color photographs which show design details for comparison to new work, and existing conditions.

3.02 ERECTION, INSTALLATION, APPLICATION

A. Remove paint from salvaged wood surfaces.

1. Guidelines for Removing Paint from Wood Surfaces: For additional procedures information, refer to GSA TP 06400-02-S.

2. Chemically Removing Paint from Wood Features: For additional procedures information, refer to GSA TP 06400-07-R.

3. Removing Paint from Wood Features Using Thermal Methods: For additional procedures information, refer to GSA TP 06400-09-R.

B. Repair/rehabilitate salvaged wood elements (e.g., wood rafter tails, wood framed door transom), including but not limited to repair of rotted or deteriorated wood, cracks, checks, and other signs of wood deterioration. New work shall match original (historic) profiles or shapes in every respect and shall be flush with existing adjacent surfaces.

1. Repairing Cracks and Checks in Wood: For additional procedures information, refer to GSA TP 06440-01-R.

2. Closing Open Joints in Wood: For additional procedures information, refer to GSA TP 06440-03-R.

3. Repairing Scratches, Gouges and Dents in Wood: For additional procedures information, refer to GSA TP 06440-04-R.

C. Install new and restored wood rafter tails with associated roof construction.

1. For additional procedures information, refer to Section 061000 - Rough Carpentry, Section 062000 - Finish Carpentry, and Section 061753 - Shop-Fabricated Wood Trusses, and related requirements specified in other sections.

D. Install wood window sills with associated interior finish carpentry.

1. For additional procedures information, refer to Section 062000 - Finish Carpentry, and related requirements specified in other sections.

E. Refinish wood elements, including but not limited to wood rafter tails and wood framed door transom, with appropriate paint, stain or natural finish, in accordance with Section 099000 - Painting and Coating, and the following:

1. Primers and Paints for Wood: For additional procedures information, refer to GSA TP 06300-01-S.

2. Surface Preparation for Painting Wood: For additional procedures information, refer to GSA TP 06300-02-R.

3. Applying a Semi-Transparent or Opaque Stain to Wood: For additional procedures information, refer to GSA TP 06300-03-R.

4. Applying a Water-repellent Preservative to Wood: For additional procedures information, refer to GSA TP 06310-01-P.

5. Preparing a Non-toxic Water-repellent Preservative: For additional procedures information, refer to GSA TP 06310-01-S.

6. Refinishing Interior Wood: For additional procedures information, refer to GSA TP 06400-10-R.

7. General Guidelines for Painting Exterior and Interior Surfaces: For additional procedures information, refer to GSA TP 09900-07-S.

3.03 PROTECTION

A. Begin and maintain protection and other precautions required through the remainder of construction period to ensure that newly rehabilitated wood rafter tails will not be damaged throughout the remainder of any restoration or rehabilitation work.

END OF SECTION

SECTION 061000

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wood bucks used in conjunction with rough opening for door frame installation in steel stud-framed partitions.

B. Secondary subfloor (including wood sleepers and plywood sheathing panels) for wood strip and plank flooring system.

C. Roof sheathing.

D. Roof blocking, nailers and cant strips.

E. Preservative treated wood materials.

F. Communications and electrical room mounting boards.

G. Miscellaneous wood blocking, nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 060340 -

Conservation Treatment for Period Architectural Woodwork

1. Repair and rehabilitation of salvaged wood rafter tails, for reinstallation in roof construction.

2. Fabrication of new wood rafter tails to match existing, where the available quantity of salvaged wood rafter tails is insufficient for complete installation.

C. Section 061753 - Shop-Fabricated Wood Trusses.

D. Section 062000 - Finish Carpentry

E. Section 064100 - Architectural Wood Casework

F. Section 092116 - Gypsum Board Assemblies: Steel stud framing and furring for interior walls./partitions; concealed backing for attachment and support of wall-mounted elements.

G. Section 096429 - Wood Strip and Plank Flooring: Wood plank flooring over secondary subfloor.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Forest and Paper Association (AFPA):

1. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2012.

C. American Society for Testing and Materials (ASTM):

1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

3. ASTM D3498 -- Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems; 2003 (2011).

4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

D. American Wood-Preservers' Association (AWPA):

1. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

E. U.S. Product Standards (PS):

1. PS 1 - Structural Plywood; 2009.

2. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

3. PS 20 - American Softwood Lumber Standard; 2010.

F. Southern Pine Inspection Bureau, Inc. (SPIB):

I. SPIB (GR) - Grading Rules; 2014.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Samples: For rough carpentry members that will be exposed to view, submit two samples, minimum 12 inches (300 mm) in length illustrating wood grain, color, and general appearance.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Southern Pine, unless otherwise indicated.

2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Moisture Content:

1. Moisture content shall comply with applicable requirements of governing building code, including but not limited to HVHZ requirements.

2. All lumber 2 inches (51 mm) or less in thickness shall contain not more than 19-percent moisture at the time of permanent incorporation in a building or structure and/or at the time of treatment with a wood preservative.

3. Where preservative-treated wood is used in enclosed locations where drying in service cannot readily occur, such wood shall be at a moisture content of 19 percent or less before being covered with insulation, interior wall finish, floor covering or other materials.

C. Protection against Decay and Termites: Wood shall be protected from decay and termites in accordance with the applicable provisions of FBC-B SECTIONS 2304.11.1 through 2304.11.9.

1. Wood Used above Ground: Wood used above ground in the locations specified in FBC-B SECTIONS 2304.11.2.1 through 2304.11.2.7, 2304.11.3 and 2304.11.5 shall be preservative-treated wood using water-borne preservatives, in accordance with AWPA U1 (Commodity Specifications A or F) for above-ground use.

a. Wood Supported by Exterior Foundation Walls: Wood framing members, including wood sheathing, that rest on exterior foundation walls and are less than 8 inches (203 mm) from exposed earth shall be of preservative-treated wood.

b. Sleepers and Sills: Sleepers and sills on a concrete or masonry slab that is in direct contact with earth shall be of preservative-treated wood.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

1. Exceptions:

a. Wood bucks used in conjunction with rough opening for door frame

installation in a stud-framed partition shall be cut to match depth of steel studs. For example, where wood bucks are used in 3-5/8 in. deep steel stud-framed partition, they shall be cut to 3-5/8 in. depth.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 2 or Standard Grade.

2. Boards: Standard or No. 3.

2.03 EXPOSED DIMENSION LUMBER (except Finish Carpentry and Architectural Wood Casework)

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings.

C. Surfacing: S4S.

D. Moisture Content: S-dry or MC19.

2.04 EXPOSED BOARDS (except Finish Carpentry and Architectural Wood Casework)

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S4S.

D. Species: Douglas Fir.

E. Grade: No. 2, 2 Common, or Construction.

2.05 CONSTRUCTION PANELS

A. Roof Sheathing: PS 1 plywood meeting the following criteria:

1. Roof Sheathing Panels <u>not</u> Exposed to Exterior: PS 1, C-D or better, APA Struct I Rated Sheathing.

a. Bond Classification: Exposure I.

b. Panel Span Rating: 60/32.

c. Panel Thickness: 1-1/8 inch.

2. Roof Sheathing Panels Exposed to Exterior: PS 1 A-C or better, APA Struct I Rated Sheathing, Sanded (A-face sanded and exposed to exterior).

a. Bond Classification: Exterior.

b. Panel Span Rating: 60/32.

c. Panel Thickness: 1-1/8 inch.

d. Install sheathing with “A” face on bottom, exposed between rafter tails.

B. Subfloor Sheathing: PS 1, C-D or better, APA Struct I Rated Sheathing.

1. Bond Classification: Exposure I.
2. Panel Span Rating: 48/24.
3. Panel Thickness: 3/4 inch.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood (A-face exposed to view); 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

D. Other Applications:

1. Plywood Concealed from View but Located within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View but Not Exposed to Weather: PS 1, A-D or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.06 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.

C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.

D. Sleepers and Shims: Softwood lumber, pressure treated for moisture protection, 2 by 4 inch (50 by 100 mm) size.

E. Sill Gasket on Top of Foundation Wall: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.

F. Adhesive: Waterproof, air cure adhesive meeting the performance standards and test requirements of ASTM D3498; cartridge dispensed.

1. Product: “Titebond GREENchoice Weatherproof Subfloor Adhesive” by Franklin International, Inc. (www.titebond.com/sle), or equal.

2.07 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
2. Preservative Treatment (above grade): AWPA U1, Use Category UC3B, Commodity Specification A to 0.25 lb/cu ft (4.0 kg/cu m) retention.
    1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    2. Treat lumber in contact with masonry or concrete.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices, unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by governing building code and AFPA (WFCM).

E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

    1. Frame wall openings with two wood bucks at each jamb, and at header. Coordinate

with steel stud framing; support headers on cripple studs.

2. Wood bucks used in conjunction with rough opening for door frame installation in a stud-framed partition shall be cut to match depth of steel studs. For example, where wood bucks are used in 3-5/8 in. deep steel stud-framed partition, they shall be cut to 3-5/8 in. depth.

C. In stud-framed or furred walls/partitions, provide blocking attached to studs/furring as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

1. For additional requirements, refer to Section 092116 - Gypsum Board Assemblies.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.05 ROOF-RELATED CARPENTRY

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

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

1. Attach panels to framing in accordance with requirements shown on Structural drawings.

B. Secondary Subflooring: Install Secondary Subflooring with sleepers in accordance with wood flooring manufacturer's instructions, and as specified in Section 096429 - Wood Strip and Plank Flooring.

1. Place sleepers on vapor retarder membrane, parallel to short dimension of room and space at 16 in. (400 mm) nominally, to suit sheathing dimensions.

a. Stagger sleepers and lap ends 6 in. (150 mm) minimum.

b. Shim sleepers as required to prevent rocking and to provide solid contact with structural substrate, and to provide level base for support of plywood subfloor sheathing installation.

c. Maintain minimum 3/4 in. (19 mm) expansion gap between sleepers and at fixed walls and other interruptions.

2. Lay plywood sheathing with face grain at right angle to sleepers, and with end joints over sleepers.

a. Maintain 1/8 in. (3 mm) gap between plywood sheathing panels, and 3/4 in. (19 mm) expansion gap between edge of plywood sheathing installation and fixed walls and other interruptions.

3. Attach plywood sheathing to sleepers with adhesive, and nail at 12 inches (300 mm) on center.

a. Apply adhesive in accordance with manufacturer's instructions.

4. For additional requirements, refer to Section 096429 - Wood Strip and Plank Flooring.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.

2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.

3. Install adjacent boards without gaps.

4. Size and Location: As indicated on drawings.

3.07 TOLERANCES

A. Framing Members: 1/4 inch (6 mm) from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

END OF SECTION

SECTION 061100

RECLAMATION OF HISTORIC LUMBER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Remilling of salvaged historic lumber for reuse as wood wall paneling, including but not limited to wood selection, metal removal, kiln drying, grading and sizing, milling, face preparation, and packaging.

1.02 RELATED REQUIREMENTS

A. Section 024100 - Demolition: General demolition of non-historic materials, and salvage of designate historic materials for reuse in finished work; asbestos abatement; lead-based paint hazard abatement; and removal of resulting rubbish and debris

B. Section 060340 -

Conservation Treatment for Period Architectural Woodwork:

1. Repair and rehabilitation of salvaged wood rafter tails, for reinstallation in new roof construction.

2. Fabrication of new wood rafter tails to match existing, where the available quantity of salvaged wood rafter tails is insufficient for complete installation.

C. Section 061000 - Rough Carpentry.

D. Section 064216 - Wood Wall Paneling: Installation of interior wood wall paneling, using wood fabricated from reclaimed historic lumber.

E. Section 099000 - Painting and Coating: Field applied finishes.

1.03 RFEERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM D173/D173M - Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing;

2. ASTM D3274 -- Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation

3. ASTM D3359 -- Measuring Adhesion by Tape Test

4. ASTM D4214 -- Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films

C. American Woodwork Institute (AWI):

1. AWI (QSI) -- Architectural Woodwork Quality Standards Illustrated; 8th edition.

D. Architectural Woodwork Manufacturers Association of Canada (AWMAC).

E. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-EB -- Florida Building Code, Existing Buildings.

a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

F. Woodwork Institute (WI).

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Submit shop drawings for finish carpentry wood elements fabricated from reclaimed historic lumber, in accordance with requirements specified in Section 060340 -

Conservation Treatment for Period Architectural Woodwork and Section 064216 - Wood Wall Paneling.

C. Samples: Submit samples of finish carpentry wood paneling elements fabricated from reclaimed historic lumber, in accordance with requirements specified in Section 060340 – Conservation Treatment for Period Architectural Woodwork and Section 064216 - Wood Wall Paneling.

1.05 QUALITY ASSURANCE

A. Repairs, alterations, and restoration work shall be guided by the recommended approaches in rehabilitation set forth in FBC-EB APPENDIX B and referenced GSA TP procedures.

1. When repairing existing wood doors, repairs shall match the size, shape, texture, configuration, craftsmanship and details that characterize the original historic elements.

B. Wood Restoration Contractor Qualifications: Work of this section shall be performed by a Restoration Contractor with minimum of ten (10) years of documented experience in types of work specified in this Section.

1. Project experience shall include full service restoration of deteriorated historic exterior finish carpentry elements in at least three locally designated or National Register listed properties located within the State of Florida.

2. Wood Restoration Contractor shall have an office and shop located within 300 miles of the project site.

3. Wood Restoration Contractor shall provide qualified workers trained and experienced in the restoration of wood components in historic structures.
    a. Wood restoration crew shall consist of experienced woodworkers and apprentices.
4. Prequalified Wood Restoration Contractors:
    a. CCS Restoration LLC: 200 North Laurel Avenue; Sanford, FL 32771; Tel 407-928-8620; www.ccsrestoration.com.
    b. Goodwin Company: 106 SW 109th Place; Micanopy, FL 32667; Tel 800-336-3118; www.heartpine.com.
    c. Hansen and Bringle Millwork: 5750 2nd Avenue; Key West, Fl. 33040; Tel 305-747-0020; www.hansenandbringle.com.

C. Coordinate work of this Section with work specified in Section 061000 - Rough Carpentry and Section 064216 - Wood Wall Paneling, and related requirements specified in other sections.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Wood Materials:
1. Salvaged lumber is stored in a metal shipping container on-site.
    a. Contractor shall maintain metal shipping container as necessary to store and protect salvaged lumber.
    b. When metal shipping container is no longer needed to store and protect salvaged lumber, Contractor shall inform Owner and request that it be removed from site.
2. Store and cover wood products to protect against moisture.
3. Support stacked products to prevent deformation and to allow air circulation.
4. Maintain salvaged lumber in dry condition, with moisture content not greater than 19 percent, unless otherwise noted.
5. Do not deliver remilled wood materials to project site until after building is fully enclosed and interior temperature and humidity are in accordance with recommendations of AWI (QSI) Section 1700.

B. Paint Removers:
1. Deliver paint removers, solvents, and other chemicals, used for surface preparation, in sealed containers that legibly show the designated name, formula or specification number, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer.
    a. Furnish such materials in containers not larger than 5 gallons (20 L); store containers in accordance with the manufacturer's written directions; and, as a minimum, store them off the ground, under cover, with sufficient ventilation to

prevent the buildup of flammable vapors and at 40 to 95 degrees F (4 to 35 degrees C).

2. Store paint removers, solvents, or other preparation materials in accordance with manufacturer's instructions.

3. Unless otherwise recommended by the product manufacturer, the ambient temperature shall be 45 to 95 degrees F (7 to 35 degrees C) when handling and applying paint removers, solvents, or other preparation materials.

PART 2 - PRODUCTS

2.01 RECLAIMED HISTORIC LUMBER FOR REUSE AS WOOD WALL PANELING

A. General:

1. Species: Assumed to be Long Leaf Southern Yellow Pine (antique heart pine) or Old-Growth Southern Yellow Pine.

2. Moisture Content:

a. Finished Boards: MC15, unless otherwise noted.

B. Selection and Grading Criteria: On the demolition site, salvaged lumber shall be carefully removed, graded for best use, and reasonably cleaned up of debris and metal, as follows:

1. Lumber Selected for Reuse in Finished Work: Boards selected for reuse in finished work shall meet the following criteria:

a. Knots: Less than one knot per three square feet of flooring; some knots may be broken.

b. Holes: Occasional nail holes allowed, except with ferrous bleed; bolt holes not allowed.

c. Cracks/Checks: Moderate surface checking is allowed; cracks through the thickness of the board are not allowed.

d. Color: 90-percent or more of the surface area of the floor to be red heart content; otherwise color variances are unlimited, but predominately range from red to brown and yellow.

e. Grain: The majority of the wood to be flat or cathedral grain; some rift cut or quarter sawn boards may be included.

2. Lumber Deemed Not Suitable for Reuse in Finished Work: Lumber not selected for reuse in finished work shall be distributed in the following preferential order:

a. Sold as reclaimed lumber with proceeds accruing to the Owner.

b. Offered to the public free of charge.

c. Diverted from landfills by recycling.

2.02 PAINT REMOVERS

A. Chemical paint removers shall be a commercial item specifically manufactured for the type of paint to be removed.

PART 3 - EXECUTION

3.01 REMILLING OF HISTORIC LUMBER

A. General:

1. Fabricate lumber in accordance with AWI (QSI) Section 500.

a. Grade: Unless otherwise indicated, provide products of quality specified by AWI (QSI) for Custom Grade.

2. Storage and Protection of Salvaged Lumber:

a. Salvaged lumber is stored in a container on-site.

b. Maintain salvaged lumber in dry condition, with moisture content not greater than 19 percent.

B. Wood Selection:

1. Initial Selection: At the demolition site, inspect lumber in accordance with Selection and Grading Criteria specified above.

2. Initial Grading: Selected boards shall be graded for best use and reasonably cleaned of debris and tramp metal. After initial grading, distribute lumber as follows:

a. Lumber graded as most suitable for reuse as wood wall paneling boards is to be transported to Wood Restoration Contractor's shop for metal removal, removal of applied finishes, and remilling.

b. Lumber that does not meet high standards will remain stored in a container on-site until such time as sufficient quantity of wood wall paneling boards has been produced.

C. Metal Removal:

1. Prior to sizing and milling of wood, verify that wood is free of tramp metal (e.g., pieces of metal bar stock, broken machinery parts; and broken grinding blades; nuts, bolts, screws, nails and staples; metal dust and filings).

a. Use metal detectors and basic hand tools to locate tramp metal and carefully remove it from wood. Avoid damaging the wood.

2. Secondary Grading: After metal removal, wood is to be graded for a second time.

a. Lumber graded as most suitable for reuse as wood wall paneling boards is to be processed for removal of applied finishes and sizing.

b. Lumber that does not meet high standards will be returned to container on-site until such time as sufficient quantity of finished boards has been produced.

D. Removal of Applied Finishes:

1. Removal of Applied Finishes Containing Hazardous Materials: Comply with requirements specified in Section 024100 - Demolition, and with applicable regulatory requirements.
2. Paint and Coating Removal:
    a. Salvaged Historic Lumber for Reuse as Wood Wall Paneling: This lumber is to be salvaged from original roof trusses which are unpainted. Therefore, removal of paint/coating is not required.
    b. Historic Rafter Tails: Refer to Section 060340 -

    Conservation Treatment for Period Architectural Woodwork.

E. Sizing:
1. Prior to sizing, measure moisture content of selected wood members.
    a. Boards having moisture content greater than19 percent shall be air-dried, then carefully kiln-dried to MC19 or lower.
2. All four sides of dry boards are to be cut true and square with a Computer Numeric Control (CNC) milling machine to predetermined width and thickness.
3. Surfacing: S4S.
4. Final Grading: After sizing of boards, wood is to be graded for a third time. Only sound, solid and attractive boards are to be milled into boards for use in flush wood wall paneling.
    a. Sized boards graded as most suitable for reuse as wood wall paneling boards is to be processed for final milling.
    b. Sized boards that do not meet high standards will be returned to container on-site until such time as sufficient quantity of finished boards has been produced.

F. Final Milling:
1. Prior to final milling, measure moisture content of selected wood members.
    a. Boards having moisture content greater than 15 percent shall be air-dried, then carefully kiln-dried to MC15 or lower.
2. The sized and dried boards are to be milled as follows:
    a. Boards with tongue and groove edges are to be cut true and square with a Computer Numeric Control (CNC) milling machine to predetermined width and thickness.
    b. Board Dimensions:
        (1) Width: 5-1/2 inches (plus tongue width), except as authorized by Architect.
        (2) Thickness: 3/4 inch.
        (3) Length: Full length, equal to height of wall paneling installation as shown

on drawings.

b. Edge Treatment: Tongue and groove.

c. Ends: Square.

G. Surface Pre-finishing: Faces of re-milled lumber to be sanded smooth to 150 grit or finer.

3.02 SURFACES TO BE PREPARED FOR FIELD-APPLIED FINISHING

A. Surfaces Designated to Receive Field-Applied Transparent Finish: For surface preparation and field-applied transparent finish requirements, refer to Section 099000 - Painting and Coating.

END OF SECTION

SECTION 061753

SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood roof trusses.
2. Wood girder trusses.
3. Wood truss bracing.
4. Metal truss accessories.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for roof sheathing and subflooring.

1.3 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 ACTION SUBMITTALS

A. Shop Drawings:

1. Delegated-Design: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

a. The Truss System Engineer, a Delegated Engineer, shall submit shop drawings and calculations for review to Architect/Engineer for the assemblage of prefabricated, engineered wood trusses and truss girders, together with all bracing, connections and other structural elements and all spacing and location criteria (truss placement plan), that, in combination, function to support the dead, live and wind loads applicable to the roof Truss System. The Truss System does not include walls, or any other structural support systems. These shop drawings and calculations shall be signed and sealed by the Truss System Engineer.

b. The Truss Design Engineer, a Delegated Engineer, shall submit shop (piece) drawings and calculations for each different truss of the Truss System such that each truss will function to support the dead, live and wind loads applicable to each truss and truss girder that together comprise the Truss System. These

shop drawings and calculations shall be signed and sealed by the Truss Design Engineer.

c. The Truss System Engineer and the Truss Design Engineer shall each be responsible for their own work. However, they may be the same individual providing two separate services.

2. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.

3. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.

4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.

5. Show splice details and bearing details.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For metal connector-plate manufacturer and fabricator.

B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.

C. Evaluation Reports: For the following, from ICC-ES:

1. Metal-plate connectors.

2. Metal truss accessories.

1.6 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

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

D. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and WTCA and that complies with TPI quality-control procedures for manufacture of connector plates published in TPI 1.

E. Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in TPI BCSI**,** "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.

2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.

3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer as described in the Structural Drawings to design metal-plate-connected wood trusses.

B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

1. Design Loads: As indicated.

2. Maximum Deflection Under Design Loads:

a. Roof Trusses: Vertical deflection of 1/240 of span.

C. Comply with applicable requirements and recommendations of the following publications:

1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."

2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."

3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review. Provide lumber graded by

an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Minimum Chord Size for Roof Trusses: 2 by 4 inches nominal both top and bottom chords.

C. Minimum Specific Gravity for Top Chords: 0.50.

D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry".

2.3 METAL CONNECTOR PLATES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Alpine Engineered Products, Inc.; an ITW company.
2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
3. CompuTrus, Inc.
4. Eagle Metal Products.
5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
7. Robbins Engineering, Inc.
8. Truswal Systems Corporation; an ITW company.

B. Source Limitations: Obtain metal connector plates from single manufacturer.

C. General: Fabricate connector plates to comply with TPI 1.

D. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.

2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153.

B. Fastener Type:

1. Nails, Brads, and Staples: ASTM F 1667.

2. Power-Driven Fasteners: ICC-ES ESR-1539.

3. Wood Screws: ANSI/ASME B18.6.1.

4. Lag Bolts: ANSI/ASME B18.2.1.

5. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and flat washers.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cleveland Steel Specialty Co.

2. KC Metals Products, Inc.

3. Phoenix Metal Products, Inc.

4. Simpson Strong-Tie Co., Inc.

5. USP Structural Connectors.

C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

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

2.7 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install bracing to comply with Section 061000 "Rough Carpentry”.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements.

1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

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

B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION

SECTION 062000

FINISH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood door frames.

C. Wood wall base, casings and moldings.

D. Wood window sills.

E. Wood rafter tails.

1.02 RELATED REQUIREMENTS

A. Section 060340 - Conservation Treatment for Period Architectural Woodwork: Repair and rehabilitation of salvaged wood rafter tails, for reinstallation in roof construction; fabrication of new wood rafter tails, to match existing (where the available quantity of salvaged wood rafter tails is insufficient for complete assembly).

B. Section 061000 - Rough Carpentry:

1. Wood bucks used in conjunction with rough opening for door frame installation in steel stud-framed partitions.

2. Concealed wood blocking, nailers, furring, and grounds.

C. Section 064100 - Architectural Wood Casework: Shop fabricated custom cabinet work.

D. Section 064216 - Wood Wall Paneling: Installation of wood wall paneling fabricated from reclaimed historic lumber.

E. Section 081423 - Exterior Stile & Rail Wood Doors.

F. Section 081433 - Interior Stile & Rail Wood Doors.

G. Section 099123 - Interior Painting: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Woodwork Institute (AWI):

1. AWI (QSI) -- Architectural Woodwork Quality Standards Illustrated; 8th edition.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).

2. Provide the information required by AWI (QSI).

C. Samples: Submit two samples of wood trim 12 inches (300 mm) long.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 - PRODUCTS

2.01 GENERAL

A. Quality Grade: Unless otherwise indicated, provide products of quality specified by AWI (QSI) for Custom Grade.

2.02 FINISH CARPENTRY ITEMS

A. Exterior Finish Carpentry Items:

1. Rafter Tails (restored historic wood rafter tails, and new replica wood rafter tails): Refer to Section 060340 - Conservation Treatment for Period Architectural Woodwork.

B. Interior Finish Carpentry Items:

1. General:

a. Wood Material: Solid lumber.

(1) Species: Natural ash, natural birch, basswood, maple, poplar, red oak, white oak, or mahogany conforming to AWI (QSI) Lumber Grade II Hardwood.

(2) Maximum Moisture Content: 9 percent.

2. Window Sills:

a. Profile: As indicated on drawings; exposed ends and edges to be square cut with eased edges, unless otherwise noted.

b. Dimensions: As indicated on drawings.

(1) Length: Full width of window opening, as indicated on drawings.

(2) Depth: Sill to return to window frames.

3. Wall Base (baseboards):

a. Profile: As indicated on drawings; exposed ends and edges to be square cut with eased edges, unless otherwise noted.

b. Dimensions: As indicated on drawings; or if not indicated, then 1 x 6 inches (nominal).

(1) Length: 12 ft, min.

4. Casing Moldings (for windows and doors):

a. Profile: As indicated on drawings; exposed ends and edges to be square cut with eased edges, unless otherwise noted.

b. Dimensions: As indicated on drawings; or if not indicated, then 1 x 3 inches (nominal).

(1) Length: 8 ft, min.

5. Panel Molding (for top of wood wall paneling):

a. Profile: As indicated on drawings; exposed ends and edges to be square cut with eased edges, unless otherwise noted.

b. Dimensions: As indicated on drawings; or if not indicated, then 1 x 4 inches (nominal).

(1) Length: 12 ft, min.

6. Wood Door Frames (including jamb and stop):

a. Profile: As indicated on drawings, unless otherwise noted.

b. Dimensions:

(1) Jamb:

(a) Depth: Match thickness of wall/partition (i.e., stud depth plus board materials).

(b) Thickness: 1-1/4-inch.

(2) Stop:

(a) Depth: As indicated on drawings.

(b) Thickness: 5/8-inch.

c. For additional requirements, refer to Section 081433 - Interior Stile & Rail Wood Doors.

2.03 FASTENINGS

A. Adhesive: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size, type and finish to suit application.

2.04 ACCESSORIES

A. Wood Filler: Solvent base, tinted to match surface finish color.

B. Shims: Cedar wood shims.

2.05 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. General:

1. Install work in accordance with AWI (QSI) requirements for grade indicated.

2. Set and secure materials and components in place, plumb and level.

3. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

B. Door Frames:

1. Coordinate work of this section with installation of rough wall openings to allow for proper installation of door and door frame assemblies.

2. Install door and door frame (jambs and stops) in accordance with Custom Grade per AWI (QSI), including but not limited to Section 1700.

3. Set and secure materials and components in place, plumb and level.

a. Adjust as necessary to function and smoothly.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 099000 - Painting and Coating.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch (1.6 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

SECTION 064100

ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Custom built-in bookcases and cabinets.

B. Custom built-in reception desk.

C. Preparation for installing electrical and telecomm utilities in wood casework.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry:

1. Stud framing, grounds, and concealed blocking.

2. Wood sleepers and plywood sheathing for subfloor beneath wood casework.

B. Section 062000 - Finish Carpentry: Finish carpentry items; wood door frames; wood wall base, casings and moldings; wood window sills; wood rafter tails.

C. Section 092116 - Gypsum Board Assemblies: Stud framing and concealed backing plates for proper attachment and support of wood casework.

D. Section 096429 - Wood Strip and Plank Flooring: Subfloor beneath wood casework to be flush with finished wood flooring adjacent thereto.

E. Section 123600 - Countertops: Quartz surfacing countertop for built-in wood reception desk.

F. Division 26 - Electrical: Electrical power outlets, lighting, and other related electrical work installed in custom built-in bookcases and casework.

G. Section 270000 - Telecommunication Systems: Outlets installed in custom built-in bookcases and casework.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Hardboard Association (AHA):

1. AHA A135.4 -- Basic Hardboard; 2004.

C. American National Standards Institute (ANSI):

1. ANSI A208.1 -- American National Standard for Particleboard; 2009.

D. American Society of Mechanical Engineers (ASME):

1. ASME B18 -- Fasteners.

a. ASME B18.2.1 -- Square and Hex Bolts and Screws (Inch Series); 2012, including July 2013 errata.

b. ASME B18.2.2 -- Nuts for General Applications (Inch Series); 2010.

c. ASME B18.6.1 -- Wood Screws (Inch Series).

d. ASME B18.21.1 -- Lock Washers (Inch Series); 2009.

e. ASME B18.22 -- Plain Washers; 1965 (R2008).

E. American Society for Testing and Materials (ASTM):

1. ASTM A307 -- Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength; 2007b.

2. ASTM A325 -- Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 1994.

3. ASTM A563 -- Standard Specification for Carbon and Alloy Steel Nuts; 2015.

4. ASTM E84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.

5. ASTM F593 -- Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2013a.

6. ASTM F594 -- Specification for Stainless Steel Nuts; 2009 (R2015).

F. Architectural Woodwork Institute (AWI):

1. AWI (QSI) -- Architectural Woodwork Quality Standards Illustrated; 8th edition, Version 1.0, 2003.

G. American Wood-Preservers' Association (AWPA):

1. AWPA C2 -- Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; 2003.

H. Builders Hardware Manufacturers Association (BHMA):

1. BHMA A156.9 -- American National Standard for Cabinet Hardware; 2010 (ANSI/BHMA A156.9).

I. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

J. Hardwood Plywood Veneer Association (HPVA):

1. HPVA HP-1 -- American National Standard for Hardwood and Decorative Plywood; 2009.

K. Federal Specifications and Standards, U.S. General Services Administration (FS):

1. FS FF-N-105 -- Nails, Brads, Staples and Spikes; Wire, Cut and Wrought; 1971.

2. FS FF-S-111 -- Screw, Wood.

3. FS FF-S-325 -- Shield, Expansion; Nail, Expansion and Nail, Drive Screw (Devices, Anchoring, Masonry).

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data:

1. Provide data on wood treatment materials and application instructions.

2. Provide data for attachment hardware and finish hardware.

a. Include evidence that products to be installed in this Project meet or exceed BHMA 156.9 Grade 1 requirements.

b. Provide data and instructions for attachment hardware and finish hardware.

C. Shop Drawings: Provide complete and detailed shop drawings for all custom built-in bookcases and casework.

1. Indicate plan layouts and elevations, assembly methods, accessory listings, hardware locations, and schedule of finishes.

a. Include field-verified dimensions, and indicate relative locations of work of other trades that is directly related to work of this section (e.g., wood flooring, window openings and details, installation heights and locations of concealed backing systems in furred gypsum board wall assemblies).

2. Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft (1:8).

3. Coordination:

a. Coordinate shop drawings custom built-in bookcases and casework with shop drawings for the following:

(1) Wood framing and other rough carpentry specified in Section 061000 - Rough Carpentry.

(2) Metal furring, metal stud framing and backer plates specified in Section 092113 - Gypsum Board Assemblies.

b. Shop drawings are to be unified and submitted jointly with product data.

D. Samples:

1. Hardware: Submit two samples of each type of hardware to be provided.
2. All samples will be reviewed by Architect before fabrication for Project, with final selection samples used for comparison inspections.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI (QSI), Custom grade.

B. Woodwork Manufacturer/Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Contractor's personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity, and quality to that shown and specified.
2. Manufacturer shall be a member in good standing of the American Woodwork Institute (AWI).
3. Manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Coordination: Contractor shall coordinate work of this section with related work specified in other sections (e.g., rough carpentry elements, wood flooring system, wood windows, gypsum wallboard systems, finish carpentry elements, electrical and datacomm outlets).

D. Field Verification of Conditions and Dimensions: Prior to development of shop drawings, woodwork manufacturer/fabricator shall inspect and accept work of other trades that is directly related to work of this section (e.g., wood flooring, window openings and details, installation heights and locations of concealed backing systems in furred gypsum board wall assemblies).

1. In addition, woodwork manufacturer/fabricator shall woodwork manufacturer/fabricator shall take field measurements of related work by other trades, and shall indicate such field-verified dimensions on casework shop drawings.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Protect work from moisture damage and exposure to sunlight, humidity, and other conditions detrimental to appearance of wood.

B. Custom built-in bookcases and casework must be delivered, stored, and handled in a manner that will prevent damage and disfigurement.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install custom built-in bookcases and casework when temperature or humidity conditions may have a detrimental effect on such work.

1.08 PROJECT CONDITIONS

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

1. Where elements of custom built-in bookcases and casework are intended to align with work specified in other sections, field verify such other work prior to fabrication of custom built-in bookcases and casework.

B. Sequence work to ensure utility connections are achieved in an orderly and expeditious manner.

C. Coordinate the work with electrical rough-in and installation of associated and adjacent components.

PART 2 - PRODUCTS

2.01 GENERAL

A. Quality Grade: Unless otherwise indicated, provide products of quality specified by AWI (QSI) for Custom Grade.

B. Design Load Requirements: Design and fabricate casework and hardware to support the following minimum loads.

1. Shelves (based on nominal 12-in. width x 48-in span): 50 lbs per inch span (uniformly distributed loads), with not more than 1/4-inch deflection.

2. Drawers:

a. Type 1 (drawer width up to 20 in.): 100 lbs per drawer.

b. Type 2 (drawer width more than 20 in.): 150 lbs per drawer.

2.02 MANUFACTURERS

A. Particleboard:

1. Flakeboard Company Limited: www.flakeboard.com.

B. Cabinet Hardware:

1. Accuride International Inc.: 12311 Shoemaker Avenue; Santa Fe Springs, CA 90670; Tel: 562-903-0200.

2. Blum, by Julius Blum, Inc.: 7733 Old Plank Road; Stanley, NC 28164; Tel. 800-438-6788.

3. Colonial Bronze Company: 511 Winsted Road; Torrington, CT 06790; Tel: 860-489-9233.

4. Garcy

5. Grant Slides & Track

6. Grass America, Inc.: P.O. Box 1019; 1202 Hwy 66 South; Kernersville, NC 27284; Tel: 800-334-3512.

7. Hager Hinge Company: St. Louis, MO 63104.

8. Knape and Vogt Manufacturing Company: 2700 Oak Industrial Drive NE; Grand Rapids, MI 49505; Tel: 800-253-1561.

9. Liberty Hardware Manufacturing Corporation: 140 Business Park Drive; Winston-Salem, NC 27107; Tel: 336-769-4077.
10. Rockler Companies, Inc.: 4365 Willow Drive; Medina, MN 55340; Tel: 800-376-7856.
11. Salice America, Inc.: 2123 Crown Centre Drive; Charlotte, NC 28227; Tel. 800-222-9652.
12. Soss Invisible Hinges (by Universal Industrial Products Company): Tel: 800-922-6957.
13. Stanley Hardware, by The Stanley Works: 480 Myrtle Street; New Britain, CT 06053; Tel: 800-337-4393.

2.03 MATERIALS

A. Wood Products:

1. Lumber:
    a. Softwood Lumber:
        (1) Dimension Lumber for Concealed Applications:
            (a) Species: Refer to Section 061000 - Rough Carpentry.
        (2) Exposed Dimension Lumber: N/A.
    b. Hardwood Lumber:
        (1) Species: Natural ash, natural birch, basswood, maple, poplar, red oak, white oak, or mahogany conforming to AWI (QSI) Lumber Grade II Hardwood.
        (2) Maximum Moisture Content: 9 percent.
2. Softwood Plywood:
    a. Subfloor Sheathing: Refer to Section 061000 - Rough Carpentry.
    b. Other Applications: N/A.
3. Hardwood Veneer Plywood:
    a. Description: Manufactured panel made up of 3 or more thin plies of hardwood (i.e., red oak) laid on top of each other with the grain of each ply running perpendicular to the one on either side of it, conforming to HPVA HP-1; graded in accordance with AWI (QSI), Custom quality.
    b. Core: Multiple-ply hardwood veneer code, manufactured using the 2-Step “Calibrated Blank” process (i.e., core veneers assembled and pressed without the face and back; then the resulting "blank" is sanded to a calibrated tolerance before going back to the press with face and back veneers applied).
    c. Face Veneers:

(1) Veneer Grading:

(a) Face Grade: AA, per HPVA HP-1.

(b) Back Grade: 1, HPVA HP-1; except where drawings indicate two layers of plywood laminated together to form a shelf (i.e., Face Grade on both top and bottom surfaces), lower Back Grade may be used.

(2) Wood Species: Hardwood, closed grain (e.g., maple, birch, cherry or hickory).

(3) Veneer Cutting: Quarter sliced or plain sliced.

(4) Veneer Matching: Per AWI (QSI) Quality Grade.

4. Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.

a. Density: Medium, 48-50 lbs/cu ft

b. Surface Burning Characteristics (ASTM E84):

(1) Flame Spread: 25

(2) Fuel Contributed: 10

(3) Smoke Developed: 25

c. Finish:

(1) Paint or varnish all surfaces and edges not covered with plastic laminate.

(2) At cutouts made for particleboard countertops, seal all edges to prevent water damage or swelling of material.

d. Product: Duraflake FR (as manufactured by Flakeboard), or equal.

5. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch (6 mm) thick, smooth two sides (S2S).

a. Comply with AWI (QSI), Grade 1.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3.

1. Grades: Provide specific types (grades) as follows:

a. Type HGS: 0.048 inch (1.22 mm) nominal thickness, through-color type.

(1) Color(s): Up to two colors as selected by Architect from laminate manufacturer's complete range of colors.

(2) Finish/Pattern: As selected by Architect from laminate manufacturer's complete range of finishes and patterns.

b. Type VGS: 0.028 inch (0.71 mm) nominal thickness, through-color type.

(1) Color(s): Up to two colors as selected by Architect from laminate

manufacturer's complete range of colors.

(2) Finish/Pattern: As selected by Architect from laminate manufacturer's complete range of finishes and patterns.

c. Type CLS: 0.020 inch (0.51 mm) nominal thickness, through-color type.

(1) Color(s): One color as selected by Architect from laminate manufacturer's complete range of colors.

(2) Finish/Pattern: As selected by Architect from laminate manufacturer's complete range of finishes and patterns.

d. Type BKL: 0.020 inch (0.51 mm) nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

C. Fasteners and Anchors:

1. General:

a. Select material, type, size, and finish required by each substrate for secure attachment/anchorage.

b. Use only stainless steel fasteners/anchors in the following applications:

(1) When fastener/anchor will be in contact with treated wood.

(2) When fastener/anchor will be exposed to view.

(3) When fastener/anchor will be located in an area where high humidity or moisture is anticipated (e.g., restroom).

2. Fasteners:

a. Assembly Fasteners: Designed to apply even, controlled pressure between joint members, eliminating twisting and buckling.

(1) Product: Knape and Vogt Type 516 Tite-Joint, or equal.

b. Concealed Joint Fasteners: Threaded steel.

c. Screws: Select material, type, size and finish required to suit application. Comply with FS FF-S-111 for applicable requirements.

(1) Wood Screws: ASME B18.6.1, Group, Type and Class as applicable.

d. Bolts and Nuts:

(1) Bolts: ASTM F593 stainless steel, or ASTM A325 heavy, hexagon head bolts, corrosion-resistant steel.

(2) Nuts: ASTM F594 stainless steel, or ASTM A563 corrosion-resistant steel.

e. Nails: Select material, type, size, and finish required to suit application. Comply with FS FF-N-105 for applicable requirements.

3. Anchoring Devices: FS FF-S-325, Group, Type and Class as applicable.

    a. Furnish anchors and inserts, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

D. Cabinet Hardware:

1. General:

    a. Comply with BHMA A156.9, and as specified herein.

    b. Provide cabinet hardware and accessory materials to comply with requirements indicated for design, material, finish, and manufacturer.

        (1) Install in accordance with hardware manufacturer's installation instructions.

    c. Exposed Finishes: Satin chrome, except as otherwise indicated.

2. Door Hinges:

    a. General:

        (1) Type: European-style, concealed, self-closing type, steel with polished finish.

        (2) Quantity (per door):

            (a) Door Leaf Weight, less than 15 lbs.: Two (2) hinges per leaf.

            (b) Door Leaf Weight, 15 to 30 lbs.: Three (3) hinges per leaf.

            (c) Door Leaf Weight, 30 to 45 lbs.: Four (4) hinges per leaf.

            (d) Door Leaf Weight, 45 to 60 lbs.: Five (5) hinges per leaf.

            NOTE: Hinge spacing per manufacturer's recommendations; also, distance between the top and bottom hinges must be greater than the width of the door.

    b. Product: 95-degree CLIP top BLUMOTION manufactured by Blum, or equal.

3. Barrister Door Slides:

    a. General:

        (1) Type: Barrister style door slides, combining hinging action and sliding action into a simple roller slide that permits the door to be tucked into the cabinet.

        (2) Material(s): Durable metal, with smooth-sliding nylon rollers.

        (3) Finish / Color: Epoxy coating / custom color to match color of bookcase.

    b. Product: Rockler 9" Barrister Bookcase Door Slides (Item # 25724) manufactured by Rockler Companies, Inc., or equal.

4. Drawer and Door Pulls:

a. General:

(1) Type: 6-5/16 inch Satin Stainless Steel Rod mounted onto smaller diameter posts.

(2) Quantity (per drawer or door):

(a) Drawers, 24 Inches or Less in Width: Provide 1 pull per drawer.

(b) Drawers, Over 24 Inches in Width: Provide 2 pulls per drawer.

(c) Doors: Provide 1 pull per door leaf.

b. Product: DP55A, Satin Stainless Steel (SSS), manufactured by Doug Mockett & Company, Inc., or equal.

5. Drawer and Door Knobs:

a. General:

(1) Description: Round "mushroom" cabinet knob.

(2) Material / Finish: Zinc die cast, with satin nickel finish.

(3) Dimensions (nominal):

(a) Height: 1.61 in.

(b) Length: 1.75 in.

(c) Width: 1.75 in.

(4) Quantity (per drawer or door):

(a) Drawers, 24 Inches or Less in Width: Provide 1 knobs per drawer.

(b) Drawers, Over 24 Inches in Width: Provide 2knobs per drawer.

(c) Doors: Provide 1 knob per door leaf.

b. Product (Basis of Design): 1-3/4" Perimeter Knob manufactured by Liberty Hardware Mfg. Corp. (Model P19454C-SN-CP), or equal.

6. Drawer Slides:

a. General:

(1) Type: Full-extension, self-closing, side-mount drawer slides with steel ball bearings, rail/mount disconnect, vertical cam adjustment, hold-in detents, and silenced in and out; 0.050 inch slide space.

(2) Static Load Rating (per pair):

(a) Type 1 (drawer width up to 20 in.): Heavy-duty (100 lbs).

(b) Type 2 (drawer width more than 20 in.): Extra heavy-duty (150 lbs).

(3) Finish: Clear zinc.

(4) Quantity: One pair per drawer.

b. Product(s):

(1) Type 1 (drawer width up to 20 in.): Accuride Model 3832SC, or equal.

(2) Type 2 (drawer width more than 20 in.): Accuride Model 4032, or equal.

7. Adjustable Shelf Hardware:

a. General:

(1) Provide adjustable shelves for cabinets with the following hardware, to provide shelf adjustment on 1/2 inch centers, except where drawings indicate fixed shelving.

(2) Provide cantilever type shelf standards and cantilever brackets where indicated. For shelves longer than 48 inches, support at intermediate points at not more than 48 inches spacing by cantilever shelf standards and cantilever brackets.

b. Product(s):

(1) Shelf End Standards: Knape and Vogt No. 255AL, or equal.

(2) Shelf Support Clips: Knape and Vogt No. 256AL, or equal.

(3) Shelf Standards for Cantilever Brackets: Knape and Vogt No. 80A, or equal.

(4) Cantilever Shelf Brackets: Knape and Vogt No. 180A, or equal.

8. Locks:

a. Description: Cabinet lock(s) designed for use in cabinet doors and drawer, with slotted strike; Custom grade; shall be master key capable.

b. Product: CL-Series cabinet locks manufactured by Schlage, or equal.

9. Plastic Grommets: Provide quantity and sizes as required for miscellaneous cut-out openings; color Black, unless otherwise indicated.

E. Accessories:

1. Adhesive: Low-VOC type recommended by AWI to suit application.

2. Shimming, Blocking, Sleepers and Grounds: Refer to Section 061000 - Rough Carpentry.

3. Wood Filler: Solvent base, tinted to match surface finish color.

2.04 FABRICATION

A. General: Fabricate work of this Section in conformance with specified quality level, and as follows:

1. Quality Level: Custom Grade, Heavy Duty performance, in accordance with AWI (QSI).

2. Thicknesses of Material: Shall be as indicated in contract documents; but not less

than as per AWI (QSI), Section 400-G-8 standards for type(s) of material used.

3. Casework Dimensions: Shall be as indicated on drawings; or if not indicated, then as per AWI (QSI), Section 400-G-9 standards for "Casework Standard Dimensions".

    a. Accessibility: Comply with applicable requirements of FBC-A, including but not limited to maneuvering clearance, reach range, protruding object and operable parts.

    b. Where there is a discrepancy between dimensions indicated on drawings and referenced AWI standards, request direction from Architect.

4. Cabinet Hardware: Fabricate and install cabinet hardware per AWI (QSI) Section 400-G-14 standards and manufacturer's instructions.

5. Complete fabrication processes, including assembly, finishing, and hardware application, prior to shipment to project site, to maximum extent possible. Dissemble components only as necessary for shipment and installation, permitting passage through building openings.

6. Exposed Sheet Material Edges:

    a. All Elements (except exposed edges of shelves): Fit exposed sheet material edges with matching wood veneer. Use one piece for full length only.

    b. Exposed Edges of Shelves: Fit exposed sheet material edges with matching solid lumber edging. Use one piece for full length only.

7. Openings: Factory-cut openings to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.

    a. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

    b. Smooth edges of cutouts and other openings, where located in countertops.

8. Applied Finishes:

    a. General:

        (1) Apply finish in full, uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.

    b. Plastic Laminate (HPDL Overlay): Where plastic laminate finish is indicated, direction and matching of pattern/grain shall be per AWI (QSI) requirements for Custom Grade.

    c. Wood Veneer Laminate: Where wood veneer finish is indicated, direction and matching of pattern/grain shall be per AWI (QSI) requirements for Custom Grade.

9. Cabinet Hardware and Accessory Materials: Provide cabinet hardware and

accessory materials to comply with requirements indicated for design, material, finish, and manufacturer.

a. Install in accordance with hardware manufacturer's installation instructions.

10. Running Trim and Casings: Solid lumber.

a. Coordinate with Section 062000 - Finish Carpentry.

11. Coordinate with electrical requirements and provide raceways, with complete access panels for electrical.

B. Custom Built-In Bookcases and Cabinets:

1. Style: Flush Overlay Construction, except as otherwise indicated on drawings.

2. Materials: As indicated on drawings, and as follows:.

a. Case Body Members:

(1) Top, Exposed End, Face Frame and Bottom: Hardwood veneer plywood.

(2) Exposed End Corner Details: Hardwood veneer plywood or solid hardwood lumber, as indicated.

(3) Cabinet Back: Hardwood veneer plywood, except as otherwise indicated.

(4) Anchor Strip (for cabinet backs less than 1/2-inch thick): Solid lumber or plywood.

b. Exposed Shelf: Hardwood veneer plywood.

c. Semi-Exposed Shelf: Hardwood veneer plywood.

d. Drawer Body:

(1) Sides, Back, and Subfront: Solid lumber or plywood.

(2) Bottom: Plywood.

e. Drawer Front: Hardwood veneer plywood, except as otherwise indicated.

f. Doors:

(1) Flush Door: Hardwood veneer plywood, except as otherwise indicated.

(2) Glass Door Frame: Solid lumber, except as otherwise indicated.

g. Mounting / Hanger Strip: Solid lumber or plywood.

h. Glazing, for Glass Door:

(1) Glass: Shall conform to ASTM C1036, Type I, Class 1, Q3, and the following criteria:

(a) Fully Tempered Type: ASTM C1048, Kind FT.

(b) Thickness: 6 mm (1/4-in., nominal), unless otherwise indicated.

(2) Glazing Accessories:

(a) Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.

(b) Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

(c) Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.

3. Shelving: Material thicknesses shall be not less than minimums indicated in AWI (QSI), Section 400-G-8 standards for type(s) of material used.

   a. Open Shelving in Bookcase Units: All shelves shall be of same thickness, based on longest span.

4. Edge Treatment of Exposed and Semi-Exposed Components:

   a. Solid Lumber: Exposed edges to be square cut with eased edges, unless otherwise indicated.

   b. Sheet Materials:

      (1) All Elements (except exposed edges of shelves): Fit exposed sheet material edges with matching wood veneer. Use one piece for full length only.

      (2) Exposed Edges of Shelves: Fit exposed sheet material edges with matching solid lumber edging. Use one piece for full length only. Exposed edges to be square cut with eased edges, unless otherwise indicated.

C. Custom Built-In Reception Desk:

1. Style: Flush Overlay Construction, except as otherwise indicated on drawings.

2. Materials: As indicated on drawings.

   a. Case Body Members:

      (1) Top: Softwood plywood, suitable for use as substrate beneath quartz surfacing countertop.

      (2) Exposed End, Face Frame and Bottom: Hardwood veneer plywood, with plastic laminate (HPDL) applied finishes.

      (3) Exposed End Corner Details: Hardwood veneer plywood, with plastic laminate (HPDL) applied finishes.

(4) Cabinet Back: Hardwood veneer plywood, with plastic laminate (HPDL) applied finishes.

b. Shelves:

(1) Exposed Shelf: N/A.

(2) Semi-Exposed Shelf: Hardwood veneer plywood, with plastic laminate (HPDL) applied finishes.

c. Drawer Body:

(1) Sides, Back, and Subfront: Solid lumber or plywood, with plastic laminate (HPDL) applied finishes.

(2) Bottom: Plywood.

d. Drawer Front: Hardwood veneer plywood, plastic laminate (HPDL) applied finishes.

e. Doors:

(1) Flush Door: Hardwood veneer plywood, plastic laminate (HPDL) applied finishes.

(2) Glass Door Frame: N/A.

f. Anchor Strip (for cabinet backs less than 1/2-inch thick): Solid lumber or plywood.

3. Edge Treatment of Exposed and Semi-Exposed Components: Fit exposed sheet material edges with matching plastic laminate (HPDL) applied edging. Use one piece for full length only.

2.05 SHOP FINISHING

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

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. Finishing System:

1. Custom Built-In Bookcases and Cabinets: Finish work in accordance with AWI (QSI), Section 1500 - Factory Finishing requirements for Custom Grade and as follows:

a. Opaque, System - 5, Conversion Varnish.

(1) Color: As selected by Architect.

(2) Sheen: Satin.

b. Casework Surfaces to Be Finished: Determination as to which portions of casework shall be ‘Exposed’, Semi-exposed’, and ‘Concealed’ shall be the same as defined in AWI (QSI) Section 400-G-3, except that, for purpose of factory-finishing, both sides of cabinet doors shall be considered ‘Exposed’.

2. Custom Built-In Reception Desk: Finish work in accordance with AWI (QSI), Section 400 - Architectural Cabinets requirements for Custom Grade, and as follows:

    a. Finishing Materials: High Pressure Decorative Laminate (HPDL).

        (1) General:

            (a) Color(s): Up to two colors as selected by Architect from laminate manufacturer's complete range of colors.

            (b) Finish/Pattern: As selected by Architect from laminate manufacturer's complete range of finishes and patterns.

            (c) Blending of Grain/Pattern across Multiple Cabinet Faces in Each Elevation (if applicable): Continuous pattern.

            (d) Direction of Matching of Pattern/Wood Grain on Individual Cabinet (if applicable): Continuous vertical figure across doors and drawer fronts and selection for pleasing blend of figure and color per elevation.

        (2) Exposed Surfaces (as defined in AWI (QSI) Section 400-G-3):

            (a) Horizontal Surfaces: NEMA LD 3 Type HGS.

            (b) Vertical Surfaces: NEMA LD 3 Type VGS.

        (3) Semi-Exposed Parts (as defined in AWI (QSI) Section 400-G-3):

            (a) Cabinet Liner: NEMA LD 3 Type CLS.

        (4) Concealed Parts (as defined in AWI (QSI) Section 400-G-3):

            (a) Laminate Backer: NEMA LD 3 Type BKL.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify adequacy of subflooring, and of backing and support framing.

    1. Coordinate work of this section with requirements of Section 061000 - Rough Carpentry and Section 096429 - Wood Strip and Plank Flooring, to ensure proper installation of subfloor beneath casework.

    2. Coordinate work of this section with requirements of Section 092113 - Gypsum Board Assemblies, to ensure proper installation of backing/blocking for anchoring and support of casework attached to walls or partitions.

B. Condition wood casework to average prevailing humidity conditions in installation areas before installing.

C. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

D. Prior to installing work of this Section, examine shop-fabricated work for completion

and complete work as required, including back priming and removal of packing.

E. Verify utilities and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. General:

1. Install work in accordance with AWI P-200, Section 1700, Custom Grade.
2. Verify dimensions before proceeding and obtain measurements at site for work required to be accurately fitted to other construction.
3. Coordinate work with other trades affected by this installation.
    a. Moving Items: If it is necessary for other trades to move cabinetwork to make final connections, cabinetwork supplier shall assist such trades in moving such cabinetwork and shall be on the job to carefully level and adjust cabinetwork as last connections are made.
4. Give particular attention to work of supporting and attachment items, so as not to delay progress.
5. Discard materials which are unsound, warped, bowed, twisted, improperly treated, too small to fabricate work with minimum joints, or defective fabrication with respect to surface, size, profile, or pattern.
6. Set and secure materials and components in place, plumb and level.
    a. Anchor woodwork to anchors or blocking built in or directly attached to substrates.
    b. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.
    c. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
    d. Use fixture attachments in concealed locations for wall mounted components.
    e. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
    f. Secure cabinet bases to floor using appropriate angles and anchorages.
    g. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
    h. Install prefinished paneling with nails at 16 inch (400 mm) on center, except as otherwise indicated; where indicated, install paneling with beveled wood rails.
7. Coordinate the installation of firestopping behind paneling.

8. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (1 mm). Do not use additional overlay trim to conceal larger gaps.
    a. Refinish cut surfaces to match adjacent surfaces.
9. Install hardware in accordance with manufacturer's instructions and accepted shop drawings.

B. Bookcases and Casework:
1. General:
    a. Install without distortion for proper opening and accurate alignment of doors and drawers.
    b. Adjust hardware to center doors and drawers.
    c. Anchor tops to base units and other support systems.
    d. Erect straight, level and plumb to tolerances, and securely anchor in place.
    e. Scribe and closely fit to adjacent work.
    f. Cut and fit around pipes, ducts, and other items.
2. Bookcase Base Units:
    a. Set bookcases in line and plumbed, and leveled by means of wood shims, or by adjustable levelers provided in each cabinet unit.
    b. Secure base units together with concealed galvanized steel bolts, washers and nuts.
    c. Secure base units to masonry walls and to concrete floors at concealed locations, near each end, with 1/4 inch diameter zinc-plated anchors or toggles.
    d. Secure base units to wood blocking or metal backing plate in metal stud partitions and furred areas at concealed locations near each end, with 1/4 inch diameter zinc-plated screws.
3. Bookcase Wall Units:
    a. Carefully align wall units, level, and firmly anchor to wall.
    b. At furred or stud-framed walls/partitions, install wall cabinets with sheet metal screw anchors into backing plates attached to metal studs or furring.
        (1) Coordinate placement and installation of backer plates with work installation of stud framing and furring, before installation of gypsum board.
        (2) Attach cabinet unit using sufficient number of anchors to support weight of cabinet and anticipated load. Anchors to be spaced maximum 16 inches on center, with not less than 4 anchors per unit; minimum 2 anchors to be installed in top mounting rail, and minimum 2 anchors in bottom rail.
    c. At masonry walls (without furring), anchor wall cabinets with sheet metal

screws or machine screws in concrete expansion anchors or toggles.

d. Scribe fillers where required, fit and install, to produce a neat closure between building walls and cabinet units.

4. Adjustable Shelving:

a. Install wood and plastic laminate finished wood shelving where indicated in cabinetwork, supported by specified end standards and clips.

b. For shelves longer than 48 inches, support at intermediate points at not over 48 inches spacing by specified cantilever shelf standards and cantilever brackets.

c. Erect shelf standards plumb, and secure with zinc-plated steel screws.

5. Fixed Shelving:

a. Install wood and plastic laminate shelving where indicated in cabinetwork.

b. Fixed shelving in open and closed cabinets to be factory-built into cabinets.

3.03 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16 inch (1.5 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.7 mm).

C. Maximum Offset in Surface Alignment: 1/16 inch.

D. Maximum Offset in Revealed Adjoining Surface: 1/8 inch.

E. Plumb and Level: 1/8 inch in 8 ft., maximum.

3.04ADJUSTING

A. Repair damaged work or replace with new to eliminate defects.

B. Adjust joinery for uniform appearance.

C. Clean, lubricate and adjust hardware.

D. Adjust moving or operating parts to function smoothly and correctly.

E. Touch-up factory applied finishes, to restore finish on joints and damaged or soiled areas. Completed work shall have uniform finish throughout.

3.05CLEANING

A. Clean all surfaces in accordance with manufacturer's recommendations.

B. Provide protection and maintain installed condition until Substantial Completion.

C. Remove all protective coatings at time of Final Acceptance.

END OF SECTION

SECTION 064216

WOOD WALL PANELING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Installation of custom wood paneling fabricated from reclaimed historic lumber.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Grounds, furring and concealed blocking.

B. Section 061100 - Reclamation of Historic Lumber: Reclamation and remilling of salvaged historic lumber for re-use as wall paneling in finished work.

C. Section 062000 - Finish Carpentry: Running trim.

D. Section 099000 - Painting and Coating: Site finishing of wood paneling.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Woodwork Institute (AWI):

1. AWI (QSI) -- Architectural Woodwork Quality Standards Illustrated; 8th edition.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).

2. Provide the information required by AWI (QSI).

3. Indicate related work specified in other sections, including but not limited to drywall partition and wood running trim (e.g., cap molding, casing, baseboard).

a. Coordinate with Section 062000 - Finish Carpentry.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in

this section with minimum five years of documented experience.

1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

B. Coordinate work of this Section with work specified in Section 061000 - Rough Carpentry, Section 062000 - Finish Carpentry, and Section 061100 - Reclamation of Historic Lumber.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

B. Do not deliver wood materials to project site until building is fully enclosed and interior temperature and humidity are in accordance with recommendations of AWI (QSI) Section 1700.

PART 2 - PRODUCTS

2.01 T&G WOOD PANELING (RECLAIMED HISTORIC LUMBER)

A. Quality Level: Unless otherwise indicated, provide products of quality specified by AWI (QSI) for Custom Grade.

B. Flat Paneling: Refer to Section 061100 - Reclamation of Historic Lumber,

1. Outside Corners: Mitered and splined.

2.02 ADHESIVES AND FASTENERS

A. Adhesives: Type suitable for intended purpose, complying with applicable air quality regulations.

B. Fasteners: Of size, type and finish to suit application.

2.03 ACCESSORIES

A. Lumber for Shimming, Blocking, and Furring: Softwood lumber; refer to Section 061000 - Rough Carpentry.

2.04 FABRICATION

A. Finish exposed edges of panels as specified by grade requirements.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting and scribing.

PART 3 - EXECUTION

3.01 EXAMINATION

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

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Install work in accordance with AWI (QSI) requirements for grade indicated.

B. Do not begin installation until wood materials have been fully acclimated to interior conditions.

C. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.

D. Where necessary to cut and fit on site, scribe work abutting other components. Do not use additional overlay trim to conceal gaps.

E. Set exposed fasteners, fill with wood filler, and finish to match panel finish.

F. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.

3.03 PREPARATION FOR FIELD FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: Refer to Section 099000 - Painting and Coating.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch (1.6 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.8 mm).

END OF SECTION

SECTION 072100

THERMAL INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Board insulation at exterior wall behind drywall wall finish.

B. Batt insulation in ceiling/roof construction.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 061000 - Rough Carpentry: Supporting construction for batt insulation.

C. Section 061753 - Shop-Fabricated Wood Trusses.

D. Section 092116 - Gypsum Board Assemblies: Gypsum board air barrier at underside of roof trusses.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C578 -- Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

2. ASTM C665 -- Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

3. ASTM E84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

4. ASTM E136 -- Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C; 2016.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Foam Board Insulation Materials:

1. Dow Chemical Company: www.dow.com.
2. Kingspan Insulation LLC: www.trustgreenguard.com.
3. Owens Corning Corporation: www.ocbuildingspec.com..

B. Batt Insulation Materials:

1. CertainTeed Corporation: www.certainteed.com.
2. Johns Manville: www.jm.com.
3. Owens Corning Corporation: www.ocbuildingspec.com.

2.02 APPLICATIONS

A. Insulation on Inside of Concrete and Masonry Exterior Walls: Fiber board.

B. Insulation in Wood Framed Ceiling Structure: Batt insulation with integral vapor retarder.

2.03 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board, with either natural skin or cut cell surfaces, and complying with the following characteristics:

1. Type: ASTM C578, Type X.
2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
4. Panel Size: Pre-cut to a nominal width of 23-7/8 in. x 96 in. length, to fit between Z-channels at 24 in. o.c.
5. Thermal Resistance (ASTM C518):
    a. 1-1/2 inch (38 mm) thick material at 75 deg F (24 deg C): R-7.5, minimum.
    b. 2 inch (38 mm) thick material at 75 deg F (24 deg C): R-10, minimum.
6. Compressive Strength (ASTM D1621): 15 psi (103 kPa), minimum.

7. Flexural Strength (ASTM C203): 60 psi (414 k/Pa), minimum.
8. Water Absorption (ASTM C272): 0.10 percent (by volume), maximum.
9. Water Vapor Permeance (ASTM E96): 1.5 perm (86 ng/Pa•s•m2), maximum.
10. Dimensional Stability (ASTM D2126): 2.0 percent linear change, maximum.
11. Linear Coefficient of Thermal Expansion (ASTM E228): 3.5 x 10-5 in/in/deg F (6.3 x 10-5 m/m°/deg C).
12. Board Edges: Square.
13. Product: "Foamular INSULPINK-Z" by Owens Corning, or equal.

2.04 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt, sized for friction fit installation, and complying with the following characteristics:
   1. Type: ASTM C665, Type III, Class B and C.
   2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   4. Combustibility: Non-combustible, when tested in accordance with ASTM E136 .
   5. Formaldehyde Content: Zero.
   6. Thermal Resistance (ASTM C518): R-30, minimum.
   7. Thickness:
      a. Batt Insulation for Ceiling/Roof Construction: 9-1/2 inches, nominal; but not less than thickness required to achieve specified thermal resistance.
      b. Batt Insulation for Filling Perimeter Window and Door Shim Spaces and Crevices in Exterior Wall and Roof Construction: As required to fill void.
   8. Facing: Aluminum foil, flame spread 25 rated; one side.
   9. Product: “Thermal Batt FIBERGLAS Insulation” by Owens Corning, or equal.

2.05 ACCESSORIES

A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch (50 mm) wide.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards vertically on walls, unless otherwise noted.

1. Butt edges and ends tightly to adjacent boards and to protrusions.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior roof and ceiling spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces.

1. Lap ends and side flanges of membrane.

F. Retain insulation batts in place with gypsum board on furring secured to bottom chord of roof trusses.

G. Tape seal butt ends and lapped flanges in membrane.

H. Tape seal tears or cuts in vapor retarder.

3.04 PROTECTION

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

END OF SECTION

SECTION 073216

CONCRETE ROOF TILES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete roof tiles.

B. Fasteners and accessories.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood roof sheathing; roof edge blocking and nailers.

B. Section 075200 - Modified Bituminous Membrane Roofing: Underlayment.

C. Section 076200 - Sheet Metal Flashing and Trim: Roof flashings fabricated from sheet metal.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM A90 -- Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings; 2001.

2. ASTM A525 -- Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process; 1987.

3. ASTM A641 -- Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a.

4. ASTM C91/C91M -- Standard Specification for Masonry Cement; 2005.

5. ASTM C144 -- Standard Specification for Aggregate for Masonry Mortar; 2011.

6. ASTM C270 -- Standard Specification for Mortar for Unit Masonry; 2008a.

7. ASTM C1492 -- Standard Specification for Concrete Roof Tile; 2003.

8. ASTM D226/D226M -- Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2006.

9. ASTM D249 -- Standard Specification for Asphalt Roll Roofing (Organic Felt) Surfaced with Mineral Granules; 1989 (R1996).

10. ASTM D2626 -- Standard Specification for Asphalt-Saturated and Coated Organic

Felt Base Sheet Used in Roofing; 2004.

11. ASTM D4586/D4586M -- Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (R2012)e1.

12. ASTM E96/E96M -- Standard Test Methods for Water Vapor Transmission of Materials; 2005.

C. Florida Building Code, 5th edition – 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-EB -- Florida Building Code, Existing Building.

a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

3. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

a. FBC-TP TAS-100 -- Test Procedure for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems.

b. FBC-TP TAS-101 -- Test Procedure for Static Uplift Resistance of Mortar or Adhesive Set Tile Systems.

b. FBC-TP TAS-102 -- Test Procedure For Static Uplift Resistance of Mechanically Attached, Rigid Roof Systems.

c. FBC-TP TAS-102(A) -- Test Procedure for Static Uplift Resistance of Mechanically Attached, Clipped, Rigid, Roof Systems.

d. FBC-TP TAS-108 -- Test Procedure for Wind Tunnel Testing of Air Permeable, Rigid, Discontinuous Roof Systems.

e. FBC-TP TAS-112 -- Standard Requirements for Concrete Roof Tiles.

c. FBC-TP TAS-114 -- Test Procedures for Roof System Assemblies in the High-Velocity Hurricane Zone Jurisdiction.

D. National Roofing Contractors Association (NRCA):

1. NRCA MS104 -- The NRCA Steep Roofing Manual; Fifth Edition, with interim updates.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Manufacturer's data sheets on tile, underlayment and tile adhesive, indicating material characteristics, installation instructions, and limitations and precautions.

1. Include copies of Product Approval for Concrete Roof Tiles, Underlayment, and Tile Adhesive.

C. Shop Drawings: For metal flashings and counterflashings, indicate overall configurations and thicknesses, details at complex intersections, jointing methods and locations, and fastening details.

D. Samples: Set of tiles representing actual product in color, finish, and style.

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Concrete Roof Tiles: 100 sq. ft. (9.3 sq. m) of each type, in unbroken bundles.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 WARRANTY

A. Manufacturer’s Warranty: Standard form in which manufacturer agrees to repair or replace concrete roof tiles that fail in materials within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of concrete-tile roofing that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 CONCRETE ROOF TILES

A. Concrete Roof Tiles:

1. Comply with requirements for ASTM C1492, with nail holes made before curing.

2. Weight: Normal weight tile, using ASTM C33 aggregates.

3. Profile: Flat interlocking tile with smooth texture and square-cut butt.

4. Tile Size: As selected from manufacturer’s standards.

B. Special Shapes and Fittings: Supply special shapes and fittings of same material and finish as adjacent tile, factory-formed, as indicated on drawings or as required for specific project conditions, including but not limited to hip caps, ridge caps, and eave edges.

1. Special shapes shall include but are not limited to: 90-deg Rake, 3-Sided Ridge, 3-

Sided Hip Starter, and Apex 3-Way.

C. Product (Basis of Design): 'Entegra Concrete Roof Tiles (HVHZ jurisdictions)' - 'Bermuda Flat Style' as manufactured by Entegra Roof Tiles LLC (www.enterga.com), complying with Florida Product Approval FL-7804-R9.

1. Texture: Smooth.

2. Base Color: White.

2.02 UNDERLAYMENT

A. Refer to Section 075200 - Modified Bituminous Membrane Roofing.

2.03 FASTENERS

A. General:

1. Fasteners that are in contact with stainless steel or aluminum flashing material shall be stainless steel.

B. Underlayment Fasteners: Refer to Section 075200 - Modified Bituminous Membrane Roofing.

C. Nails: Stainless steel ring shank nails, conforming to roof tile product approval.

2.05 TILE ADHESIVE AND MORTAR

A. Tile Adhesive: Two-component polyurethane roof tile foam adhesive.

1. Physical and Performance Requirements:

a. Density (ASTM D1622/D1622M): 1.6 lbs/cu ft.

b. Compressive Strength (ASTM D1621):

(1) Parallel to Rise: 18 PSI.

(2) Perpendicular to Rise: 12 PSI.

c. Tensile Strength (ASTM D1623): 28 PSI, parallel to rise.

d. Water Absorption (ASTM D2127): 0.08 lbs/sq ft.

e. Moisture Vapor Transmission (ASTM E96/E96M): 3.1 perm / inch.

f. Dimensional Stability (ASTM D2126, 2 weeks):

(1) +0.07 percent volume change at -40 deg F.

(2) +6.0 percent volume change at 158 deg F and 100 percent RH.

g. Closed Cell Content (ASTM D2856): 86 percent.

2. Product (Basis of Design): "ICP Adhesives Polyset AH-160" by ICP Adhesives and Sealants, Inc., conforming to Miami-Dade County Product Approval No. 16-0315.01 and roof tile product approval.

B. Mortar:

1. Cement: ASTM C91, Type M.
2. Sand: ASTM C144, uniformly graded and free from organic materials.
3. Mix: Premixed or site mixed, ASTM C270 for Type M mortar.
4. Color: Standard non-pigmented (gray), except as follows:
    a. Mortar Applications Exposed to View: Match tile color.

2.06 METAL FLASHING MATERIALS

A. Provide metal roof flashing as specified in Section 076200 - Sheet Metal Flashing and Trim.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine structural roof deck for compliance with specified requirements. Verify that roof penetrations and roof openings are correctly installed in proper locations.

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

3.02 PREPARATION

A. Prepare roof deck surfaces using methods recommended by tile manufacturer for achieving best results under project conditions.

B. Seal roof deck joints wider than 1/16 inch (1.5 mm) with deck tape.

3.03 INSTALLATION

A. Install concrete tile roofing system in accordance with requirements of Product Approval(s), and with recommendations of the underlayment manufacturer, the tile manufacturer and NRCA MS104.

B. Underlayment:
    1. General:
        a. No roofing material shall be fully or partially adhered directly to a nailable deck, unless otherwise noted in the roof assembly product approval.
    2. Base Sheet: Apply the base sheet parallel to and abutting the eave, in accordance with manufacturer’s instructions and underlayment Product Approval.
        a. End lap and side laps should be minimum 6 inches, and head laps minimum 4 inches.
        b. Mechanically fasten the base sheet to the deck with approved nails and tin tags, maximum 6 inches on center at the laps and two staggered rows maximum 12 inches on center in the field.
        c. Cover entire roof with the base sheet.

d. Apply the metal drip edge and other flashings over the base sheet.

e. Coat entire metal surface of deck flange with asphalt primer.

3. Underlayment Sheet:

a. Install minimum two layers of underlayment over entire roof area.

(1) The first course of underlayment should be parallel and flush to the edge of the eave.

(2) Install underlayment perpendicular to roof slope, stagger end laps of each layer, and nail in place.

b. Fasten the top of each sheet to the deck through the black selvage lap maximum 12 inches on center with approved fasteners.

(1) Apply each succeeding course of underlayment, lapping the entire width of the black selvage area.

c. Apply SBS mastic under all side or any other laps onto the top white surface of underlayment.

(1) All side laps must be minimum 6 inches.

(2) Use a roller like the one shown below to insure complete adhesion to the base sheet.

4. For additional requirements, refer to Section 075200 - Modified Bituminous Membrane Roofing.

C. Sheet Metal Flashing: Install flashing at other locations as indicated and as required by project conditions.

D. Elastomeric Membrane Flashing: Apply self-adhering membrane flashing in concealed locations where metal flashing would be difficult or impossible to apply effectively.

E. Attachment Members:

1. Nailers: Install nailers at ridge and hips, directly over underlayment. Protect with additional layer of underlayment before installing ridge and hip tiles and accessories.

F. Concrete Tile:

1. Install first row of tile at eaves with minimum projection of 1 inch (255 mm), unless otherwise indicated or recommended by tile manufacturer.

2. Lay tile square with building lines and parallel with roof slope. Install filler, closure, and mitered pieces as required.

3. Install tile with minimum of 3 inch (75 mm) headlaps, unless otherwise noted in Product Approval.

4. Stagger joints between courses.

5. Miter tile at valleys to form straight edge using masonry saw.

6. Cut and fit tiles neatly around vents, pipes, and other projections.
7. Set ridge and hip tile in full bed of mortar. Strike flush with face of tile.
8. Install accessories in accordance with manufacturer's details and recommendations.

3.04 PROTECTION

A. Minimize traffic over finished roof surface. Where walking on roof is absolutely necessary, wear soft-soled shoes and walk on butt of tiles to avoid breakage.

B. Remove and replace damaged or broken tile before Date of Substantial Completion.

3.05 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <*Insert name*> of <*Insert address*>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:

1. Owner: <*Insert name of Owner*>.
2. Address: <*Insert address*>.
3. Building Name/Type: <*Insert information*>.
4. Address: <*Insert address*>.
5. Area of the Work: <*Insert information*>.
6. Acceptance Date: <*Insert date*>.
7. Warranty Period: <*Insert time*>.
8. Expiration Date: <*Insert date*>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
    a. Lightning;
    b. Peak gust wind speed exceeding <Insert wind speed> mph (m/sec);
    c. Fire;
    d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;

f. Vapor condensation on bottom of roofing; and

g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.

4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <*Insert day*> day of <*Insert month*>, <*Insert year*>.

1. Authorized Signature: <*Insert signature*>.

2. Name: <*Insert name*>.
3. Title: <*Insert title*>.

END OF SECTION

SECTION 075200

MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Modified bituminous membrane roofing systems for low-slope roof and steep slope roof.

B. Insulation board, cover board, and insulation fasteners.

C. Roofing base sheet, underlayment sheet, and membrane sheet materials.

D. Base flashings.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood nailers and cant strips; plywood roof sheathing.

B. Section 073216 - Concrete Roof Tiles.

C. Section 076200 - Sheet Metal Flashing and Trim: Roof edge drip flashings; counterflashings, reglets.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society of Civil Engineers (ASCE):

1. ASCE 7 -- Minimum Design Loads for Buildings and Other Structures; 2010.

C. American Society for Testing and Materials (ASTM):

1. ASTM C1177/C1177M -- Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

2. ASTM C1289 -- Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.

3. ASTM D226/D226M -- Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.

4. ASTM D1970/D1970M -- Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Membrane Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.

5. ASTM D6163/D6163M -- Standard Specification for Styrene Butadiene Styrene

(SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements; 2000(2015)e1.

6. ASTM D6164/D6164M -- Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements; 2011.

7. ASTM D6222/D6222M -- Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements; 2011.

D. Factory Mutual Research Corporation (FM).

E. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

a. FBC-TP RAS-117 -- Standard Requirements for Bonding or Mechanical Attachment of Insulation Panels and Mechanical Attachment of Anchor and/or Base Sheets to Substrates.

b. FBC-TP TAS-121 -- Standard Requirements for Testing and Approval of Roofing Adhesives, Mastics and Coatings.

F. National Roofing Contractors Association (NRCA):

1. NRCA ML104 -- The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.

2. NRCA (RMG) -- Roofing Materials Guide; Volume 16, February 1990.

a. NRCA (RMG) Section 2 -- Roof Membrane Warranties and Guarantees.

G. Underwriters Laboratories Inc. (UL).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of associated flashings and counterflashings installed by other sections.

B. Pre-installation Meeting: At least one week prior to starting the work of this section, a pre-roofing meeting shall be arranged by the Contractor and attended by the material manufacturers' technical representatives, Roofing Contractor, Contractor, Architect and Owner's representative, to discuss specific expectations and responsibilities, Owner occupancy and maintenance of Owner's operations, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.

1. Review preparation and installation procedures and coordinating and scheduling required with related work.

2. Plan and coordinate the installation of the roofing system with other trades in such a manner as to avoid membrane damage, keeping the complete installation weather-tight and in accordance with all approved details and warranty requirements.

3. Review methods and procedures related to roofing installation, including

manufacturer's written instructions.

4. Review and finalize construction schedule and verify availability of materials, roofing contractor's personnel, equipment, and facilities needed to make progress and avoid delays.
5. Review methods and procedures for removal of existing roofing and examination of deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
6. Review structural loading limitations of roof deck during and after roofing.
7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
8. Review governing regulations and requirements for insurance and certificates, if applicable.
9. Review temporary protection requirements for roofing system during and after installation.
10. Review roof observation and repair procedures after roofing installation.

1.05 DESIGN & PERFORMANCE REQUIREMENTS

A. General: Installed roofing system shall withstand specified uplift pressures, thermally-induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane manufacturer based on testing and field experience.

C. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspection agency to resist uplift pressure calculated according to the requirements of the governing building code and ASCE 7.

1. Wind Load Design Criteria:

a. Building Risk Category (FBC-B TABLE 1604.5 and ASCE 7 Table 1-1): Risk Category II.

b. Basic Wind Speed (FBC-B SECTION 1609.3):

(1) Ultimate Design Wind Speed (V*ult*), as indicated on FBC-B SECTION 1620 (based on Risk Category II): 175 MPH.

c. Wind Exposure Category (FBC-B SECTION 1609.4.3): C, unless otherwise noted.

d. Roof Height: As indicated on drawings.

e. Building Width: As indicated on drawings.

f. Roof Slope: As indicated on drawings.

g. Deck Type: Plywood.

D. Maximum Design Pressure (MDP) Rating (per Product Approval): Provide roofing system that is identical to systems that have been successfully tested and approved, with MDP rating equal to or greater than pressures indicated on the drawings.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit manufacturer’s printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used.

1. Include current Product Approval(s) for proposed roofing system(s); identify applicable Deck Type(s) and System Type(s), specific product selections and optional components, and Design Pressure Rating(s).

2. Include manufacturer’s installation instructions, including but not limited to membrane seaming precautions and perimeter conditions requiring special attention.

3. Include complete list of accessories or materials not manufactured or expressly authorized for use in manufacturer's literature, with written approval from manufacturer confirming that such accessories or materials are acceptable and compatible with the proposed roofing system.

C. Shop Drawings: Submit large scale shop drawings for installation of all parts of the work of this section and related requirements.

1. Include dimensioned roof plans indicating all roofing-related detail references,

a. Indicate orientation of roof deck, orientation of membrane roofing.

2. Include details indicating seams, connections and accessory items; layout of tapered insulation, including slopes; flashing methods; joint or termination detail conditions; and conditions of interface with work of other trades and existing work to remain.

D. Manufacturer's Certificate: Provide manufacturer’s certification stating that materials and systems comply with specifications and applicable requirements of the governing building code.

E. Warranties:

1. Submit sample Material and System Warranties, for approval.

2. After approval of samples, submit manufacturer's Material and System Warranties,

and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with NRCA ML104, manufacturer's instructions, and product approval requirements.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 15 years of documented experience.

C. Installer (Roofing Contractor) Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1. Roofing Contractor shall be an “Authorized Applicator”, authorized and approved by the membrane manufacturer to install the specified roofing system.

2. Roofing contractor and key supervisory personnel shall have received sufficient training by manufacturer.

3. Roofing Contractor’s key supervisory personnel shall have not less than three years experience in the installation of like products, and shall be present at all times during roofing installation.

D. UL Listing: Provide roof system that has been tested and listed by UL as Class A for roof deck, slope and application indicated.

E. Wind Uplift: Provide complete roofing system, including all materials in conformance with Florida Product Approval, and designed to comply with the applicable requirements of the governing building code.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture; ballast materials may be stored outdoors.

C. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane when environmental conditions are outside the ranges recommended by manufacturer.

B. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.09 WARRANTY

A. Contractor’s Warranty: Correct defective Work within a five year period after Date of Substantial Completion.

B. Manufacturer’s Warranty:

1. Coverage: If a leak develops due to a manufacturing defect or due to installation

workmanship of the installing contractor, roofing manufacturer will provide Owner with labor and material necessary to return the system to a watertight condition.

2. Exclusions from Coverage: Exclusions to roofing systems warranty/guarantee coverage are limited to the following:

   a. The following "Specifically Enumerated Exclusions from Coverage", as documented in NRCA (RMG) Section 2, are permitted:

      (1) Exclusion 1: Natural disasters and acts of God (lightning, tornados, earthquakes).

      (2) Exclusion 2: Hail.

      (3) Exclusion 3: Acts of negligence, abuse or misuse, accidents, vandalism, civil disobedience, war.

      (4) Exclusion 6: Repairs or alterations of roof or installation of structures, fixtures, or utilities on or through roof without prior approval of manufacturer.

      (5) Exclusion 9: Traffic or storage of materials on roof.

      (6) Exclusion 15: Repairs performed on materials furnished by others in correcting leaks unless specifically authorized and approved by manufacturer; unauthorized repairs; roof maintenance for corrections other than leaks.

      (7) Exclusion 16: Fire.

      (8) Exclusion 18: Contaminants that have not first been approved or accepted by manufacturer; exposure to or contact with damaging substances on deteriorating substances or agents.

      (9) Exclusion 22: Infiltration or condensation of moisture in or through underlying area; vapor condensation beneath the roof.

      (10) Exclusion 24: Acts of parties other than manufacturer or authorized roofing contractor.

      (11) Exclusion 25: Penetration of the roof membrane by vegetation.

   b. The following "Specific Conditions to Make the Warranty Ineffective or Null and Void", as documented in NRCA (RMG) Section 2, are permitted:

      (1) Condition B: Repairs, alterations, and additions without prior approval of manufacturer.

      (2) Condition C: Failure of owner to pay all bills for roof installation and materials.

      (3) Condition F: Failure to use reasonable care in maintenance; failure to follow manufacturer's maintenance instructions.

      (4) Condition G: Failure to comply with terms and conditions of warranty.

(5) Condition H: Failure to notify manufacturer within prescribed time of discovery of defect and/or leak.

(6) Condition I: Owner's unwillingness to accept manufacturer's warranty in lieu of all other remedies and to return signed copy to manufacturer; owner's failure to execute the warranty.

(7) Condition J: Change in building usage or a significant change in use of building affecting roof membrane.

(8) Condition K: Assignment of warranty without written approval of manufacturer.

(9) Condition L: Lack of validation by manufacturer.

(10) Condition M: Failure of owner to make repairs to leaks not covered by manufacturer's warranty.

(11) Condition N: Repair work by any contractor other than approved contractor or use of unapproved material.

(12) Condition O: Building is used in any manner or for any purpose other than the purpose for which is was intended.

(13) Condition P: Roof is used as promenade or work deck.

(14) Condition Q: Roof is flooded.

(15) Condition R: Membrane or materials supplied by manufacturer are not applied according to manufacturer's specifications or instructions.

(16) Condition S: Failure to repair damaged roof within specified time period by approved applicator.

3. Monetary Limitations: No Dollar Limit (NDL).

4. Warranty Duration: 20 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Membrane Materials:

1. Polyglass USA, Inc.: www.polyglass.com.

B. Insulation:

1. Polyisocyanurate Foam Insulation:

a. Atlas Roofing Corp.: www.atlasroofing.com

b. Hunter Panels, LLC: www.hunterpanels.com.

c. Polyglass USA, Inc.: www.polyglass.com.

2. Gypsum Insulation Board:

a. Georgia-Pacific Gypsum LLC: www.buildgp.com.

C. Fasteners:

1. OMG, Inc.: www.omgroofing.com.
2. Polyglass USA, Inc.: www.polyglass.com.
3. SFS Intec, Inc.: www.sfsintecusa.com.

2.02 ROOFING SYSTEMS

A. Low-Slope Roof System:

1. Description (Basis of Design): “Polyglass Self-Adhered Roof System over Wood Decks”, conforming to Miami-Dade Product Approval NOA No. 13-1217.01 System Type C(2).
2. Insulation: Polyisocyanurate board.
3. Cover Board: Gypsum board.
4. Modified Bituminous Roofing: Two-ply membrane, with insulation and cover board.
5. Surfacing: N/A.

B. Steep Slope Roof System (Tile Underlayment):

1. Description (Basis of Design): “Polyglass Polystick Underlayment”, conforming to Miami-Dade Product Approval NOA No. 15-0410.04 System Type E(1).
2. Modified Bituminous Roofing: Two-ply membrane, including ASTM D226 Type II base sheet and ASTM D1970/D1970M underlayment membrane.
3. Surfacing: Concrete roof tiles; refer to Section 073216 - Concrete Roof Tiles.

2.03 MEMBRANE AND SHEET MATERIALS

A. Low-Slope Roof System:

1. Base Sheet: ASTM D6163/D6163M Type I; self-adhered, fire-rated, fiberglass-reinforced, SBS-modified bitumen membrane with a self-adhering back face and a smooth top face.
    a. Product (Basis of Design): "Elastoflex SA V FR", manufactured by Polyglass.
2. Membrane: ASTM D6222/D6222M Type I; self-adhered, fire-rated, polyester-reinforced, APP-modified bitumen membrane with a self-adhering back face and a granule top face.
    a. Product (Basis of Design): "Polyflex SA P FR", manufactured by Polyglass.
3. Flexible Flashing Material: Same material as membrane.

B. Steep Slope Roof System (Tile Underlayment):

1. Base Sheet: ASTM D226/D226M, Type II, No. 30 asphalt-saturated organic felt underlayment.
2. Underlayment Membrane: ASTM D1970/D1970M, self-adhering, glass-

fiber/polyester reinforced, waterproofing membrane designed for use as a roof tile underlayment.

a. Product (Basis of Design): "Polystick TU Plus", manufactured by Polyglass.

2.04 INSULATION

A. Top Insulation Layer (Cover Board): Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch (6 mm) thick.

1. Product (Basis of Design): "DensDeck", manufactured by Georgia-Pacific.

B. Base Insulation Layer (Polyisocyanurate Board): Rigid cellular foam, complying with ASTM C1289, Type II, Class 1 (cellulose felt or glass fiber mat both faces), Grade 2 (20 psi), and with the following characteristics:

1. Board Size: 48 x 48 inch (1220 x 1220 mm).

2. Board Thickness: 1.5 inch (37.5 mm), unless otherwise noted.

3. Board Edges: Square.

4. Product (Basis of Design): "Polytherm", manufactured by Polyglass..

2.05 ACCESSORIES

A. Cant Strips: Wood, pressure preservative treated; as specified in Section 061000 - Rough Carpentry.

B. Underlayment Base Sheet Fasteners: Nails and tin caps complying with requirements of governing building code including but not limited to FBC-B SECTION 1517.5 and FBC-TP TAS-114, and with requirements of Product Approval.

1. Fastening shall comply with FBC-B SECTIONS 1518.2 and 1518.4.

C. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.

1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.

2. Product: “#14 Roofgrip” fastener with “Flat Bottom Metal Plate” manufactured by OMG, or equal listed in the roofing system product approval.

D. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.

E. Sealants: As recommended by membrane manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections,

properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 WOOD DECK PREPARATION

A. Verify flatness and tightness of joints of wood decking. Fill knot holes with latex filler.

B. Seal joints of plywood with tape.

C. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.03 INSULATION INSTALLATION

A. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

B. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

C. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches (450 mm).

D. Do not apply more insulation than can be covered with membrane in same day.

E. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and FM requirements.

1. Use fastener type and fastening pattern as required to comply applicable Wind Uplift criteria.

3.04 MEMBRANE APPLICATION

A. Apply membrane in accordance with manufacturer's instructions.

B. Apply membrane; lap and seal edges and ends permanently waterproof.

C. Apply smooth, free from air pockets, wrinkles, fish-mouths, or tears. Ensure full bond of membrane to substrate.

D. At end of day's operation, install waterproof cut-off. Remove cut-off before resuming roofing.

E. At intersections with vertical surfaces:

1. Extend membrane over cant strips and up a minimum of 8 inches (200 mm) onto vertical surfaces.

2. Apply flexible flashing over membrane.

F. At roof edge drip flashing, extend membrane and base sheet under flashing and to the outside face of the wall.

G. Around roof penetrations, mop in and seal flanges and flashings with flexible flashing.

H. Coordinate installation of roof drains and related flashings.

3.05 CLEANING

A. Remove bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

3.06 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Sealants for joints within sheet metal fabrications.

C. Reglets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood nailers for sheet metal work.

B. Section 073216 - Concrete Roof Tiles: Non-metallic flashings associated with concrete roofing tiles.

C. Section 075200 - Modified Bituminous Membrane Roofing.

D. Section 079200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM B32 -- Standard Specification for Solder Metal; 2008 (Reapproved 2014).

2. ASTM B370 -- Standard Specification for Copper Sheet and Strip for Building Construction; 2012.

3. ASTM C920 -- Standard Specification for Elastomeric Joint Sealants; 2014.

4. ASTM D2178/D2178M -- Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2013a.

5. ASTM D4586/D4586M -- Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).

C. Copper Development Association, Inc. (CDA):

1. CDA A4050 -- Copper in Architecture - Handbook; current edition.

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

    a. FBC-TP RAS-111 -- Standard Requirements for Attachment of Perimeter Woodblocking and Metal Flashing.

E. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):

1. SMACNA (ASMM) -- Architectural Sheet Metal Manual; 2012.

I. Single Ply Roofing Industry (SPRI):

1. SPRI ES-1 -- Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2003 (ANSI/SPRI ES-1).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work of this section with installation of associated roofing systems, membrane flashings and related work specified in related sections.

B. Pre-installation Meeting: At least one week prior to starting the work of this section, a pre-roofing meeting shall be arranged by the Contractor and attended by the material manufacturers' technical representatives, Roofing Contractor, Contractor, Architect and Owner's representative, to discuss specific expectations and responsibilities, Owner occupancy and maintenance of Owner's operations, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.

1. Review preparation and installation procedures and coordinating and scheduling required with related work.

2. Plan and coordinate the installation of the roofing system with other trades in such a manner as to avoid membrane damage, keeping the complete installation weather-tight and in accordance with all approved details and warranty requirements.

3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

4. Review and finalize construction schedule and verify availability of materials, roofing contractor's personnel, equipment, and facilities needed to make progress and avoid delays.

5. Review methods and procedures for removal of existing roofing and examination of deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

6. Review structural loading limitations of roof deck during and after roofing.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, and condition of other construction that will affect roofing system.

8. Review governing regulations and requirements for insurance and certificates, if applicable.

9. Review temporary protection requirements for roofing system during and after installation.

10. Review roof observation and repair procedures after roofing installation.

1.05 DESIGN & PERFORMANCE REQUIREMENTS

A. General: Installed sheet metal roof flashing systems shall withstand specified uplift pressures, thermally-induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Material Compatibility: Provide sheet metal flashing and trim materials that are compatible with one another and with related roofing system materials under conditions of service and application required.

C. Wind Load Design Criteria: Provide sheet metal roof flashing systems that will resist wind load pressure calculated according to the requirements of the governing building code and ASCE 7, including but not limited to code requirements for High Velocity Hurricane Zone (HVHZ) - as follows:

1. Building Risk Category (FBC-B TABLE 1604.5 and ASCE 7 Table 1-1): II.

2. Basic Wind Speed (Ultimate Design Wind Speed, 3-second gust (V*ult*): 175 mph (395 km/hr).

3. Wind Exposure Category (FBC-B SECTION 1620.3): C.

4. Enclosure Classification: Enclosed Building.

5. Roof Height: As indicated on drawings.

6. Building Width: As indicated on drawings.

7. Corner / Perimeter Zone: As indicated on drawings.

8. Minimum Parapet Height: As indicated on drawings.

D. Metal Edge Securement:

1. Metal edge securement assemblies shall be designed and installed for wind loads in accordance with FBC-B CHAPTER 16 and tested for resistance in accordance with ANSI/SPRI ES-1 or FBC-TP RAS-111, except the basic wind speed shall be determined from Wind Load Design Criteria as specified in this Section.

2. Wind Resistance Tests: The following minimum securement criteria apply to edging systems. Roof edge systems shall pass SPRI Test Method RE-1, RE-2 or RE-3, as appropriate for the application.

a. Membrane Attachment: Edge devices designed to act as membrane terminations shall pass SPRI Test Method RE-1 (attached to SPRI ES-1).

(1) The design of perimeter attachment, when terminating the roofing system, shall provide a minimum holding power of 100 pounds/foot, which force shall be measured in direction of 45 degrees back onto the roof as tested according to SPRI Test Method RE-1.

(2) Specifically for mechanically attached membrane roofing systems, the perimeter attachment loadings shall be calculated based on the force required to hold the roof system's perimeter sheet in place for the design

wind speed.

(3) The fastener spacing shall be adjusted and the edge detail shall have sufficient strength to meet and resist these loads.

b. Edge Flashing: Edge flashings and other edge devices for which the exposed vertical component area exceeds the exposed horizontal component area shall pass SPRI Test Method RE-2 (attached to SPRI ES-1).

(1) The vertical face of edge flashing shall be tested according to SPRI Test Method RE-2.

(2) Test results shall meet or exceed horizontal and vertical design wind pressures as calculated according to SPRI Test Method RE-2.

3. Fasteners/Anchors: Fasteners/anchors which have published withdrawal resistance values generated from laboratory testing, shall have a margin of safety applied to average laboratory test results as noted in Table 1 of FBC-TP RAS-111.

1.06 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Submit complete shop drawings for all roof flashing assemblies.

1. Indicate material, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

2. Indicate profile and configuration, thickness of metal, dimensions, anchor details, fastening methods, terminations, and installation details.

3. Indicate related work of other trades, including but not limited to cast-in-place concrete, concrete masonry, roofing, and roof penetrating components (e.g., pipe, conduit).

C. Engineering Calculations: Submit engineering calculations showing that sheet metal roof flashing assemblies meet or exceed specified performance criteria and applicable requirements of the governing building code.

1. Coordinate engineering calculations with shop drawings.

2. Engineering calculations shall be prepared by a qualified Delegated Engineer.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Delegated Engineer Qualifications: Florida-registered engineer, proficient in design of types of work specified in this section.

C. Fabricator Qualifications: Company specializing in sheet metal work with ten years of

documented experience.

1. Shall be approved Roofing Contractor; for additional qualification requirements, refer to Section 075200 - Modified Bituminous Membrane Roofing.

D. Installer (Roofing Contractor) Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1. Roofing Contractor shall be an "Authorized Applicator", authorized and approved by the membrane manufacturer to install the specified roofing system.

2. Roofing contractor and key supervisory personnel shall have received sufficient training by manufacturer.

3. Roofing Contractor's key supervisory personnel shall have not less than three years experience in the installation of like products, and shall be present at all times during roofing installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. General:

1. Hook Strip/Continuous Cleat Thickness Requirements for Edge Metal and Copings Face Dimensions: Shall comply with requirements specified in FBC-TP RAS-111, including but not limited to Section 4.4.

a. Hook strip shall be one thickness greater than that of the metal profile material, as commercially available

B. Copper: ASTM B370, cold rolled; natural finish.

C. Stainless Steel: ASTM A240/A240M Type 304, or ASTM A666 Type 304.

1. Finish: No. 2D (dull, cold rolled).

2.02 ACCESSORIES

A. Fasteners: Stainless steel, with soft neoprene washers.

B. Underlayment: ASTM D2178/D2178M, glass fiber roofing felt.

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Zinc molybdate alkyd.

E. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

F. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and

recommended by manufacturer for substrates to be sealed; clear.

G. Plastic Cement: ASTM D4586/D4586M, Type I.

H. Reglets: Surface mounted type, stainless steel; face and ends covered with plastic tape.

I. Solder: ASTM B32; Sn50 (50/50) type.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

1. Metal thickness shall conform to requirements of FBC-B SECTION 1517.6 and FBC-TP RAS-111.

B. Fabricate cleats of same sheet metal material as flashing, unless otherwise noted.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

E. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

F. Tin edges of copper sheet to be soldered. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.

G. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

I. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing. Return and brake edges.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.03 INSTALLATION

A. Conform to drawing details shown on drawings, unless otherwise noted or approved by Architect.

B. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.04 FIELD QUALITY CONTROL

A. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Joint sealants, backings, bond breakers, and other related materials.

B. Pre-formed seals.

1.02 RELATED SECTIONS

A. Section 075200 - Modified Bituminous Membrane Roofing

B. Section 076200 - Sheet Metal Flashing and Trim.

C. Section 092116 - Gypsum Board Assemblies: Acoustic sealant.

D. Section 099000 - Painting and Coating: Surface preparation and field-application of paints and coatings.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C510 -- Standard Test Method for Staining and Color Change of Single- or Multi-component Joint Sealants; 2005a (2011).

2. ASTM C661 -- Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (R2011).

3. ASTM C719 -- Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle); 2013.

4. ASTM C794 -- Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2001.

5. ASTM C919 -- Standard Practice for Use of Sealants in Acoustical Applications; 2012.

6. ASTM C920 -- Standard Specification for Elastomeric Joint Sealants; 2005.

7. ASTM C962 -- (refer to ASTM C1193).

8. ASTM C1087 -- Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (R2011).

9. ASTM C1135 -- Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2000 (2011).
10. ASTM C1193 -- Standard Guide for Use of Joint Sealants; 2013.
11. ASTM C1248 -- Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (R2012).
12. ASTM D412 -- Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 1998a (2002)e1.
13. ASTM D1056 -- Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber; 2014.
14. ASTM D2203 -- Standard Test Method for Staining from Sealants; 2001 (2011).
15. ASTM D2240 -- Standard Test Method for Rubber Property Durometer Hardness; 2003.

C. Tile Council of North America (TCNA):

1. TCNA (HB) -- Handbook for Ceramic Tile Installation; current edition.

D. Federal Specifications and Standards, U.S. General Services Administration (FS):

1. FS TT-S-00227 - Sealing Compound: Elastomeric Type, Multi-component.
2. FS TT-S-00230 - Sealing Compound: Elastomeric Type, Single Component.
3. FS TT-S-001543 - Sealing Compound: Silicone Rubber Base.
4. FS TT-S-001657 - Sealing Compound: Single Component, Butyl Rubber Based, and Solvent Release Type.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Manufacturer’s Project Review Services Report: Prior to product selection, all adhesive and sealant applications must be reviewed by manufacturer’s technical service staff.

1. Review all joint details for compliance with manufacturer's recommended design principles. Provide suggestions or changes and/or identify limitations of the designs.
2. Test Reports:
    a. Submit results of Laboratory Pre-Construction Testing.
    b. Submit results of Field Pre-Construction Testing.
    c. Submit manufacturer's recommendations for joint preparation, priming, and joint accessory materials based on test results.

d. Submit manufacturer's recommended installation procedure modifications resulting from field adhesion tests.

C. Product Data:

1. Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

3. Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, color availability, and primer data.

4. Provide a copy of the Material Safety Data Sheet for each solvent, primer or sealant material.

D. Shop Drawings: Submit shop drawings including details to show installation and interface between sealants and adjacent work.

1. Include details showing proper joint sealer and backing at the following locations:

a. Exterior perimeter joint sealant and backer at fenestration elements (e.g., storefronts, windows, door frames, fixed wall louvers).

b. Exterior joint sealant and backer at exterior expansion and control joints in walls, ceilings and soffits.

c. Exterior joint sealant at metal-to-metal joints and metal-to-glass joints in exterior storefronts.

Note: Only applicable if water infiltration testing indicates leakage.

2. Details for each applicable joint condition shall be developed by qualified sealant manufacturer’s representative, and shall be based on field-verified conditions and results of Laboratory Pre-Construction Testing and Field Pre-Construction Testing.

E. Samples:

1. Submit color charts for each sealant type for initial selection.

2. Submit standard cured color samples for each sealant type illustrating selected colors.

F. Manufacturer's Installation Instructions: Submit manufacturer's published installation procedures.

1. Indicate special procedures, surface preparation, perimeter conditions requiring special attention, and warranty requirements.

2. Include instructions for completing sealant intersections when different materials are joined.

G. Manufacturer's Certificate:

1. Certify products are suitable for intended use and products meet or exceed specified requirements.

2. Certify applicator is approved by manufacturer.

1.05 QUALITY ASSURANCE

A. Provide single source responsibility for each type of joint materials.

B. Materials shall be compatible with one another, with joint substrate, and other adjacent materials including finishes.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.

D. Applicator Qualifications:

1. Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.

2. Designate one individual as project foreman who shall be on site at all times during installation.

E. Laboratory Pre-Construction Testing: Test sealants, joint accessories, and joint substrates in accordance with the following, before starting work of this section:

1. Obtain samples of joint substrate products specified in other sections.

2. Adhesion: ASTM C794 and ASTM C719; determine surface preparation and required primer.

3. Compatibility: ASTM C1087; determine materials forming joints and adjacent materials do not adversely affect sealant materials and do not affect sealant color.

4. Staining: ASTM D2203, ASTM C510, or ASTM C1248; determine sealants will not stain joint substrates.

F. Field Pre-Construction Testing:

1. Test each elastomeric sealant and joint substrate in accordance with the following, before beginning work of this section:

a. Install sealants in field samples or mockups using joint preparation methods determined by laboratory pre-construction testing.

2. Install field test joints in inconspicuous location as approved by Architect.

3. Test Method: Manufacturer's standard field adhesion test to verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.

4. When test indicates sealant adhesion failure, modify joint preparation, primer, or both and retest until joint passes sealant adhesion test.

G. Perform work in accordance with ASTM C1193 and manufacturer's installation instructions.

H. Joint Tolerance: Provide joint tolerances in accordance with manufacturer's printed instructions.

I. Manufacturers' Field Services: Material or product suppliers or manufacturers shall provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship,, and to initiate instructions when necessary.

1. Manufacturer's Field Reports: Report observations and site decisions or instructions provided to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

a. Indicate date and time present at project site.

b. Include observations; indicate compliance with manufacturer's installation instructions, and supplemental instructions provided to applicators or installers.

1.06 WARRANTY

A. Correct defective work within a five year period after Date of Substantial Completion.

B. Include coverage for installed sealants and accessories which fail to achieve airtight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.01 GENERAL

A. Manufacturer's Recommendations: Only products recommended by the manufacturer for the specific application indicated shall be so used.

B. Single Source Responsibility: All joint sealer materials for a specific application shall be obtained from a single manufacturer.

C. Compatibility: Joint sealers, backings, bond breakers, fillers, and other related materials shall be provided which are compatible with one another and with joint substrates under the indicated conditions of service and application, as demonstrated by manufacturer's testing and field experience.

D. Colors: Colors of exposed joint sealers shall be as selected by the Architect from manufacturer's complete range of colors.

2.02 MANUFACTURERS

A. Sealants:

1. BASF Construction Chemicals - Building Systems: www.buildingsystems.basf.com.

2. Dow Corning Corp.: www.dowcorningcom.

3. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.

4. Pecora Corporation: www.pecora.com.

5. Tremco Global Sealants: www.tremcosealants.com.

B. Preformed Seals:

1. Compression Seals:

a. Emseal Corp.

b. Illbruck Sealant Systems.

c. Nystrom, Inc: www.nystrom.com.

d. Sandell Manufacturing Co., Inc.

2. Hollow-Neoprene Gaskets:

a. Acme Highway Products Corp.

b. Watson Bowman Associates, Inc.

2.03 JOINT SEALANTS

A. Sealant Type S-1: One-part, ultra low-modulus, high-performance, neutral-cure, silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use T, NT, M, G, A, and O.

1. Applications: New and remedial construction joint sealing including expansion and control joints, precast concrete panel joints, curtain wall joints, mullion joints, etc.

a. Durable, flexible, watertight bond with many common building materials, including combinations of concrete, aluminum, painted substrates, and glass.

2. Physical and Performance Requirements:

a. Durometer Hardness, Shore A (ASTM C661): 15.

b. Tensile Strength (ASTM D412): 100 psi (0.070 kg/mm2), maximum.

c. Peel Strength (ASTM C794): 25 lb/in (4.46 kg/cm).

d. Tensile Strength (ASTM C1135):

(1) at 25-percent extension: 15 psi (0.010 kg/mm2).

(2) at 50-percent extension: 20 psi (1.015 kg/mm2).

e. Joint Movement Capabilities, Extension/Compression (ASTM C719): +100/-50 percent.

f. Staining (ASTM C1248): None.

3. Product: “Dow 790” by Dow, or equal.

a. Color: To be selected by Architect.

B. Sealant Type S-2: One-part, low-modulus, high-performance, neutral-cure, non-staining, low dirt pick-up, silicone joint sealant, designed for sealing sensitive porous substrates; ASTM C920 Type S, Grade NS, Class 50, Uses NT, M, G, A and O.

1. Formulation shall be specifically designed to reduce residue rundown, dirt pickup, and substrate staining.

2. Physical and Performance Requirements:

a. Matte finish.

b. Hardness (ASTM C661): 15 (+/-3).

c. Movement Capability (ASTM C719): +/-50 percent.

c. Low polar attraction to dirt.

3. Product: "Spectrem 3" by Tremco, or equal.

C. Sealant Type S-3: Multi-component, low-modulus, neutral-cure, non-staining, low dirt pick-up, silicone joint sealant, designed for sealing moving joints; ASTM C920 Type M, Grade NS, Class 50, Uses NT, M, G, A and O.

1. Formulation shall be specifically designed to reduce residue rundown, dirt pickup, and substrate staining.

2. Physical and Performance Requirements:

a. Hardness (ASTM C661): 15 (+/-3).

b. Movement Capability (ASTM C719): +/-50 percent.

3. Product: "Spectrem 4-TS" by Tremco, or equal

D. Sealant Type S-4: One-part, acetoxy silicone sealant with fungicide; ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A and O; mildew resistant.

1. Shall be recommended by manufacturer for use in bathrooms and similar applications where joints need protection against fungi and bacteria.

2. Color: White (with integral fungicide).

3. Product: "Tremsil 200" by Tremco, or equal.

E. Sealant Type S-5: One-part, mildew-resistant, silicone sealant; ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, Use O; formulated with fungicide for sealing joints with non-porous substrates around ceramic tile, showers, sinks and plumbing fixtures.

1. Hardness, Shore A (ASTM C661): 25-30.

2. Product: "Dow Corning 786" by Dow Corning, or equal.

F. Sealant Type S-6: One-part, non-acid-curing, silicone sealant; ASTM C920; Type S; Grade NS; Class 25; and complying with the following requirements for Uses NT, M, G, A, and, as applicable to joint substrates indicated, Use O.

1. Modulus and additional joint movement capabilities as follows:

a. Sealant Type S-6L (Low Modulus): Tensile strength of 45 PSI or less at 100 percent elongation when tested after 14 days at 77 degrees F and 50 percent relative humidity per ASTM D412.

b. Sealant Type S-6M (Medium Modulus): Tensile strength of not less than 45 nor more than 75 PSI or less at 100 percent elongation when tested after 14 days at 77 degrees F and 50 percent relative humidity per ASTM D412.

c. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, withstand 50 percent increase and decrease of joint width as measured at time of application and remain in compliance with other requirements of ASTM C920.

2. Products:

a. Sealant Type S-2L (Low Modulus): "Dow Corning 790" by Dow Corning, or equal.

b. Sealant Type S-2M (Medium Modulus): "Dow Corning 795" by Dow Corning, or equal.

G. Sealant Type S-7: One-part, acid-curing, silicone sealant; ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to joint substrates indicated, Use O.

1. Product: "Dow Corning 999" by Dow Corning, or equal.

H. Sealant Type S-8: Two-part, non-acid curing, silicone sealant for Use T; ASTM C920; Type M; Grade NS; Class 25; Uses T, M, and, as applicable to joint substrates indicated, Use O; and complying with the following requirement for additional joint movement capability:

1. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand an increase and decrease of 50 percent of joint width as measured at time of application and remain in compliance with other requirements of ASTM C920.

2. Product: "Dow Parking Sealant FC" by Dow Corning, or equal.

I. Sealant Type S-9: Premium, very-low-modulus, high-movement, non-sag, fast-curing, ready-to-use, solvent-free, silyl-terminated polyether polymer (STPe) sealant.

1. Compliance Requirements:

a. ASTM C 920, Type S, Grade NS, Class 50, Use NT, M, A, G and O.

b. FS TT-S-001543A, Type II, Class A, Type Nonsag.

c. FS TT-S-00230C, Type II, Class A.

d. COE CRD-C-541, Type II, Class A.

2. Physical and Performance Requirements:

a. Movement Capability (ASTM C719): +/-50 percent.

b. Extension (ASTM C1382): 100 percent.

c. 100% Modulus (ASTM D412): 35 psi (0.24 MPa).

d. Tensile Strength (ASTM D412): 220 psi (1.5 MPa).

e. Tear Strength (ASTM D1004): 40 lb/in (7.1 kg/cm).

f. Ultimate Elongation at Break (ASTM D412): 1,200 percent.

g. Sag in Vertical Displacement (ASTM C639): No sag.

i. Hardness, Shore A (ASTM C661): 17.

j. Stain and Color Change (ASTM C510): Pass (no visible stain).

k. Bond Durability (ASTM C719): Pass (on glass, aluminum, concrete; +/-50 percent).

l. Adhesion, in peel (ASTM C794):

(1) Aluminum: 35 pli (6.2 kg/cm).

(2) Glass: 33 pli (5.8 kg/cm).

(3) Concrete: 36 pli (6.4 kg/cm).

3. Product: "Sonolastic 150 VLM" by BASF, or equal.

J. Sealant Type U-1: One-part, low-modulus, moisture cure, polyurethane hybrid sealant; paintable.

1. Compliance Requirements:

a. ASTM C920, Type S, Grade NS, Class 35, Use NT, M, A and O.

b. FS TT-S-00230C, Class A, Type II.

2. Physical and Performance Requirements:

a. Movement Capability (ASTM C719): +/-35 percent.

b. Hardness, Shore A (ASTM C661): 25(+/-3).

c. Stain and Color Change (ASTM C510): Pass (no visible stain).

d. Adhesion, in peel (ASTM C794):

(1) Aluminum: 20-25 pli (89-112 N).

(2) Concrete: 18-22 pli (80-98 N).

3. Product: "Dymonic FC" by Tremco, or equal

K. Sealant Type U-2: One-part, high-performance, medium-modulus, low-VOC, UV stable, non-sag polyurethane sealant; paintable; ASTM C920 Type S, Grade NS, Class 50, Use NT, T, M, A, O, I.

1. Physical and Performance Requirements:

a. Hardness (ASTM C661): 40 (+/-5).

b. Movement Capability (ASTM C719): +100 percent / -50 percent.

2. Product: "Dymonic 100" by Tremco, or equal.

L. Sealant Type U-3: Multi-part, non-sag, urethane sealant; ASTM C920, Type M, Grade NS, Class 25, Uses NT, M, G, A, and, as applicable to joint substrates indicated, Use O.

1. Product: "Dynatrol II" by Pecora, or equal.

M. Sealant Type U-4: Two-part, non-sag, urethane sealant for Use T; ASTM C920; Type

M, Grade NS: Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, Use O.

1. Product: “Dynatred” by Pecora, or equal.

N. Sealant Type U-5: One-part, non-sag, urethane sealant; ASTM C920; Type S; Grade NS; Class 25; Uses NT, M, A, and, as applicable to joint substrates indicated, Use O.

1. Product: “Dynatrol I” by Pecora, or equal.

O. Sealant Type U-6: One-part, non-sag, low-modulus, urethane sealant; ASTM C920; Type S; Grade NS; Class 25; Uses NT, M, A, and, as applicable to joint substrates indicated, Use; with additional capability to withstand an increase and decrease of 50 percent of joint width as measured at time of application and remain in compliance with other requirements of ASTM C920, based on manufacturer's recommendations and testing.

1. Product: “Vulkem 921” by Tremco, or equal.

P. Sealant Type U-7: One-part, pourable, urethane sealant; ASTM C920; Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, Use O.

1. Products:

a. “Vulkem 45” by Tremco.

b. “Urexpan NR-201” by Pecora.

Q. Sealant Type L-1: Highly elastic, latex sealant for sound-rated partition and ceiling systems; compatible with gypsum board, cementitious backer board, and metal stud framing system components.

1. Shall provide excellent adherence, permanent flexibility, and lasting seal.

2. Shall meet or exceed ASTM C919 and ASTM C834.

3. Product: “SHEETROCK® Acoustical Sealant” by USG, or equal; for additional requirements, refer to Section 092116 - Gypsum Board Assemblies.

R. Sealant Type L-2: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.

1. Applications: Use for:

a. Interior wall and ceiling control joints.

b. Joints between door and window frames and wall surfaces.

c. Other interior joints for which no other type of sealant is indicated.

2. Product: AC-20 + Silicone Acrylic Latex Caulking Compound by Pecora, or equal.

2.04 JOINT SEALANT BACKING

A. General:

1. Provide sealant backings of material and type which are:

a. Non-staining.

b. Compatible with joint substrates, sealants, primers and other joint fillers.

c. Approved by sealant manufacturer for applications indicated.

B. Backup strip shall be a flexible and compressible type of closed cell foam polyethylene, butyl rubber, rounded at surface to contact sealant, as recommended by sealant manufacturer.

1. Backup strip must fit neatly into the joint without compacting and to such a height to allow a sealant depth of 1/2 the width of the joint.

2. Sealant must not bond to the backup material.

C. Plastic Foam Joint-Fillers: Pre-formed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of either flexible, open cell polyurethane foam or non-gassing, closed-cell polyethylene foam, subject to sealant manufacturer's approval; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

D. Elastomeric Tubing Joint Fillers: Neoprene, butyl, silicone or EPDM tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to minus 26 degrees F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.

E. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer for preventing bond between sealant and joint filler or other materials at the back or third surface of the joint. Provide self-adhesive tape where applicable.

2.05 PREFORMED SEALS

A. Foam Seals: Manufacturer's standard preformed, pre-compressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellant agent; factory-produced in pre-compressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by the manufacturer. Provide products which are permanently elastic, mildew-resistant, non-migratory, non-staining, compatible with joint substrates and other joint sealers, and comply with the following requirements:

1. Impregnating Agent: Manufacturer's standard

2. Density: Manufacturer's standard

3. Backing: Pressure sensitive adhesive, factory applied to one side, with protective wrapping or coated on one face with release agent serving as bond breaker for primary joint sealant.

B. Compression Gasket: Manufacturer's standard preformed polychloroprene elastomeric joint seal of the open-cell compression type complying with ASTM D2628 and with requirements indicated for size, profile and cross-section design.

2.06 ACCESSORIES

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

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

B. Surface Cleaning of Joints: All joints shall be cleaned out immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. All foreign material shall be removed from joint substrates which could interfere with adhesion of joint sealer, including dust; paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer) oil; grease; waterproofing; water repellents; water, and surface dirt.

2. Concrete, masonry, cement plaster (stucco), and similar porous joint substrate surfaces shall be cleaned by brushing, grinding, blast cleaning, mechanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Loose particles remaining from the above cleaning operations shall be removed by vacuuming or blowing out joints with oil-free compressed air.

3. Laitance and form release agents shall be thoroughly removed from all concrete surfaces.

4. Metal, glass, and other nonporous surfaces shall be cleaned with chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

C. Joint Priming:

1. Clean and prime joints in accordance with manufacturer's instructions.

2. Joint substrates shall be primed where indicated or where recommended by joint sealer manufacturer. Primer shall be applied so as to comply with joint sealer manufacturer's recommendations. Primers shall be confined to areas of joint sealer bond. Spillage or migration onto adjoining surfaces shall not be allowed.

D. Protect elements surrounding the work of this section from damage or disfigurement.

1. Masking tape shall be used where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by

such contact or by cleaning methods required to remove sealant smears. Tape shall be removed immediately after tooling without disturbing joint seal.

3.03 INSTALLATION

A. General:

1. Unless otherwise indicated, comply with joint sealer manufacturers' printed installation instructions.

    a. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

2. Perform installation in accordance with ASTM C1193.

3. Perform acoustical sealant application work in accordance with ASTM C919.

4. 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.

5. Install bond breaker where joint backing is not used.

6. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

7. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint-fillers of the types indicated to provide support of sealants during application and at position necessary to product the required cross-sectional shapes and depths.

    a. Do not leave gaps between ends of joint-fillers.

    b. Do not stretch, twist, puncture or tear joint-fillers.

    c. Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints, where required to prevent third-side adhesion of sealant to back of joint.

3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint-fillers.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and

depths relative to joint widths which allow optimum sealant movement capability.

E. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by the sealant manufacturer.

   1. Concave joint configuration per Figure 6A in ASTM C962, unless otherwise indicated.

F. Preformed Seals:

   1. Install in accordance with manufacturer's written instructions.

   2. Pre-compressed Foam Seals:

      a. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.

      b. Prepare joints and install seals in accordance with manufacturer's written recommendations.

      c. Remove loose materials and foreign matter that could impair adhesion of sealant.

      d. Do not stretch pre-compressed seal; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.

   3. Compression Gaskets:

      a. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.

      b. Prepare joints and install seals in accordance with manufacturer's written recommendations.

      c. Remove loose materials and foreign matter that could impair adhesion of sealant.

      d. Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.

3.04 PROTECTION AND CLEANING

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers and reseal joints with new materials to produce installations with repaired areas indistinguishable from original work.

B. Clean off excess sealants or sealant smears adjacent to joints as Work progresses, by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.05 SEALANT SCHEDULE

A. Exterior Joints: Provide joint sealant products and assemblies conforming to recommendations included in the accepted Manufacturer's Project Review Services Report, and as follows:

1. Control and Expansion Joints in Paving: Sealant Type S-8.
2. Joints in Cement Plaster, and between Cement Plaster and Adjacent Work (e.g., concrete): Sealant Type U-1 or U-2.
3. Lap Joints in Exterior Sheet Metal Work: Sealant Type S-1.
4. Joints between Stucco and Tile: Sealant Type U-1 or U-2, per recommendations in Manufacturer's Project Review Services Report.
5. Perimeter Joints between Concrete/Stucco and Fenestration Frame Assembly (e.g., HM door frame; aluminum window; glazed aluminum curtain wall; aluminum storefront): Sealant Type S-2, U-1 or U-2, per recommendations in Manufacturer's Project Review Services Report.
6. Joints between Penetrating Elements (e.g., pipe, conduit) and Cement Plaster or Concrete: Sealant Type U-6.
7. Joints for Which No Other Sealant Type is Indicated: Sealant Type S-2, S-3, U-1 or U-2, per recommendations in Manufacturer's Project Review Services Report.

B. Interior Joints:

1. Joints between Metal Stud Track/Runner and Adjacent Construction, and between Outlet Boxes and Gypsum Board: Refer to Concealed Joints.
2. Joints between Plaster/Concrete and Plaster/Concrete: Sealant Type U-1 or U-2.
3. Joints between Plaster and Fenestration Frame Assembly (e.g., HM door frame; aluminum window; aluminum curtain wall; aluminum storefront): Sealant Type U-1 or U-2, per recommendations in Manufacturer's Project Review Services Report.
4. Perimeter Joints between Plaster and Fenestration Frame Assembly (e.g., HM door frame; aluminum window; aluminum curtain wall; aluminum storefront): Sealant Type L-2.
5. Perimeter Joints between Gypsum Board and Fenestration Frame Assembly (e.g., HM door frame; aluminum window; aluminum curtain wall; aluminum storefront): Sealant Type L-2.
6. Perimeter Joints between Tile and Fenestration Frame Assembly (e.g., HM door frame; aluminum window; aluminum curtain wall; aluminum storefront): Sealant Type S-4.
7. Perimeter Joints between Tile and Plumbing Fixtures: Sealant Type S-4.

8. Tile-to-Tile Movement Joints: Sealant Type S-4.

    a. For additional requirements, refer to Section 093000 - Tiling.

9. Joints for Which No Other Sealant Type is Indicated: Sealant Type L-2.

C. Concealed Joints:

1. Concealed Metal Lap Joints (e.g., concealed lap and hook joints in sheet metal flashing and trim): Sealant Type S-1, except where solder is used.

2. Concealed Bedding Joints (e.g., joints under thresholds and saddles at door openings; joints between sheet metal flashing and other materials): Sealant Type U-1.

3. Concealed Acoustical Joints at Interior Stud-Framed Partitions (e.g., joints between metal stud track/runner and adjacent construction; sealant joints between outlet boxes and gypsum board):

    a. Dry Areas: Sealant Type L-1 or L-2, per recommendations in Manufacturer's Project Review Services Report.

    b. Wet Areas (e.g., restrooms): Sealant Type S-4 or U-2, per recommendations in Manufacturer's Project Review Services Report.

END OF SECTION

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Hollow metal door and frame assemblies.

1.02 RELATED REQUIREMENTS

A. Section 062000 - Finish Carpentry: Wood trim and casing at interior side of exterior hollow metal door frame.

B. Section 076200 - Sheet Metal Flashing and Trim: Sheet metal flashing at head of exterior hollow metal door frame.

C. Section 087100 - Door Hardware.

D. Section 085200 - Wood Windows: New wood window installed as transom above exterior hollow metal door.

E. Section 099000 - Painting and Coating: Field painting.

F. Division 26 - Electrical: Provisions for electrical service to doors and door hardware.

G. Division 28 - Electronic Safety and Security: Provisions for access control equipment at doors.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American National Standards Institute (ANSI):

1. ANSI/ICC A117.1 -- Accessible and Usable Buildings and Facilities; 2009.

2. ANSI/SDI A250.3 -- Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

3. ANSI/SDI A250.4 -- American National Standard Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings; 2011.

4. ANSI/SDI A250.6 -- Hardware on Standard Steel Doors (Reinforcement - Application); 2003 (R2009).

5. ANSI/SDI A250.8 -- SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2014.

6. ANSI/SDI A250.10 -- Test Procedure and Acceptance Criteria for Prime Painted

Steel Surfaces for Steel Doors and Frames; 2011.

7. ANSI/SDI A250.11 -- Recommended Erection Instructions for Steel Frames; 2012.

C. American Society for Testing and Materials (ASTM):

1. ASTM A366/A366M -- Standard Specification for Commercial Steel (CS) Sheet, Carbon, (0.15 Maximum Percent) Cold-Rolled; 1997.

1. ASTM A591/A591M -- Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Applications; 1998.

2. ASTM A653/A653M -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

3. ASTM A1008/A1008M -- Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

4. ASTM A1011/A1011M -- Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

5. ASTM E90 -- Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

6. ASTM E330/E330M -- Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

7. ASTM E413 -- Classification for Rating Sound Insulation; 2010.

D. Builders Hardware Manufacturers Association (BHMA):

1. BHMA A156.115 -- American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

E. Door Hardware Institute (DHI):

1. DHI A115.1 -- Specifications for Preparation of 1-3/8" and 1-3/4" Standard Steel Doors and Steel Frames for Series 1000 Mortise Locks and Latches; 2014.

a. DHI A115.1G -- Installation Guide for Doors and Hardware.

F. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

3. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

a. FBC-TP TAS-201 -- Impact Test Procedures; Testing Application Standard; 1994.

b. FBC-TP TAS-202 -- Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard; 1994.

c. FBC-TP TAS-203 -- Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard; 1994.

G. Hollow Metal Manufacturers Association (HMMA): A division of NAAMM.

H. International Code Council, Inc. (ICC).

I. National Association of Architectural Metal Manufacturers (NAAMM):

1. NAAMM/HMMA 820 -- Hollow Metal Frames (including TN01 and TN02).

2. NAAMM/HMMA 830 -- Hardware Selection for Hollow Metal Doors and Frames; 2002.

3. NAAMM/HMMA 831 -- Hardware Locations for Hollow Metal Doors and Frames; 2011.

4. NAAMM/HMMA 840 -- Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

J. National Fire Protection Association (NFPA):

1. NFPA 80 -- Standard for Fire Doors and Other Opening Protectives; 2016.

2. NFPA 252 -- Standard Methods of Fire Tests of Door Assemblies; 2012.

K. Steel Door Institute (SDI):

1. SDI 111 -- Recommended Standard Details for Steel Doors & Frames; 2009.

2. SDI 122 -- Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

L. Underwriters Laboratories, Inc. (UL):

1. UL (DIR) -- Online Certifications Directory; current listings at database.ul.com.

2. UL 10C -- Standard for Positive Pressure Fire Tests of Door Assemblies; current edition, including all revisions.

1.04 DESIGN & PERFORMANCE REQUIREMENTS - EXTERIOR OPENINGS

A. Wind Load and Missile Impact Load Design and Performance Requirements (Exterior Door Assemblies):

1. General: Door assemblies shall comply with design criteria specified in the Contract Documents and applicable requirements of the governing building code, including but not limited to FBC-B CHAPTER 16.

2. Design Loads: Comply with requirements of governing building code, criteria indicated on the drawings, and as follows:

a. Door assemblies shall be of sufficient strength to support the estimated or actual imposed dead, live, wind, and any other loads, both during construction

and after completion of the structure, without exceeding the allowable materials stresses specified by the governing building code.

b. Wind Load Design Criteria:

(1) Design Wind Speed: Wind velocity (3-second gust) used in structural calculations (FBC-B SECTION 1620.2): 175 MPH.

(2) Building Risk Category (FBC-B TABLE 1604.5 and ASCE 7 Table 1-1): II, unless otherwise noted on drawings.

(3) Wind Exposure Category (FBC-B SECTION 1620.3): C, unless otherwise noted on drawings.

c. Maximum Design Load Rating (per Product Approval): As indicated on the drawings.

3. Preconstruction Load Tests: Door assemblies shall be tested for structural integrity in accordance with FBC-B SECTION 1710.5.

a. Door assemblies shall be tested in accordance with quality control test methods intended to confirm compliance with the large missile impact and wind load requirements specified in FBC-B CHAPTER 16 and FBC-TP TAS-201, TAS-202 and TAS-203.

b. Door assemblies shall be supplied with a permanent label, applied by the manufacturer, including information identifying the manufacturer, the product model/series number, positive and negative design pressure rating, product maximum size, impact-resistance rating, Florida or Miami-Dade product approval number, applicable test standard(s), and approved product certification agency, testing laboratory, evaluation entity or Miami-Dade product approval.

B. Fire-Resistance Performance Requirements (Fire-Rated Door Assemblies):

1. Where fire-rated door is indicated or required, provide fire-rated door assembly complying with applicable requirements of NFPA 80.

a. Door assembly shall be tested, listed and labeled by a nationally-recognized independent testing agency.

b. Label shall comply with requirements of NFPA 80, and shall be permanently affixed to the door or frame.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide manufacturer's standard details and technical data demonstrating compliance with specified requirements.

1. For each door assembly, include manufacturer's recommended installation instructions.

2. For each exterior door assembly, include copies of current Product Approval indicating compliance with Preconstruction Load Tests (e.g., design pressure ratings, large and small missile impact approval).

    a. Where Product Approval includes options (e.g., jamb anchor options, lock options), indicate each option selected.

C. Shop Drawings: Provide shop drawings showing all new steel doors and frames shown in the drawings.

1. Indicate the following:

    a. Door, frame, and hardware schedule, in accordance with SDI 111.

    b. Door frame types and profiles; materials and details of design and construction; hardware locations; and reinforcement type and locations.

    c. Interface with wall construction, including furring, framing, and interior wall finishes; anchorage and fastening methods; and methods of assembling sections, and finish requirements.

2. Exterior Door Assemblies: Indicate conformance with specified requirements, and coordinate with installation instructions indicated in the applicable door assembly Product Approval.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.06 QUALITY ASSURANCE

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

B. Manufacture products only after receipt of approved hardware schedule and templates.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver steel doors and frames cartoned or crated to provide protection during transit and job storage.

B. Inspect steel doors and frames upon delivery for damage. Remove and replace damaged items as directed.

C. Store in accordance with NAAMM HMMA 840

D. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Hager Companies: 139 Victor Street; Saint Louis, MO 63104; Tel. 314-772-4400.

B. Next Door Company: 1300 NW 74 Street; Miami, FL 33147; Tel. 305-619-1589.

C. Quality Engineered Products Company, Inc.: 4506 Quality Lane; Tampa, FL 33634; Tel. 813-885-1693.

D. Schlage Lock Company, LLC: 6810 Hillside Court; Indianapolis, IN 46250; Tel. 317-715-4073.

E. Steelcraft, a Brand of Allegion plc; 2015 | Block D, Iveagh Court, Harcourt Road; Dublin 2, Co. Dublin, Ireland; www.allegion.com.

2.02 MATERIALS

A. Steel Sheet for Doors and Frames:

1. Cold Rolled Steel: ASTM A366/A366M or ASTM A1008/A1008M, Designation CS.

B. Steel Sheet for Anchors and Accessories: Electrolytically deposited zinc coated steel; ASTM A591/A591M, coating 40Z(12G), minimum.

2.03 DOORS AND FRAMES

A. General:

1. Accessibility: Comply with applicable requirements of ANSI/ICC A117.1 and FBC-A.

2. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard and as follows:

a. Exterior Door Assemblies: In accordance with requirements of the applicable Product Approval.

3. Galvanizing: Steel door and frame components to be hot-dipped zinc -iron alloy-coated (galvannealed), ASTM A653, with A60/ZF180 coating (minimum).

4. Finishing: All door and frame components to be factory-primed with Shop-Applied Primer, ready for field finishing with Field-Applied Finish.

a. For field finishing requirements, refer to Section 099000 - Painting and Coating.

5. Fire-Rating: N/A.

6. STC Rating (calculated in accordance with ASTM E413, tested in accordance with ASTM E336 or ASTM E1408): 35, unless otherwise noted.

7. Insulating Value (U-factor):

a. Exterior Door Assemblies (FBC-EC TABLE C303.1.3(2)): Provide insulated construction with U-factor of 0.60 maximum, when tested in accordance with ASTM C1363.

8. Weatherstripping:

a. Exterior Door Assemblies: In accordance with Product Approval; see also, Section 087100 - Door Hardware.

9. Combined Requirements: If a particular door assembly is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type (e.g., an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior door assemblies and for sound-rated doors).

    a. Where two or more requirements conflict, comply with the most stringent.

B. Doors:

1. Exterior Door Assemblies:

    a. Grade: ANSI A250.8 Level 3 (extra heavy-duty), Model 2 (seamless design, fully welded); 16 gage (0.053 in./1.3 mm).

    b. Thickness: 1-3/4 inches (44 mm).

    c. Core Material: Manufacturers standard core material/construction and in compliance with requirements, including but not limited to Product Approval and Insulating Value (U-factor).

    d. Door Top Closures: Manufacturer's minimum 24 gage galvanized steel closure channel, flush with top of faces and edges.

        (1) Provide top closure at each door installed in exterior wall of building, and at each interior door subject to collection of water at the door top.

    e. Door Edge Profile: Manufacturers standard for application indicated.

    f. Door Panel Configuration: Embossed panels, as indicated on drawings.

    g. Finishing: Factory-primed with Shop-Applied Primer, ready for field finishing with Field-Applied Finish.

        (1) For field finishing requirements, refer to Section 099000 - Painting and Coating.

C. Frames:

1. Metal Thickness: 16 gage minimum, unless otherwise noted.

    a. Frames for Exterior Door Assemblies: Comply with the requirements of grade specified for corresponding door; 16 gage minimum.

2. Provide continuous full-profile welded unit type frames.

    a. Weld miter joints between head and jamb faces completely along their length either internally or externally.

    b. Internally weld perimeter profile joints full length of soffit and rabbets with hairline seams on external meeting surfaces.

    c. Grind and finish face joints smooth.

3. Frame Profile: Double rabbet, with equal rabbet depth.
    a. Face Width: 2 inches.
    b. Jamb Depth: Equal to sum of throat opening dimension and both backbend depth dimensions.
    c. Rabbet Depth:
        (1) Frame for Exterior Hollow Metal Door: 1-15/16 inch; typical at both rabbets of each frame.
        (2) Frame for Interior Wood Door: N/A.
    d. Backbend Depth: 1/2 inch, unless otherwise noted.
    e. Throat Opening:
        (1) Door Frame in Interior Stud-Framed Wall Opening: N/A.
        (2) Door Frame in Exterior Concrete/CMU Wall Opening: As indicated on drawings, per product approval.
4. Holes in Frame for Existing Masonry Jamb Anchors: Holes in frame for jamb anchor bolts shall be located at the center of the soffit, and equidistant from both faces.
    a. Holes for jamb anchor bolts shall be countersunk such that after installation, the anchor head will be slightly recessed in frame soffit.
    b. Spacing: At exterior door assemblies, holes shall be spaced in accordance with requirements of Product Approval.
5. Finishing: Factory-primed with Shop-Applied Primer, ready for field finishing with Field-Applied Finish.
    a. For field finishing requirements, refer to Section 099000 - Painting and Coating.
6. Mullions for Pairs of Doors: N/A.
7. Header/Transom Bars:
    a. Steel Tube: ASTM A500 Grade B galvanized steel tube.
        (1) Dimensions:
            (a) Size: 2 in. x 6 in., x full width or opening.
            (b) Wall Thickness: Minimum 0.250 in.
        (2) For additional information, refer to drawings.
8. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
9. Frames Wider than 48 Inch (1219 mm): N/A.
10. Frames Installed Back-to-Back: N/A.

D. Frames for Interior Glazing or Borrowed Lights: N/A.

E. Products (Basis of Design):

1. Interior Door Assemblies: Steelcraft “L” Series with polystyrene core and “LW” edge options, or equal.

2. Exterior Door Assemblies: “Series 6070F Outswing Commercial Steel Door - LMI” by Next Door Company, conforming to Miami-Dade Product Approval NOA 15-0515.04.

2.04 ACCESSORIES

A. Frame Anchors:

1. Jamb Anchors:

a. Exterior Door Assembly in CMU/Concrete Wall: Provide jamb anchors in accordance with requirements of the applicable Miami-Dade County Product Control Notice of Acceptance (NOA).

(1) Type: Minimum 3/8-inch diameter, flat-head, sleeve-type, expansion anchor; tested to ASTM E488/E488M criteria.

(a) Length: As required to achieve minimum embed depth.

(b) Minimum Embed Depth: 2 inches, except where greater embed depth is required per door manufacturer’s Product Approval.

(2) Quantity and locations of jamb anchors to comply with requirements of the applicable Miami-Dade County Product Control Notice of Acceptance (NOA).

b. Interior Door Assembly in CMU/Concrete Walls: N/A.

c. Interior Door Assembly in Stud-framed Drywall Partition: N/A.

2. Head/Ceiling Strut Anchors: N/A.

3. Floor Anchors: Steel angle clip type; provide one anchor per jamb.

a. Metal Thickness: 16 gage, minimum.

b. Fasteners: Two per jamb, minimum.

c. Weld anchor to bottom of each jamb, except as otherwise indicated; weld prior to galvanizing of frame assembly.

B. Louvers: N/A.

C. Glazing: N/A.

D. Removable Stops: N/A.

E. Perimeter Seal Hardware (Exterior Doors): Exterior door assemblies installed in locations where the overhang (OH) ratio is equal to or more than 1 shall include threshold, sweep, door seal, adjustable stop, and rain drip cap conforming to door manufacturer’s Product Approval, as required to comply with FBC water infiltration

requirement.

1. For additional information, refer to Section 087100 - Door Hardware.

F. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

1. For additional information, refer to Section 087100 - Door Hardware.

G. Astragals for Double Doors: N/A.

H. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

I. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

J. Grout for Frames: Portland cement grout; gypsum-based products are prohibited.

1. Grout shall conform to requirements of the door assembly Product Approval NOA, and the following:

a. Compressive Strength: Minimum 3000 PSI.

b. Slump: Maximum 4-inch slump, for hand troweling; thinner pumpable grout is prohibited.

K. Bondo Filler: Stain-free, high-performance, filler material, designed for ultra-smooth application, sanding and feather-edge patching and repair of galvanized steel surfaces without having to sand down to bare metal.

1. Product: "Bondo® Ultimate Body Filler" by 3M.

2. Surface preparation, application and finishing shall comply with manufacturer's instructions.

L. Field-Applied Protective Coating (for interior surfaces of hollow metal frames designated to be grouted):

1. General:

a. Protective coating products that require stripping or removal of galvanized coating as part of surface preparation are not acceptable.

2. Product:

a. Primer: Per Protective Coating manufacturer's recommendations, for use on galvanized steel.

b. Protective Coating: Use one of the following:

(1) Automotive Undercoating: Premium quality, water-based, high-build, rubberized automotive undercoating with excellent coverage and corrosion-resistance performance, designed for direct-to-metal application; such as "No Cleanup Waterbased Undercoating" by 3M.

(2) Epoxy Mastic Coating: Premium quality, two-component, high-build, self-priming, amido amine epoxy, meeting requirements of MPI (APL)

#108; such as “Polyamide Epoxy Coating V400 (with V400-91B Semi-Gloss Converter)” by Benjamin Moore.

2.05 FINISHES

A. Shop-Applied Primer: Hollow metal doors and frames are to receive shop-applied rust-inhibiting primer, complying with ANSI A250.10.

1. Coordinate with paint materials to be used for field-applied finish specified in Section 099000 - Painting and Coating.

B. Field-Applied Paint Finish: Hollow metal doors and frames are to receive field-applied paint finish, except as otherwise indicated.

1. For field finishing requirements, refer to Section 099000 - Painting and Coating.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

D. Correct unsatisfactory condition before proceeding with installation.

3.02 PREPARATION

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

B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch (1.6 mm).

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

1. Brace or fasten frame in such a way to prevent pressure of the grout from deforming frame.

2. Prior to installation, field coat the inside of frames with Protective Coating to prevent electrolysis or corrosion.

a. Surface preparation (including primer), application and finishing shall comply with Protective Coating manufacturer’s instructions.

c. Protective coating shall be fully cured before frame is grouted.

3. Mix grout to provide 4-inch (100 mm) maximum consistency, and hand trowel into place.
    a. Do not use grout mixed to thin "pumpable" consistency.
4. For additional information, refer to NAAMM HMMA 820 TN01.

E. Patching Frames at Existing Masonry Jamb Anchor Bolt Heads: After installation, the frame surface area around each jamb anchor bolt head shall be patched with Bondo Filler and sanded smooth to achieve uniform smooth flush finish prior to painting.

F. Install hardware in accordance with hardware manufacturer's recommendations and templates.
1. Consult DHI A115.1G and ANSI A250.6 as necessary.

G. Where assembly is not factory-glazed, coordinate installation of glazing.

H. Coordinate installation of electrical connections to electrical hardware items.

I. Coordinate installation of hardware.

J. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.

B. Maximum Diagonal Distortion: 1/16 in (1.5 mm) measured with straight edge, corner to corner.

3.05 ADJUST AND CLEAN

A. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective plastic wrappings from prefinished doors.

C. Fill all dents, holes, etc. with metal filler and sand smooth flush with adjacent surfaces-paint to match.

D. Adjust doors for proper operation, free from binding or other defects.

E. Adjust sound control doors so that seals are fully engaged when door is closed.

R. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

G. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition. Provide final adjustment as follows:
1. Door Contact with Silencers: Doors shall strike a minimum of two silencers without binding lock or latch bolts in the strike plate.
2. Head, Strike, and Hinge Jamb Margin: 1/8 inch.

3. Meeting Edge Clearance, Pairs of Doors: ±1/16 inch.

4. Bolts and Screws: Leave tight and firmly seated.

H. Clean and restore soiled surfaces.

I. Remove scraps and debris, and leave site and a clean condition.

3.06 SCHEDULE

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

END OF SECTION

SECTION 081423

EXTERIOR STILE & RAIL WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Exterior wood doors, stile and rail design.

B. Wood door frames.

1.02 RELATED REQUIREMENTS

A. Section 062000 - Finish Carpentry: Wood casings and moldings not provided by door manufacturer.

B. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 081433 - Interior Stile & Rail Wood Doors.

D. Section 087100 - Door Hardware.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM A36/A36M - Specification for Carbon Structural Steel; 2008.

2. ASTM C1036 - Standard Specification for Flat Glass; 2011.

2. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

3. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

4. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential; 2000 (Reapproved 2009).

5. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.

C. Architectural Woodwork Institute (AWI):

1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

D. Architectural Woodwork Manufacturers Association of Canada (AWMAC).

E. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-EB -- Florida Building Code, Existing Building.

a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

3. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

a. FBC-TP TAS-100 -- Test Procedure for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems.

b. FBC-TP TAS-101 -- Test Procedure for Static Uplift Resistance of Mortar or Adhesive Set Tile Systems.

b. FBC-TP TAS-102 -- Test Procedure for Static Uplift Resistance of Mechanically Attached, Rigid Roof Systems.

c. FBC-TP TAS-102(A) -- Test Procedure for Static Uplift Resistance of Mechanically Attached, Clipped, Rigid, Roof Systems.

d. FBC-TP TAS-108 -- Test Procedure for Wind Tunnel Testing of Air Permeable, Rigid, Discontinuous Roof Systems.

e. FBC-TP TAS-112 -- Standard Requirements for Concrete Roof Tiles.

c. FBC-TP TAS-114 -- Test Procedures for Roof System Assemblies in the High-Velocity Hurricane Zone Jurisdiction.

F. Woodwork Institute (WI).

1.04 DESIGN & PERFORMANCE REQUIREMENTS

A. Door and Frame Assemblies:

1. General: Door and frame assemblies shall comply with design criteria specified in the Contract Documents and applicable requirements of the governing building code, including but not limited to FBC-B CHAPTERS 15 and 16 (including HVHZ provisions), and ASCE 7.

a. Refer to FBC-B SECTION 1620 for wind loads, except that minimum Basic Wind Speed shall be as specified in this Section and as indicated on the Structural Drawings.

2. Design Loads: Comply with requirements of governing building code, criteria indicated on the Structural Drawings, and as follows:

a. Exterior door and frame assemblies shall be of sufficient strength to support the estimated or actual imposed dead, live, wind, and any other loads, both during construction and after completion of the structure, without exceeding the allowable materials stresses specified by the governing building code.

b. Wind Load Design Criteria: As indicated on drawings.

c. Maximum Design Pressure (MDP) Rating (per Product Approval): Provide door and frame assemblies that are identical to systems that have been successfully tested and approved for use in HVHZ, with MDP rating equal to or greater than pressures indicated on the drawings.

3. Testing - Product Approval: Comply with applicable requirements of the FLORIDA BUILDING CODE, including but not limited to the following:

a. Door and frame assemblies shall be tested in accordance with quality control test methods intended to confirm compliance with the large missile impact and wind load requirements of FBC-B CHAPTERS 15 and 16, including FBC-B SECTIONS 1625 and 1626 and FBC-TP TAS-201, TAS-202 and TAS-203.

b. Door and frame assemblies shall be tested for structural integrity in accordance with FBC-B SECTION 1710.5.

B. Door Hardware:

1. General: Door hardware shall comply with applicable requirements Federal, State, and local codes, and the following standards:

a. Accessibility: Governing building code, including but not limited to FBC-A.

b. Life Safety: Governing building code, including but not limited to the following:

(1) FBC-B CHAPTER 10.

(2) FBC-B CHAPTER 36 and FLORIDA FIRE PREVENTION CODE (FFPC).

(a) Applicable provisions of NFPA 1(FL).

(b) Applicable provisions of NFPA 101(FL).

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data:

1. Indicate door core materials and construction; veneer/cladding species, type and characteristics.

2. Include copies of current Miami-Dade County Product Control Notice of Acceptance (NOA) indicating compliance with applicable requirements of Florida Building Code (FBC), including but not limited to design pressures and large and small missile impact tests.

a. For each door assembly, indicate options selected (e.g., jamb anchor, threshold,

door insulation, jamb bottom corner anchor, lock, door edge construction, weatherstripping, etc.).

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, beveling, factory machining, factory finishing, and other details.

1. Include finish hardware and transom glazing details.

2. Provide the information required by AWI/AWMAC/WI (AWS).

D. Samples:

1. Submit two samples of door construction, 12 x 12 inch (300 x 300 mm) in size cut from top corner of door.

2. Submit two samples of door veneer, 12 x 12 inch (300 x 300 mm) in size illustrating wood grain, stain color, and sheen.

E. Performance Validation: Submit certified label or test report on products as indicated under performance requirements to validate product compliance.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer/Installer Qualifications: Company specializing in manufacturing and installing the products specified in this section with minimum ten (10) years of documented experience.

1. Company with at least five (5) projects in the past five (5) years including exterior wood doors of similar scope and complexity as doors specified for this Project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. 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 if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. Manufacturer’s Warranties:

1. Product Warranty: Manufacturer shall guarantee products unconditionally against defects in materials and workmanship.

a. Warranty Period:

(1) Basic Warranty Period: Not less than three (3) years, commencing on date of Substantial Completion.

(2) Extended Warranty Period: Not less than seven (7) years, commencing on date of Substantial Completion, if Owner elects to purchase manufacturer's extended annual maintenance contract at an additional cost.

2. Finish Warranty: Manufacturer shall guarantee finishes against defects, including but not limited to discoloration, fading, tarnishing, peeling, pitting or flaking, for not less than (3) years, commencing on date of Substantial Completion.

3. Glass and Glazing Warranty: Manufacturer shall guarantee glass and glazing against defects in manufacturing, materials, and assembly for not less than five (5) years, commencing on date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Exterior Stile and Rail Wood Doors:

1. Basis of Design: Oliveri Millworks; 3001 Tuxedo Avenue; West Palm Beach, FL 33405; Tel 561-478-7233; www.oliveriwindowsanddoors.com.

a. Product: "Series 1000 Mahogany Wood Clad Outswing Glazed and Opaqued Wood Doors with or without Sidelights/Transoms – LMI", as manufactured by O.W.W., LLC, in accordance with Miami-Dade Product Approval NOA No. 14-0507.03.

2.02 COMPONENTS

A. General: See drawings for locations and additional requirements.

1. Quality Level: Premium Grade, Extra Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS).

B. Doors:

1. Style: Stile and rail, with solid raised panel.

2. Materials:

a. Door Stiles and Rails:

(1) Core: Mahogany.

(2) Cladding: Red Oak or Old Growth Cypress, as selected by Architect.

b. Door Panels: Same species as Cladding on Door Stiles and Rails.

3. Thickness:

a. Overall: 2-1/4 inches (57 mm).

b. Core: 1-3/4 inches (44 mm).

c. Cladding: 1/4 inch (6 mm), each face.

C. Jambs and Head: Wood, of same species as door; as indicated on drawings and conforming to door assembly Miami-Dade Product Approval details and specifications.

D. Mullions: Wood, of same species as door; as indicated on drawings and conforming to door assembly Miami-Dade Product Approval details and specifications.

E. Door Stops, Muntins, Panel and Glazing Stops, and Trim Caps: Wood, of same species as door facing, mitered corners; prepared for countersink style fasteners per door assembly Product Approval.

1. Apply silicone glazing sealant to exterior glazing stops as recommended by manufacturer.

2. Apply water repellent treatment to wood glazing stops.

F. Transom: Original historic glazed wood transom to be restored and installed above door assembly.

1. Wood Elements: Repair and restore wood elements (e.g., muntins, rails, sash) in accordance with Section 060340 - Conservation Treatment for Period Architectural Woodwork.

2. Glazing: Single glazed; repair/replace damage glazing to match existing.

G. Weatherstripping: Flexible foam with butt joint corners at perimeter of frame, conforming to door assembly Miami-Dade Product Approval details and specifications.

H. Door Hardware: As specified in Section 087100 - Door Hardware.

2.03 PERFORMANCE REQUIREMENTS

A. Design Pressure (DP): As indicated on Structural drawings.

B. Water Penetration Resistance: No uncontrolled leakage on interior face when tested in accordance with ASTM E547 at differential pressure of 15 percent of Performance Grade (PG).

C. Air Leakage: Maximum of 0.30 cu ft/minute/sq ft at 1.57 psf (0.14 L/sec/sq m at 75 Pa) differential pressure, when tested in accordance with ASTM E283.

D. Forced Entry Resistance (FER): Tested to comply with ASTM F476 requirements having at least Grade 10 performance for each required swinging door assembly.

2.04 FABRICATION

A. Fabricate doors in accordance with door quality standard specified.

B. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

C. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

D. Cut and configure exterior door edge to receive recessed weatherstripping devices.

E. Provide edge clearances in accordance with the quality standard specified.

2.05 FACTORY FINISHING - WOOD VENEER INTERIOR FACE

A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for

Grade specified and as follows:

1. Transparent:
    a. System - 11, Polyurethane, Catalyzed.
    b. Stain: As selected by Architect.
    c. Sheen: Flat.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color sealer to match door facing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Assemble multiple units before installation in accordance with manufacturer’s installation guidelines.

C. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

D. Use machine tools to cut or drill for hardware.

E. Coordinate installation of doors with installation of integral frames and hardware.

F. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 CLEANING

A. Remove protective material from factory finished surfaces.

B. Clean units using cleaning material and methods in accordance with door manufacturer's written recommendations.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

3.06 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 081433

INTERIOR STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Interior wood doors, stile and rail design.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry.

B. Section 062000 - Finish Carpentry: Wood door frames; wood casings and moldings.

C. Section 081423 - Exterior Stile & Rail Wood Doors.

D. Section 087100 - Door Hardware.

E. Section 099000 - Painting and Coating.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. Architectural Woodwork Institute (AWI):

1. AWI (QSI) - Architectural Woodwork Quality Standards Illustrated; 8th edition.

C. Architectural Woodwork Manufacturers Association of Canada (AWMAC).

D. Window and Door Manufacturers Association (WDMA):

1. WDMA I.S. 6A -- Interior Architectural Wood Stile and Rail Doors; 2013.

E. Woodwork Institute (WI).

1. WI (CCP) -- Certified Compliance Program; current edition.

2. WI (MCP) -- Monitored Compliance Program; current edition.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit manufacturer’s complete product data for each type door provided.

1. Indicate stile and rail materials and construction; core materials, thickness and construction; panel materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Submit detailed shop drawings, including but not limited to the following data:

1. Include plan and elevation views illustrating door opening criteria, sizes, configurations, types and swings.

2. Include detailed section views illustrating fabrication details and special beveling.

3. Include details illustrating stile and rail construction, and stile and rail joints.

4. Indicate construction type, factory machining criteria, and finishing requirements.

5. Include finish hardware details.

D. Samples:

1. Submit two samples of door construction, 12 x 12 inch (300 x 300 mm) in size cut from top corner of door.

2. Submit two samples of door veneer, 12 x 12 inch (300 x 300 mm) in size illustrating shop-applied finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in installation of the products specified in this section with minimum five years of documented experience, and approved by the door manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver, and store doors in accordance with quality standard specified.

B. 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 if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's warranty for the life of the installation.

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Interior Stile and Rail Wood Doors:

1. Eggers Industries: One Eggers Drive; Two Rivers, WI 54241; Tel. 920-793-1351; www.eggersindustries.com.

2. Marshfield Door Systems, Inc; www.marshfielddoors.com

3. Same manufacturer as specified for exterior stile and rail wood doors; refer to Section 081423 - Exterior Stile & Rail Wood Doors.

2.02 DOORS

A. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with one of the following:

1. AWI (QSI).

2. WDMA I.S. 6A.

B. Interior Doors: 1-3/4 inches (44 mm) thick, unless otherwise indicated; solid lumber construction; mortise and tenon joints.

C. Design Style/Pattern: Traditional, as indicated on drawings.

2.03 DOOR AND PANEL FACINGS

A. Wood Materials:

1. Stiles, Rails and Mullions: Solid lumber; grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

a. Species: Natural ash, natural birch, basswood, maple, poplar, red oak, white oak, or mahogany conforming to AWI (QSI) Lumber Grade II Hardwood.

b. Maximum Moisture Content: 9 percent.

c. Pairs: Pair match each pair; set match pairs within 10 feet (3 m) of each other when doors are closed.

2. Raised Panels: Shall be manufactured using a three ply construction; same species as solid lumber.

a. Minimum Panel Thickness: 1-1/8 in.

B. Adhesive: Type I - Waterproof.

2.04 DOOR CONSTRUCTION

A. Panel doors shall be manufactured using the traditional construction of panels grooved into adjacent stiles and rails with the stiles tongued and grooved, and doweled together with glue under pressure.

1. Machining and joinery details and tolerances shall comply with applicable standards per specified Quality Standards (Grade and Performance level).

2. Dowels used for assembly shall be not less than 1/2 in. x 5 in.

B. Sticking shall be as detailed on the architectural drawings.

C. Standard Face Dimensions:

1. Stile Face: 6 in.

2. Rails:

a. Top Rail Face: 6 in.

b. Bottom Rail Face: 10 in.

c. Cross Rail Face: 5 in.

3. Mullion Face: 5 in.

D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions.

1. Do not machine for surface hardware.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

2.05 FACTORY FINISHING

A. Finish work in accordance with AWI (QSI), Section 1500 - Factory Finishing for grade specified and as follows:

1. Opaque:

a. System - 5, Conversion Varnish.

b. Color: As selected by Architect.

c. Sheen: Satin.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color sealer to match door facing.

2.06 ACCESSORIES

A. Astragals for Double Doors: Wood, overlapping and recessed at face edge, specifically for double doors.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality

standards.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Machine cut for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

A. Conform to specified quality standard for fit, clearance, and joinery tolerances.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 083100

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wall access panels.

B. Ceiling access panels, for attic access.

C. Related hardware and attachments.

1.02 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete.

B. Section 042200 - Concrete Unit Masonry.

C. Section 092400 - Portland Cement Plastering.

D. Section 092116 - Gypsum Board Assemblies.

E. Section 099000 - Painting and Coating: Field painting.

F. Division 22 - Plumbing: Access doors for access to plumbing materials and equipment.

G. Division 23 - Heating, Ventilating and Air Conditioning: Access doors for access to HVAC materials and equipment.

H. Division 26 - Electrical: Access doors for access to electrical materials and equipment.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM A240/A240M -- Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2007.

2. ASTM A653/A653M -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.

C. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

D. Intertek Testing Services NA, Inc. (ITS):

1. ITS (DIR) -- Directory of Listed Products.

E. Underwriters Laboratories Inc. (UL):

1. UL (BMD) -- Building Materials Directory.

2. UL (FRD) -- Fire Resistance Directory.

F. Warnock Hersey (WH).

1.04 DESIGN REQUIREMENTS

A. Obtain specific locations and sizes for required access doors and frames from trades, including mechanical and electrical, requiring access to concealed equipment. Indicate on submittal schedule.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Manufacturer’s technical data for each type of access door and panel assembly, including setting drawings, templates, fire-resistive characteristics, finish requirements, and details of anchorage devices.

1. Include complete schedule, types, locations, construction details, finishes, latching or locking provisions, and other pertinent data.

C. Shop Drawings:

1. Door and Panel Units: Show types, elevations, thickness of metals, full size profiles of door members.

2. Hardware: Show materials, finishes, locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.

3. General: Show connections of units and hardware to other Work. Include schedules showing location of each type and size of door and panel units.

D. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain access door and panel units, and frames for entire Project from one source and one single manufacturer.

B. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly in which they are to be installed, and as follows:

1. Provide products listed and labeled by UL or ITS (WH) as suitable for the purpose specified and indicated.

2. Provide certificate of compliance from authority having jurisdiction indicating

approval of fire rated doors.

3. Fire-Resistance Rating:
    1. Access Panel in Rated Vertical Assembly (e.g., partition / wall): 90-minutes.
    2. Access Panel in Rated Horizontal Assembly (e.g., horizontal duct enclosure): 3-hours, except as follows:
        a. Where Access Panel is Larger than 24 x 36 Inches in Size: 2-hours.

D. Attic Access: Ceiling access panel shall be provided; comply with FBC-B SECTION 1209.2.

E. Size Variations: Obtain Architect's acceptance and approval of manufacturer's standard size units that may vary slightly from sizes indicated on Drawings.

F. Coordination: Provide inserts and anchoring devices that will be built into other Work for installation of access door assemblies. Coordinate delivery with other Work to avoid delay.

1.06 DELIVERY, STORAGE AND HANDLING

A. Package and ship in accordance with manufacturer's recommendations.

B. Store per manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Nystrom Building Products: www.nystrom.com

B. Acudor Products Inc.: www.acudor.com.

C. Karp Associates, Inc.: www.karpinc.com.

D. Milcor Inc.: www.milcorinc.com.

2.02 MATERIALS

A. Steel: Commercial quality, cold steel sheet with baked on rust inhibitive gray primer.

B. Galvanized Steel: Galvanized, bonderized steel with baked on rust inhibitive gray primer.

C. Stainless Steel: ASTM A240/A240M Type 304 stainless steel with No. 4 satin polish finish.

2.03 ACCESS PANELS

A. Type 1 Access Panel (Interior, Insulated, Fire-Rated, Flush - Walls and Ceilings): N/A.

B. Type 2 Access Panel (Exterior, Insulated, Flush):
    1. Product: Nystrom XT, or equal.
    2. Size: As indicated on Drawings; if not indicated, provide 20 x 30 inches.

3. Door: Fabricate from 20-gauge galvanized steel, insulated sandwich type construction.
4. Hinge: Stainless steel continuous piano type.
    a. Type No. 304 stainless steel (door only).
5. Frame: Fabricate from 6063-T5 extruded aluminum.
6. Latching/Locking: 1 or 2 dual acting handles, depending on door size.
    a. Lockable handle for exterior only. Coordinate cylinder and keying requirements with Section 087100 - Door Hardware.
7. Flange: 6063-T5 extruded aluminum flange, 1.25 inch wide x 0.080 inch thick.
8. Finish: Galvanized, bonderized steel, with factory applied prime coat; ready for field finishing.
    a. Coordinate with paint materials to be used for field finishing.
    b. Field-Applied Finish: Field applied paint finish; for field finishing requirements, refer to Section 099000 - Painting and Coating.
9. Insulation: 2 inch thick fiberglass.
9. Gasket: Extruded santoprene.

C. Type 3 Access Panel (Interior, Flush - Walls and Ceilings):
1. Product:
    a. Access Panel for Use in Drywall (GWB) Wall/Ceiling: Nystrom NW (drywall bead), or equal.
    b. Access Panel for Use in Plaster Wall/Ceiling: Nystrom NP (plaster bead), or equal.
    c. Access Panel for Use in Tile Wall: Nystrom NT (exposed flange), or equal.
2. Size:
    a. Wall Access Panel: As indicated on Drawings; if not indicated, provide 12 x 12 inches.
    b. Ceiling Access Panel:
        (1) For All Uses Except Attic Access: As indicated on Drawings; if not indicated, provide 12 x 12 inches.
        (2) For Attic Access (per FBC-B SECTION 1209.2): As indicated on Drawings; if not indicated, provide 22 x 30 inches.
3. Door: Fabricate from 14-gauge cold rolled sheet steel, except as follows:
    a. Access Panel for Use in Tile Wall: Fabricate from 16-gauge Type 304 stainless steel.

4. Frame:
    a. Access Panel for Use in Drywall (GWB) Wall/Ceiling: Fabricate from 16-gauge cold rolled sheet steel with 1/4 inch mounting holes and 22-gauge galvanized drywall bead at perimeter.
    b. Access Panel for Use in Plaster Wall/Ceiling: Fabricate from 16-gauge cold rolled sheet steel with 1/4 inch mounting holes and 22-gauge galvanized drywall bead at perimeter.
    c. Access Panel for Use in Tile Wall: Fabricate from 16-gauge Type 304 stainless steel.
5. Hinge: Concealed continuous piano hinge.
6. Latching/Locking: 1 or 2 key-operated cylinder cam locks, depending on door size.
    a. Coordinate cylinder and keying requirements with Section 087100 - Door Hardware.
7. Finish:
    a. Access Panels Fabricated from Cold-Rolled Steel Sheet: Galvanized, bonderized steel, with factory applied prime coat; ready for field finishing.
        (1) Coordinate with paint materials to be used for field finishing.
        (2) Field-Applied Finish: Field applied paint finish; for field finishing requirements, refer to Section 099000 - Painting and Coating.
    b. Access Panels Fabricated from Stainless Steel Sheet: No. 4 satin finish, unless otherwise noted.

D. Type 4 Access Panel (Interior, Fire-Rated, Flush - Walls Only): N/A.

E. Type 5 Access Panel (Interior, Recessed):
1. Product: Nystrom RW, or equal.
2. Size: As indicated on Drawings; if not indicated, provide 20 x 30 inches.
3. Door: Fabricate from 16-gauge cold rolled sheet steel recessed 5/8 inch for in-fill of material.
4. Frame: Fabricate from 16-gauge cold rolled sheet steel of configuration to suit material application.
    a. Wallboard Surfaces: 22-gauge galvanized drywall bead at perimeter.
    b. Plaster Surfaces: 22-gauge galvanized plaster bead at perimeter.
5. Hinge: Concealed pivoting rod.
6. Latching/Locking: 1 or 2 key-operated cylinder cam locks, depending on door size.
    a. Coordinate cylinder and keying requirements with Section 087100 - Door Hardware.

7. Finish: Phosphate dipped with factory applied prime coat, ready for field finishing.

2.04 FABRICATION

A. Manufacture each access panel assembly as an integral unit ready for installation.

B. Welded Construction: Furnish with a sufficient quantity of 1/4 inch mounting holes to secure access panels to types of supports indicated.

C. Recessed Panel: Form face of panel to provide specified recess for application of finish material. Reinforce panel as required to prevent buckling.

D. Furnish number of latches required to hold door in flush, smooth plane when closed.

PART 3 -EXECUTION

3.01 EXAMINATION

A. Verify that rough openings for door and frame are correctly sized and located.

B. Verify mechanical and electrical requirements for ceiling or wall access panels.

3.02 PREPARATION

A. Obtain specific locations and sizes for required access doors and frames from trades, including mechanical and electrical, requiring access to concealed equipment and indicate on submittal schedule.

B. Advise installers of work relating to access panel installation including rough opening dimensions, locations of supports, and anchoring methods. Coordinate delivery with other work to avoid delay.

3.03 INSTALLATION

A. Install access door and frame units per manufacturer's written instructions.

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position units to provide convenient access to concealed Work requiring access.

D. Fire-Rated Units: Include UL or ITS (WH) labels.

3.04 ADJUST AND CLEAN

A. Adjust panel after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or damaged.

END OF SECTION

SECTION 085200

WOOD WINDOWS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wood fixed windows.

B. Wood transom window.

1.02 RELATED REQUIREMENTS

A. Section 016302 - Use of Substitute Materials on Historic Building Exteriors.

B. Section 042200 - Concrete Unit Masonry: Rough openings for window installation.

C. Section 061000 - Rough Carpentry: Wood blocking.

D. Section 062000 - Finish Carpentry: Wood trim, except trim included with windows.

E. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Architectural Manufacturers Association (AAMA):

1. AAMA 501.1 -- Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure.

2. AAMA 502 -- Voluntary Specification for Field Testing of Newly Installed Fenestration Products.

3. AAMA/WDMA/CSA 101/I.S.2/A440 -- North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2011.

4. ANSI/AAMA/NWWDA 101/I.S.2 -- Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors; 1997.

C. American Society of Civil Engineers (ASCE):

1. ASCE 7 -- Minimum Design Loads for Buildings and Other Structures; 2010.

D. American Society for Testing and Materials (ASTM):

1. ASTM C1036 -- Standard Specification for Flat Glass; 2011.

2. ASTM C1048 -- Standard Specification for Heat-Strengthened and Fully-Tempered

Flat Glass; 2012.

3. ASTM C1172 -- Standard Specification for Laminated Architectural Flat Glass; 2014.
4. ASTM E283 -- Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (R2012).
5. ASTM E330 -- Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002.
6. ASTM E1300 -- Standard Practice for Determining Load Resistance of Glass in Buildings; 1998.
7. ASTM E1886 -- Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials; 2013a.
8. ASTM E1996 -- Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2014a.
9. ASTM E2112 -- Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.
8. ASTM E2190 -- Standard Specification for Insulated Glass Unit Performance and Evaluation; 2010.
9. ASTM F588 -- Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2014.

E. CSA International; formerly Canadian Standards Association (CSA).

F. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.
2. FBC-EB -- Florida Building Code, Existing Building.
    a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.
3. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.
    a. FBC-TP TAS-201 -- Impact Test Procedures.
    b. FBC-TP TAS-202 -- Criteria for Testing Impact and Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure.
    c. FBC-TP TAS-203 -- Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

G. Miami-Dade County (Miami):

1. Miami (APD) -- Approved Products Directory; Miami-Dade County; database at www.miamidade.gov/building/pc-search_app.asp.

H. National Wood Window and Door Association (NWWDA); name changed to WDMA.

I. U.S. Code of Federal Regulations (CFR):

1. 16 CFR 1201 -- Safety Standard for Architectural Glazing Materials; current edition.

J. Window and Door Manufacturer's Association (WDMA); formerly NWWDA.

1.04 DESIGN & PERFORMANCE REQUIREMENTS

A. General: Design, materials, construction and quality of exterior wood window assemblies shall comply with design criteria specified in the Contract Documents and applicable requirements of the governing building code, including but not limited to FBC-B CHAPTERS 15 and 16 (including HVHZ provisions), and ASCE 7.

B. Design Loads: Exterior wood window components and assemblies shall comply with requirements of governing building code, criteria indicated on the Structural Drawings, and as follows:

1. Exterior wood window assemblies shall be designed and constructed to be of sufficient strength to support the estimated or actual imposed dead, live, wind, and any other loads, both during construction and after completion of the structure, without exceeding the allowable materials stresses specified by the governing building code.

2. Wind Load Design Criteria:

a. Building Risk Category (FBC-B TABLE 1604.5 and ASCE 7 Table 1-1): II.

b. Basic Wind Speed (Ultimate Design Wind Speed, 3-second gust (V*ult*): 175 mph.

c. Wind Exposure Category (FBC-B SECTION 1620.3): C.

d. Enclosure Classification: Enclosed Building.

3. Maximum Design Pressure (MDP) Rating (per Product Approval): Provide wood window components and assemblies that are identical to systems that have been successfully tested and approved for use in HVHZ, with MDP rating equal to or greater than pressures indicated on the drawings.

C. Testing - Product Approval: Comply with applicable requirements of the FBC, including but not limited to the following:

1. Exterior wood window assemblies shall be tested in accordance with:

a. Quality control test methods intended to confirm compliance with the large missile impact and wind load requirements of FBC-B CHAPTERS 15 and 16, including FBC-B SECTIONS 1625 and 1626, and FBC-TP TAS-201, TAS-202 and TAS-203.

b. Requirements of FBC-B SECTION 2411.3.2, FBC-TP TAS-202, and provisions from ANSI/AAMA/NWWDA 101/I.S.2.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Show component dimensions, anchorage and fasteners, glass, and muntins.

1. Include product approval certification report from Miami-Dade County Building Code Compliance Office.

2. Field Test Recommendations: Manufacturer's recommendations for field testing in accordance with AAMA 502.

C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements, and fabrication and installation details.

D. Samples: Submit two samples illustrating window frame section, mullion section, factory-finished surfaces, glazing, and glazing materials.

1. Size: 12 by 24 inches (300 x 600 mm) each.

1.06 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Company specializing in manufacturing commercial wood windows with minimum three years of documented experience.

B. Source Quality Control:

1. All windows shall comply with applicable requirements of the Florida Building Code (FBC) and the Dade County Product Control Division.

2. Air Infiltration Test: Products must be independently lab tested and meet or exceed requirements of FBC-TP TAS-202 or ASTM E283.

a. Maximum air infiltration 0.30 CFM/SQ Ft. with differential pressure in accordance with applicable building code requirements.

3. Water Penetration Test: Products must be independently lab tested and meet or exceed FBC-TP TAS-202.

a. No water penetration for 15 minutes when window is subjected to a rate of flow of 5 gal./hr./sq. ft. with differential pressure equal to 15 percent design pressure.

4. Field Test: Field testing criteria shall be in accordance with AAMA 502 and window manufacturer's recommendations.

5. Structural Test: Products must be independently lab tested and meet or exceed requirements of:

a. FBC-TP TAS-202

b. ASTM E330.

6. Forced Entry Test: Products must be independently lab tested and meet or exceed requirements of:

a. FBC-TP TAS-202

b. ASTM F588, Grade 40 at 300 pounds.

7. Impact Test – Large Missile: Products must be independently lab tested and meet or exceed requirements of:

a. FBC-TP TAS-201.

b. ASTM E1996.

8. Cyclic Wind Loading Test: Products must be independently lab tested and meet or exceed requirements of:

a. FBC-TP TAS-203.

b. ASTM E1886.

D. Energy Conservation Performance (measured on the window size required for this project):

1. Thermal Resistance (U-Value): 0.26, maximum.

2. Solar Heat Gain Coefficient (SHGC): 0.25, maximum.

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).

B. Maintain this minimum temperature during and after installation of sealants.

1.09 WARRANTY

A. Manufacturer's Warranty(ies):

1. Product Warranty: Manufacturer shall warrant its products unconditionally against defects in materials and workmanship for three (3) years from the date of delivery.

2. Finish Warranty: Manufacturer shall warrant its proprietary finishes not to tarnish, peel, pit, flake for two (2) years from the date of delivery.

3. Glazing/Glass Warranty: Manufacturer shall warrant insulated glass to be free from defects in manufacturing, materials and assembly for ten (10) years from the date of delivery.

4. Maintenance Program: Manufacturer shall provide annual maintenance service

free of charge for three (3) years from the date of delivery.

a. This service shall include rough hardware and gasket inspection, inspection of all exterior glass caulking and rainguard inspection.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wood Components:

1. Wood for Window Frame, Sash, Sill, Glazing Bead: Mahogany; air-dried, then carefully kiln-dried.

2. Wood Blocking and Nailers: Refer to Section 061000 - Rough Carpentry.

3. Wood for Casings and Trim:

a. Exterior: Clear mahogany, of type suitable for required finish.

(1) Finger joints not permitted in transparent finished exposed surfaces.

(2) Scarf joints permitted in transparent finished exposed surfaces only if color and grain texture match.

b. Interior: Refer to Section 062000 - Finish Carpentry.

B. Metal Components:

1. Mullion Reinforcement: Stainless steel plate; 34 ksi.

2. Clips and Brackets: Galvanized steel; 54 ksi.

3. Steel Transom/Header: ASTM A500 Grade B galvanized steel tube.

a. For additional information, refer to drawings.

C. Glass and Glazing:

1. Float Glass: Provide float glass based glazing unless noted otherwise.

a. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.

(1) Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.

b. Heat-Strengthened and Fully Tempered Types: ASTM C1048; Kind HS or Kind FT, as applicable per Product Approval.

c. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.

2. Laminated Glass: Float glass laminated in accordance with ASTM C1172.

a. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.

b. Interlayer: Polyvinyl Butyral (PVB).

(1) Thickness: Per Product Approval.

(2) Manufacturer/Product: Per Product Approval.

3. Sealed Insulating Glass Units:

a. Durability: Certified by an independent testing agency to comply with ASTM E2190.

b. Edge Spacers: Aluminum, bent and soldered corners.

c. Edge Seal: Glass to elastomer with supplementary silicone sealant.

d. Purge interpane space with dry air.

4. Glazing Compounds: Window manufacturer’s standard, per Product Approval.

5. Glazing Accessories (e.g., setting blocks, spacer shims, etc.): Window manufacturer’s standard.

2.02 WOOD WINDOWS

A. Fixed Windows - Types A & B:

1. Manufacturer (Basis of Design): Tischler and Sohn (USA) Ltd; Six Suburban Avenue; Stamford, CT 06901.

a. Product: "Series Direct Glazed Impact Wood Fixed Window - LMI", conforming to Miami-Dade Product Approval NOA No. 14-0428.15; refer to Miami (APD).

2. General:

a. Configuration: Fixed, non-operable, as indicated on drawings.

(1) Wood frame and sash, factory fabricated and assembled.

b. Wood Species: Mahogany, suitable for factory-applied finish.

c. Glazing: Factory glazed; glazing method per Product Approval.

d. Clearances and Shim Spacing: Minimum required for installation and dynamic movement of perimeter seal.

e. Fasteners: Concealed from view.

f. Finishes:

(1) Exterior Finish: Shop-finished with 3-layer acrylic resin based paint.

(a) Color: As selected by Architect from manufacturer's custom range.

(2) Interior Finish: Same as exterior.

(a) Color: As selected by Architect from manufacturer's custom range.

3. Components:

a. Window Framing:

(1) Jambs, Glazing Beads, Mullion Covers:

(a) Material: Wood (Mahogany).

(b) Profile: As indicated on drawings.

(2) Mullions: Manufacturer's standard stainless steel plate.

b. Muntins: Permanently installed on outside and inside faces of insulating glass.

(1) Material: Same as window framing.

(2) Pattern: Custom design, see drawings.

(3) Bar Width: As indicated on drawings.

(4) Finish/Color: Match finish and color of interior and exterior of window framing.

c. Fasteners: Stainless steel.

d. Sealant and Backing Materials: As specified in Section 079200 - Joint Sealants, of types as indicated.

(1) Perimeter Sealant: Appropriate for application.

(2) Sealant Used within System (Not Used for Glazing): Appropriate for application.

e. Sealed Insulating Glass Units: Vision glass, double glazed.

(1) 1-3/16 inch (nominal) laminated IGU, composed of the following:

(a) Outboard Lite: Laminated glass, composed of the following:

i. Outer Layer: 5 mm (3/16 inch) annealed glass; gray tinted (PPG Solargray).

ii. Interlayer: 0.090 inch Solutia Safkex PVB; clear.

iii. Inner Layer: 5 mm (3/16 inch) annealed glass; clear.

(b) Air Space: 1/2 inch.

(c) Inboard Lite: 6 mm (1/4 inch) fully-tempered (FT) glass.

i. Low-E Coating: Solarban 70XL, on #5 surface.

f. Accessories: Provide related flashings, and anchorage and attachment devices.

B. Fixed Transom Window - Type C:

1. Basis of Design: Oliveri Millworks; 3001 Tuxedo Avenue; West Palm Beach, FL 33405; Tel 561-478-7233; www.oliveriwindowsanddoors.com.

a. Product: "Series MahoganyWood Fixed Window - LMI", as manufactured by O.W.W., LLC, in accordance with Miami-Dade Product Approval NOA No. 12-0816.04.

2. General:

a. Configuration: Fixed, non-operable, as indicated on drawings.

(1) Wood frame and sash, factory fabricated and assembled.

b. Wood Species: Mahogany, suitable for factory-applied finish.

c. Glazing: Factory glazed; glazing method per Product Approval.

d. Clearances and Shim Spacing: Minimum required for installation and dynamic movement of perimeter seal.

e. Fasteners: Concealed from view.

f. Finishes:

(1) Exterior Finish: Shop-finished with 3-layer acrylic resin based paint.

(a) Color: As selected by Architect from manufacturer's custom range.

(2) Interior Finish: Same as exterior.

(a) Color: As selected by Architect from manufacturer's custom range.

3. Components:

a. Window Framing:

(1) Jambs, Glazing Beads, Mullion Covers:

(a) Material: Wood (Mahogany).

(b) Profile: As indicated on drawings.

(2) Mullions: Manufacturer’s standard stainless steel plate.

b. Muntins: Permanently installed on outside and inside faces of insulating glass.

(1) Material: Same as window framing.

(2) Pattern: Custom design, see drawings.

(3) Bar Width: As indicated on drawings.

(4) Finish/Color: Match finish and color of interior and exterior of window framing.

c. Fasteners: Stainless steel.

d. Sealant and Backing Materials: As specified in Section 079200 - Joint Sealants, of types as indicated.

(1) Perimeter Sealant: Appropriate for application.

(2) Sealant Used within System (Not Used for Glazing): Appropriate for application.

e. Sealed Insulating Glass Units: Vision glass, double glazed.

(1) 7/8 inch (nominal) laminated IGU per Product Approval, composed of the following:

(a) Outboard Lite: Laminated glass, composed of the following:

i. Outer Layer: 5 mm (3/16 inch) annealed glass; gray tinted (PPG Solargray).

ii. Interlayer: 0.075 inch Solutia Vanceva PVB; clear.

iii. Inner Layer: 5 mm (3/16 inch) annealed glass; clear.

(b) Air Space: 1/4 inch.

(c) Inboard Lite: 3 mm (1/8 inch) heat-strengthened (HS) glass.

i. Low-E Coating: Solarban 70XL, on #5 surface.

g. Accessories: Provide related flashings, and anchorage and attachment devices.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install windows in accordance with:

1. Manufacturer's instructions and Product Approval installation requirements.

2. ASTM E2112.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sills, stools, and aprons.

E. Set sill members and sill flashing in continuous bead of sealant.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inch per 3 ft (1.6 mm per m) non-cumulative or 1/8 inch per 10 ft (3.2 mm per 3 m), whichever is less.

3.04 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

A. Remove protective material from factory finished surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Finish hardware for doors.

B. Cylinders and coordination of keying for locks specified in other sections.

C. Auxiliary locks.

1.02 RELATED REQUIREMENTS

A. Section 081113 - Hollow Metal Doors and Frames.

B. Section 081423 - Exterior Stile and Rail Wood Doors.

C. Section 081433 - Interior Stile and Rail Wood Doors.

D. Section 096429 - Wood Strip & Plank Flooring.

E. Section 283005 - Intrusion Detection System: Magnetic contacts.

F. Section 323119 - Decorative Metal Fences and Gates: Gate lock latches.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American National Standards Institute (ANSI).

C. Builders Hardware Manufacturers Association (BHMA):

1. ANSI/BHMA A156.1 -- American National Standard for Butts and Hinges; 2013.

2. ANSI/BHMA A156.2 -- American National Standard for Bored and Preassembled Locks & Latches; 2011.

3. ANSI/BHMA A156.4 -- American National Standard for Door Controls - Closers; 2013.

4. ANSI/BHMA A156.5 -- Cylinders and Input Devices for Locks; 2014.

5. ANSI/BHMA A156.6 -- American National Standard for Architectural Door Trim; 2010.

6. ANSI/BHMA A156.7 -- American National Standard for Template Hinge Dimensions; 2014.

7. ANSI/BHMA A156.8 -- American National Standard for Door Controls - Overhead

Stops and Holders; 2010.

8. ANSI/BHMA A156.13 -- American National Standard for Mortise Locks & Latches Series 1000; 2012.
9. ANSI/BHMA A156.16 -- American National Standard for Auxiliary Hardware; 2013.
10. ANSI/BHMA A156.18 -- American National Standard for Materials and Finishes; 2012.
11. ANSI/BHMA A156.21 -- American National Standard for Thresholds; 2014.
12. ANSI/BHMA A156.22 -- American National Standard for Door Gasketing and Edge Seal Systems; 2012.
13. ANSI/BHMA A156.115 -- Hardware Preparation in Steel Doors and Steel Frames; 2014.

D. Door Hardware Institute (DHI):

1. DHI (LOCS) -- Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
2. DHI WDHS.3 -- Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in DHI WDHS-1/WDHS-5 Series, 1996.

E. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.
2. FBC-A -- Florida Building Code, Accessibility.

F. Florida Fire Prevention Code, 5th edition - 2014 (FFPC):

G. Underwriters Laboratories Inc. (UL):

1. UL 437 -- Standard for Key Locks.

1.04 REGULATORY AND PERFORMANCE REQUIREMENTS

A. General: Door hardware shall comply with applicable requirements Federal, State, and local codes, and the following standards:

1. Accessibility: Governing building code, including but not limited to FBC-A.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.

C. Hardware Schedule: Submit detailed hardware schedule, vertical format.

1. List and describe each opening separately. Include all doors with identical hardware, except hand, in a single heading. Include door number, room designations, degree of swing, and hand.
2. List related details. Include dimensions, door and frame material, and other considerations affecting hardware.
3. List all hardware items to be supplied. Include manufacturer's name, quantity, product name, catalog number, size, finish, and related details needed to specifically identify what is being supplied.
4. Attach copies of catalog information for each item that include graphics to help visually identify each item.
5. Resubmit (5) copies of the corrected schedule when required.

D. Keying Schedule: Submit keying schedule after completion of the following:

1. Keying meeting between the Contractor, hardware supplier, and Owner’s representative.
2. Receipt of approved hardware schedule.

1.06 QUALITY ASSURANCE

A. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of documented experience.

1. Hardware Supplier Personnel: Hardware supplier shall employ an Architectural Hardware Consultant (AHC) to assist in the work of this section.
    a. The AHC shall review contract documents and provide recommendations for improving hardware selections, to ensure that doors and door hardware are engineered to meet the Owner’s requirements.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

C. Convey Owner's keying requirements to manufacturers.

D. Pre-installation Meeting: Convene a pre-installation meeting one week prior to commencing work of this section; require attendance by all affected installers.

E. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1. For additional requirements, refer to Section 283005 - Intrusion Detection System.

1.06 COORDINATION

A. General:

1. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
2. Furnish templates for door and frame preparation.

3. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Submittals: Coordinate submittals required under this Section with those required under the following sections:

1. Section 081113 - Hollow Metal Doors and Frames.

2. Section 081423 - Exterior Stile and Rail Wood Doors.

3. Section 081433 - Interior Stile and Rail Wood Doors.

C. Keying: Coordinate Owner's keying requirements during the course of the Work.

1. Contractor shall coordinate specific locking and keying hierarchies with designated Owner's representative.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Delivery:

1. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

2. Wrap, protect finishing hardware items for shipment.

a. Permanent cylinders and keys shall be packaged separately from the individual hardware sets.

3. Deliver to manufacturing contractors, all hardware items required by them for their application; deliver balance of hardware (except permanent cylinders and keys) to the job site.

a. Each item shall be clearly marked with its intended location.

B. Store hardware in a secure location.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide products that comply with applicable provisions of the governing building code.

B. Hardware on Exterior Doors: Shall comply with requirements of applicable Product Approval NOA for door assembly.

1. For additional information, refer to: Section 081113 - Hollow Metal Doors and Frames, and Section 081423 - Exterior Stile and Rail Wood Doors.

C. Hardware on Fire-Rated Doors:

1. Shall comply with NFPA 80 requirements.

2. Shall be listed and classified by UL as suitable for the purpose specified and indicated.

D. Materials and Finishes:

1. Finish Definitions: ANSI/BHMA A156.18.
2. Primary Finish:
    a. Exterior:
        (1) Satin Stainless Steel (300 series), ANSI/BHMA 630 (US26D).
    b. Interior:
        (1) Satin Chromium Plated Brass or Bronze, ANSI/BHMA 626 (US26D).
        (2) Satin Chromium Plated Steel, ANSI/BHMA 652 (US26D).
3. Secondary Finish:
    a. Exterior: As selected by Architect for specific applications.
    b. Interior: Bright Chromium Plated Brass or Bronze, ANSI/BHMA 625 (US26).
        (1) Use secondary finish in Toilet Rooms and other spaces containing bright chrome or polished stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
4. Exceptions:
    a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to ANSI/BHMA A156.18.
    b. Door Closer Covers and Arms: Color to be selected by Architect from manufacturer's standard colors.
    c. Aluminum Surface Trim and Gasket Housings: Finish to match door, not to match other hardware.

2.02 MANUFACTURERS

A. Hinges:
    1. Butt Hinges (Basis of Design): Hager, unless otherwise indicated.
B. Locks and Latches:
    1. Exterior Doors: As required per Product Approval.
        a. Hollow Metal Door (Basis of Design): Philadelphia Hardware Group; http://philihardware.com.
        b. Wood Door:
            (1) Sargent (ASSA ABLOY): www.sargentlock.com.
            (2) Hoppe North America: www.us.hoppe.com.
    2. Interior Doors (Basis of Design): Schlage (Allegion).
C. Closers (Basis of Design): LCN (Allegion).
D. Bolts (including Flush Bolts and Surface Bolts): Hager or Ives (Allegion).

E. Stops (including Wall Stops, Floor Stops, and Overhead Stops / Holders): Hager or Glynn-Johnson (Allegion).

F. Silencers (Basis of Design): Ives.

G. Weather Stripping, Gasketing Seals and Thresholds: Pemko Manufacturing Co., Ives, Schlegel (an Amesbury Company), National Guard Products, Inc., or Zero International, Inc.

H. Protection Plates and Trim: Hager, Hiawatha, or Triangle.

2.03 BUTT HINGES

A. General:

1. Provide hinges on every swinging door.

a. Provide five-knuckle full mortise butt hinges, unless otherwise indicated.

b. Provide ball-bearing hinges at all doors.

c. Provide hinges in the quantities indicated.

d. Provide non-removable pins on outswinging doors.

2. Comply with ANSI/BHMA A156.1 and A156.7; standard weight, unless otherwise indicated.

B. Butt Hinges for Hollow Metal Doors:

1. Quantity per Door Leaf:

a. Interior Doors: N/A.

b. Exterior Doors: Three (3), unless otherwise noted in door assembly Product Approval.

2. Size:

a. Interior Doors: N/A.

b. Exterior Doors: Provide hinge size required per Product Approval, and width sufficient to clear surrounding trim.

3. Product:

a. Interior Doors: N/A.

b. Exterior Doors:

(1) Full Mortise, Ball Bearing, Stainless Steel Base w/ Stainless Steel Pin (non-removable type), Standard Weight (ANSI A5112): Hager BB1191, except as otherwise indicated.

(a) Finish: Satin Stainless Steel, ANSI/BHMA 630 (US32D).

C. Butt Hinges for Wood Doors:

1. Quantity per Door Leaf:

a. Interior Doors: For each door, furnish number of hinges indicated in Door Hardware Schedule or as follows, whichever is greater.

(1) Doors that are 60 inches or less in height: N/A.

(2) Doors that are more than 60 inches to 90 inches in height: Three (3) hinges per door leaf, unless otherwise indicated.

b. Exterior Doors: Four (4), unless otherwise noted in door assembly Product Approval.

2. Size:

a. Door Thickness, 1-3/4 in. to 2-1/4 in.: 4.5 x 4.5 inches, unless otherwise indicated.

(1) At exterior doors, hinge size shall conform to requirements of the Product Approval.

b. Door Thickness, 1-3/8 in.: 3.5 x 3.5 inches, unless otherwise indicated.

c. Provide hinge width required to clear surrounding trim.

3. Product:

a. Interior Doors:

(1) Full Mortise, Ball Bearing, Steel Base w/ Steel Pin, Standard Weight (ANSI A8112): Hager BB1279, except as otherwise indicated.

(a) Finish: Satin Chromium Plated, ANSI/BHMA 682 (US26D).

b. Exterior Doors:

(1) Full Mortise, Ball Bearing, Stainless Steel Base w/ Stainless Steel Pin (non-removable type), Standard Weight (ANSI A5112): Hager BB1191, except as otherwise indicated.

(a) Finish: Satin Stainless Steel, ANSI/BHMA 630 (US32D).

2.04 CLOSERS

A. General:

1. Provide surface-mounted, door-mounted closers unless otherwise indicated.

2. Provide a closer on every exterior door, and on every fire- and smoke-rated door.

a. Spring hinges are not an acceptable self-closing device unless specifically so indicated.

3. On pairs of swinging doors, if an overlapping astragal is present, provide coordinator to ensure that leaves close in proper order.

4. Mounting Location:

a. Interior Doors: Mount door-mounted closer on room side of door (e.g., on Toilet Room side of door opening into Toilet Room; on Storage Closet side of

door opening into Storage Closet).

b. Exterior Doors: Mount closer on interior room side of door.

5. Provide closers with metal covers, extra-duty arms, installation accessories (e.g., plates, brackets, supports, spacers, shoes, adaptors), fasteners, and other components necessary for complete installation at each particular application.

6. Closers shall be UL-listed for self-closing doors; tested and certified under ANSI/BHMA A156.4, Grade 1.

B. Size: Non-sized cylinder shall be fully adjustable (i.e., Sizes 1, 2, 3, 4, 5 and 6), unless otherwise noted.

C. Reduced Opening Force: Shall be adjustable; maximum opening force shall comply with applicable requirements of governing building code, including but not limited to FBC-A.

D. Product: LCN 4040/4041 Series.

2.05 BOLTS

A. General:

1. Shall meet requirements per ANSI/BHMA A156.16.

B. Flush Bolt: Provide flush bolt in top leading edge of door on non-active leaf in pair swing doors.

1. Rod Length: Minimum 12 inches (300 mm).

2. Product: Ives FB457.

C. Surface Bolt: Provide surface bolt at bottom of push side on non-active leaf in pair swing doors.

1. Bolt Throw: 3-1/2 inches (for doors with large undercut), unless otherwise noted.

2. Product: Ives SB1600M1, with flat bottom strike for push-side mounting.

2.06 DOOR PROTECTION PLATES

A. General:

1. Material: 18-gage (0.050 inch) thick stainless steel.

2. Plates at fire labeled doors shall be UL-listed/labeled.

B. Kick Plates:

1. Shall meet J102 requirements per ANSI/BHMA A156.6.

2. Provide kick plate on push side of every door with closer, except storefront and all-glass doors.

3. Size: 10 inches high x width of door less 2 inches, except as otherwise noted.

2.08 DOORSTOPS AND HOLDS

A. General:

1. Wall-Mounted Doorstop: Provide at all doors, except at doors where a wall-mounted stop is impractical.

    a. Include adequate concealed backing reinforcement where doorstop is to be installed on drywall or plaster wall surface.

2. Floor-Mounted Doorstop: Provide at doors only where wall-mounted stop is impractical.

B. Products:

1. Wall-Mounted Doorstop:

    a. Convex Type (for doors not having push button lockset): Hager 230W.

    b. Concave Type (for doors having office function or push-button lockset): Hager 234W.

2. Floor-Mounted Doorstop: Hager 242F.

2.09 SILENCERS, WEATHER STRIPPING, THRESHOLDS, AND MISCELLANEOUS TRIM

A. Silencers: Resilient rubber, shaped for specific door type and application, and fitted into drilled hole in frame; conforming to the following criteria:

1. ANSI/BHMA Specification:

    a. Silencers for Hollow Metal Door Frames: Shall meet ANSI/BHMA 156.16, L03011.

    b. Silencers for Wood Door Frames: Shall meet ANSI/BHMA 156.16, L03021.

2. Size:

    a. Silencers for Hollow Metal Door Frames: 1/2 in. diameter x 1/8 in. thickness.

    b. Silencers for Wood Door Frames: 3/8 in. diameter x 1/8 in. thickness.

3. Quantity: At each door, provide the following number of silencers.

    a. Single Door: Three, located on strike side of frame.

    b. Double Door: Two, located on strike side of frame.

4. Products (Basis of Design):

    a. Silencers for Hollow Metal Door Frames: Ives SR64, or equal.

    b. Silencers for Wood Door Frames: Ives SR65, or equal.

B. Weather Stripping:

1. General:

    a. Weather Stripping at Exterior Doors: Provide weather stripping in accordance with requirements of the applicable Product Approval.

2. Products (Basis of Design):

a. Weather Stripping at Exterior Hollow Metal Doors:

(1) Rigid Jamb Weather Strip: Pemko 319AN, or equal conforming to Product Approval.

(1) Adhesive Back Weather Strip: Pemko S88W, or equal.

b. Weather Stripping at Exterior Wood Doors:

(1) Outer Weather Stripping (top roll and sides): Schlegel Q-LON QEZ-320 seal, or equal conforming to Product Approval.

(2) Inner Weather Stripping (sides of frame, between frame and sash): Schlegel Q-LON QDS-650 seal, or equal conforming to Product Approval.

c. Weather Stripping at Interior Doors:

(1) Adhesive Back Weather Stripping: Pemko S88W, or equal.

C. Threshold:

1. General:

a. Thresholds shall comply with:

(1) ANSI/BHMA A156.21.

(2) Accessibility requirements specified in Regulatory and Performance Requirements, including but not limited to FBC-A SECTION 303.

b. Provide a threshold at each door, per the Door Hardware Schedule.

(1) Field cut threshold to frame for tight fit.

(2) Coordinate with floor finishes, to ensure compliance with accessibility requirements.

2. Products (Basis of Design):

a. Threshold at Exterior Hollow Metal Doors:

(1) Aluminum Latching Panic Saddle Threshold with Aluminum Flush Modular Ramp Threshold Assembly: Pemko 2006AT and Pemko R.5FA, or equal; coordinate with door manufacturer.

b. Threshold at Exterior Wood Doors:

(1) Aluminum Latching Panic Saddle Threshold: Pemko 2005AT, or equal; coordinate with door manufacturer.

c. Threshold at Interior Doors: Aluminum Saddle Threshold (6 in. width): Pemko 1716A, or equal; coordinate installation requirements with wood flooring system manufacturer.

D. Miscellaneous Trim:

1. Overhead Rain Drip:
    a. At each exterior door, provide
        (1) Door bottom sweep at bottom of all doors, unless otherwise indicated.
        (2) Overhead rain drip at frame head above all doors, unless otherwise indicated.
    b. Products:
        (1) Extruded Aluminum Rain Drip for Exterior Hollow Metal Doors: Pemko 346PW, or equal conforming to Product Approval.
2. Door Shoe:
    a. Products:
        (1) Door Shoe with Weather Stripping for Exterior Hollow Metal Doors: Pemko 234AV, or equal conforming to Product Approval.
3. Door Sweep:
    a. Products:
        (1) Door Bottom Sweep for Exterior Hollow Metal Doors: Pemko 345PWV, or equal conforming to Product Approval.
        (2) Door Bottom Sweep for Exterior Wood Doors: Pemko 345, or equal; finish and color as selected by Architect.

2.10 LOCKS AND LATCHES

A. General:
    1. Grade Level: ANSI/BHMA A156.2 Grade 1, except as follows:
        a. Interior Doors: ANSI/BHMA A156.2 Grade 1 or 2.
    2. Backset: 2-3/4 inches, unless otherwise noted.
    3. Tactile Warning (knurling) is required on outside levers at doors into Mechanical Rooms, Electrical Rooms, and other hazardous rooms.
    4. Keyed locks shall be furnished and assembled with temporary construction cylinders and labeled with door tag number and key symbol from hardware supplier.
        a. For additional requirements, refer to CYLINDERS AND CORES in this section.
    5. Locking Functions:
        a. Cylindrical Locksets: As defined in ANSI/BHMA A156.2, and as follows.
            (1) Privacy, Bedroom or Bath: F76.
            (2) Entry or Office: F81.
            (3) Classroom: F84.

(4) Storeroom: F86.

b. Mortise Locksets: As defined in ANSI/BHMA A156.13, and as follows:

(1) Classroom Holdback: F06.

(a) Latch-bolt retracted by knob/lever from either side unless outside is locked by key.

(b) When locked, latch-bolt retracted by key outside or knob/lever inside.

(c) Auxiliary latch deadlocks latch-bolt when door is closed.

(d) Depress inside lever and turn key 360-degree for holdback feature.

(e) Inside lever is always free for immediate egress.

(2) Dormitory: F13.

(a) Latch by lever either side except when projected deadbolt locks outside knob/lever and deadlocks latch.

(b) Deadbolt and latch by key outside.

(c) Deadbolt by turn-piece inside.

(d) Inside lever retracts latch and deadbolt simultaneously, automatically unlocking outside knob/lever.

(3) Entrance: F20.

(a) Latch by lever either side except when outside locked by stop-button or projected deadbolt.

(b) Latch deadlocked by auxiliary latch or deadbolt.

(c) Deadbolt and latch by key outside.

(d) Deadbolt by turn-piece inside.

(e) Inside lever retracts latch and deadbolt simultaneously, leaving outside locked.

B. Products (Basis of Design):

1. Cylindrical Locksets:

a. Exterior:

(1) Hollow Metal Door: N/A.

(2) Wood Door: N/A.

b. Interior:

(1) Hollow Metal Door: N/A.

(2) Wood Doors: “ND Series” by Schlage (Allegion).

(a) Privacy, Bed or Bath Function (F76): Schlage ND40S-RHO.

(b) Classroom Function (F84): Schlage ND70PD-RHO.

(c) Storeroom Function (F86): Schlage ND80PD-RHO (or ND80PD-8RO, where tactile warning is required).

2. Mortise Locksets:

a. Exterior:

(1) Hollow Metal Door: PHG "Advantage 'M' Series Mortise Lever Set", conforming to requirements of applicable Product Approval.

(a) Entry, Deadbolt Function (F20): PHG 720M Series; San Diego (SD) lever style.

(2) Wood Door: Sargent (ASSA ABLOY) "7000 Series" multipoint lock.

(a) Classroom Holdback Function (F06): Sargent (ASSA ABLOY) Model 12-NB-WD7000 series multipoint lock; Function 06; ES trim; Coastal, Yarmouth (Y) lever style.

b. Interior: N/A.

2.11 CYLINDERS AND CORES

A. General:

1. Provide keyed locks with interchangeable cores.

2. Provide construction core and interchangeable core for each keyed lock.

a. Contractor shall be responsible for managing and maintaining construction cores during construction.

b. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

B. Construction Cores:

1. Keyed locks shall be furnished with keyed construction cores for use during project construction.

C. Interchangeable Cores:

1. Keyed locks shall be designed and constructed and constructed to accept interchangeable core cylinders meeting the following criteria:

1. Core: Schlage Primus XP high-security cylinder.

2. Keyway: Schlage Everest 29, master-keyed per Owner's requirements.

2. Control Keys: Furnish special control keys, and deliver to Owner in accordance with Owner's instructions.

2.12 KEYING

A. Locks shall be construction master-keyed by the Contractor under the master key specified by the Owner's representative; construction keying shall remain in place until

such time as Owner assumes partial or complete occupancy of the project.

1. In the event that one or more parts of the project are to be occupied before other parts are completed (i.e., partial occupancy), only the keying for the part completed and occupied is to be changed to permanent keying until such time as the remainder of the project is completed.
2. Permanent keys will be activated by an Owner's representative.

B. Keying Coordination Meeting: The Hardware Supplier and the Contractor shall meet with the Owner's representative and the Architect, to review contract requirements for keys and keying.

1. Prior to the Keying Coordination Meeting, the Hardware Supplier shall prepare a preliminary keying schedule, and shall submit (through the Contractor) it to the Owner's representative and the Architect.
2. Where Owner's operational and/or security requirements necessitate changes, the preliminary keying schedule shall be revised and resubmitted for acceptance.
3. Keying coordination shall include keying for locks specified in this section as well as locks specified in other sections (e.g., gate locks specified in Section 323119 - Decorative Metal Fences and Gates).

C. Delivery of Keys:

1. Change keys shall be packed and delivered with each lock or cylinder.
2. Master keys shall be sent by Registered Mail (or other means is so requested by the Owner's representative) to the individual and address per instructions provided at the Keying Coordination Meeting.
3. Refer to Cylinders and Cores for additional requirements.

2.13 ACCESSORIES

A. Fasteners:

1. Hardware as furnished, shall conform to published templates generally prepared for machine screw installation.
2. Furnish each item complete with all screws required for installation.
3. Insofar as practical, concealed type fasteners for hardware units that have exposed screws shall be furnished with Phillips flat head screws, finished to match adjacent hardware.
4. Finish: Match finish of surfaces to which fastener is applied.

B. Maintenance Tools and Accessories:

1. Provide special wrenches and tools applicable to each different or special hardware component.
2. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and the governing building code, including but not limited to accessibility requirements specified in FBC-A.

B. Use templates provided by hardware item manufacturer.

C. Mounting Height for Hardware (measured from finished floor to center line of hardware item):

1. For Steel Doors: Comply with DHI (LOCS).

a. Kick Plates: Push side; 1-inch from door bottom, except as otherwise indicated.

b. At Toilet Room Doors, lockset mounting height shall comply with FBC-A.

2. For Wood Doors: As required per Product Approval; refer to Section 081423 - Exterior Stile and Rail Wood Doors.

a. Lockset mounting height shall comply with FBC-A.

D. Keyed Locks - Cylinders and Cores: Prior to completion of construction, deliver interchangeable cores to Owner in accordance with Owner’s instructions.

1. If requested by Owner, remove construction cores and install permanent interchangeable cores at no additional cost to Owner.

E. Key Cabinet: Locate where directed. Tag one set of file keys and one set of duplicate keys; place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers, or master or grand master key.

3.03 ADJUSTING

A. Clean and adjust door hardware for smooth operation and compliance with operating and opening force requirements specified in FBC-A SECTIONS 309.4 and 404.2.9.

3.04 PROTECTION OF FINISHED WORK

A. Do not permit adjacent work to damage hardware or finish.

3.05 HARDWARE SCHEDULE

A. Refer to Section 087100.01 - Door Hardware Schedule.

END OF SECTION

SECTION 087100.01
DOOR HARDWARE SCHEDULE

COMPONENT	QUANTITY	MANUF CODE	PART #		FINISH
HARDWARE GROUP 1 (EXTERIOR, ENTRY RAMP, SINGLE, OUTSWING, HM DOOR & FRAME MIAMI-DADE PRODUCT APPROVAL NOA NO. 15-0515.04)					
HINGE	4	HAG	BB1191	4.5" x 4.5"	630 (US32D)
MORTISE LOCKSET (ENTRANCE FUNCTION - ANSI/BHMA F20)	1	PHG	720M X SD		626 (US26D)
INCLUDE INTERCHANGEABLE CORE, STRIKES, & OTHER NECESSARY ELEMENTS					
DOOR CLOSER	1	LCN	4040XP- CUSH (100º OPEN) X 72MC		AL
INCLUDE PA SHOE, SHOE SUPPORT & OTHER ACCESSORIES NECESSARY FOR COMPLETE INSTALLATION					
THRESHOLD					
LATCHING SADDLE	1	PEM	2006AT		AL
MODULAR RAMP	1	PEM	R.5FA		AL
WEATHERSTRIPPING					
RIGID JAMB	1	PEM	319 AN		AL (WHITE)
ADHESIVE BACK	1	PEM	S88W		SIL (WHITE)
TOP RAIL CAP	1	DOOR TOP CLOSURE BY DOOR MFR, PER SECTION 081113			STL
O/H RAIN DRIP	1	PEM	346PW		AL (WHITE)
DOOR SHOE	1	PEM	234AV		AL
DOOR SWEEP	1	PEM	345PWV		AL (WHITE)
KICKPLATE	1	IVE	8400	10" x 34"	613 (US10B)
VIEWER (PEEPHOLE)	1	IVE	698		626 (US26D)

SECTION 087100.01
DOOR HARDWARE SCHEDULE

COMPONENT	QUANTITY	MANUF CODE	PART #		FINISH
HARDWARE GROUP 2 (EXTERIOR, ENTRY, DOUBLE, OUTSWING, WOOD DOORS & FRAME MIAMI-DADE PRODUCT APPROVAL NOA NO. 14-0507.03)					
HINGE	6	HAG	BB1191	4.5" x 4.5"	630 (US32D)
MORTISE MULTI-POINT LOCKSET (CLASSROOM, HOLDBACK FUNCTION - ANSI/BHMA F06)					
	2	SARGENT	12-NB-7000-06 X ES-Y		626/630 (US26D)
	INCLUDE INTERCHANGEABLE CORE, STRIKES, & OTHER NECESSARY ELEMENTS				
DOOR CLOSER	2	LCN	4040XP- CUSH (100º OPEN) X 72MC		AL
INCLUDE PA SHOE, SHOE SUPPORT & OTHER ACCESSORIES NECESSARY FOR COMPLETE INSTALLATION					
THRESHOLD					
LATCHING SADDLE	1	PEM	2005AT		AL
WEATHERSTRIPPING					
OUTER	1	SCHLEGAL	Q-LON QEZ-320		
INNER	1	SCHLEGAL	O-LON QDS-650		
MISCELL OTHER COMPONENTS		DOOR MFR'S STD, PER PRODUCT APPROVAL			MFR'S STD
HARDWARE GROUP 3 (INTERIOR, OPEN ROOM, SINGLE, OUTSWING, WOOD DOOR & FRAME)					
HINGE	3	HAG	BB1279	4.5" x 4.5"	626 (US26D)
CYLINDRICAL LOCKSET (CLASSROM FUNCTION - ANSI/BHMA F84)					
	1	SCH	ND70PD x ATH		626 (US26D)
	INCLUDE INTERCHANGEABLE CORE, STRIKES, & OTHER NECESSARY ELEMENTS				
KICKPLATE	1	IVE	8400	10" x 34"	613 (US10B)
SILENCER	3	IVE	SR64		GRY
WEATHERSTRIPPING					
ADHESIVE BACK	1	PEM	S88W		SIL (WHITE)
STOP (WALL BUMPER)	1	IVE	WS401CVX		626 (US26D)

SECTION 087100.01
DOOR HARDWARE SCHEDULE

COMPONENT	QUANTITY	MANUF CODE	PART #		FINISH
HARDWARE GROUP 4 (INTERIOR, TOILET ROOM, SINGLE, INSWING, WOOD DOOR & FRAME)					
HINGE	3	HAG	BB1279	4.5" x 4.5"	626 (US26D)
CYLINDRICAL LOCKSET (BATH/BEDROOM PRIVACY FUNCTION - ANSI/BHMA F76)					
	1	SCH	ND40S x ATH		626 (US26D)
	INCLUDE STRIKES, & OTHER NECESSARY ELEMENTS				
THRESHOLD					
SADDLE	1	PEM	1716A		AL
KICKPLATE	1	IVE	8400	10" x 34"	613 (US10B)
SILENCER	3	IVE	SR64		GRY
WEATHERSTRIPPING					
ADHESIVE BACK	1	PEM	S88W		SIL (WHITE)
STOP (WALL BUMPER)	1	IVE	WS401CVX		626 (US26D)
HARDWARE GROUP 5 (INTERIOR, JANITOR CLOSET, SINGLE, OUTSWING, WOOD DOOR & FRAME)					
HINGE	3	HAG	BB1279	4.5" x 4.5"	626 (US26D)
CYLINDRICAL LOCKSET (STOREROOM FUNCTION - F86)					
	1	SCH	ND80PD x ATH		626 (US26D)
	INCLUDE INTERCHANGEABLE CORE, STRIKES, & OTHER NECESSARY ELEMENTS				
THRESHOLD					
SADDLE	1	PEM	1716A		AL
KICKPLATE	1	IVE	8400	10" x 34"	613 (US10B)
SILENCER	3	IVE	SR64		GRY
WEATHERSTRIPPING					
ADHESIVE BACK	1	PEM	S88W		SIL (WHITE)
STOP (WALL BUMPER)	1	IVE	WS401CVX		626 (US26D)

SECTION 087100.01
DOOR HARDWARE SCHEDULE

COMPONENT	QUANTITY	MANUF CODE	PART #		FINISH
HARDWARE GROUP 6 (INTERIOR, UTILITY CLOSET, DOUBLE, OUTSWING, WOOD DOORS & FRAME)					
HINGE	6	HAG	BB1279	4.5" x 4.5"	626 (US26D)
CYLINDRICAL LOCKSET (STOREROOM FUNCTION - F86)					
	1	SCH	ND80PD x ATH		626 (US26D)
	INCLUDE INTERCHANGEABLE CORE, STRIKES, & OTHER NECESSARY ELEMENTS				
FLUSH BOLT (TOP)	1	IVE	FB457		626 (US26D)
SURFACE BOLT (BOTTOM)	1	IVE	SB1600M1		689 (SP28)
THRESHOLD					
SADDLE	1	PEM	1716A		AL
KICKPLATE	2	IVE	8400	10" x 34"	613 (US10B)
SILENCER	2	IVE	SR64		GRY
WEATHERSTRIPPING					
ADHESIVE BACK	1	PEM	S88W		SIL (WHITE)
STOP (WALL BUMPER)	1	IVE	WS401CVX		626 (US26D)
HARDWARE GROUP 7 (INTERIOR, STORAGE ROOM, DOUBLE, OUTSWING, WOOD DOORS & FRAME)					
HINGE	6	HAG	BB1279	4.5" x 4.5"	626 (US26D)
CYLINDRICAL LOCKSET (STOREROOM FUNCTION - F86)					
	1	SCH	ND80PD x ATH		626 (US26D)
	INCLUDE INTERCHANGEABLE CORE, STRIKES, & OTHER NECESSARY ELEMENTS				
FLUSH BOLT (TOP)	1	IVE	FB457		626 (US26D)
SURFACE BOLT (BOTTOM)	1	IVE	SB1600M1		689 (SP28)
KICKPLATE	2	IVE	8400	10" x 34"	613 (US10B)
SILENCER	2	IVE	SR64		GRY
WEATHERSTRIPPING					
ADHESIVE BACK	1	PEM	S88W		SIL (WHITE)
STOP (WALL BUMPER)	1	IVE	WS401CVX		626 (US26D)

SECTION 090161

CORAL STONE FLOORNG RESTORATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Restoration of existing historic coral stone paving/flooring, including guidance on the removal of surface dirt and environmental pollution.

B. Sealing of existing historic coral stone paving/flooring, using clear penetrating sealer.

1.02 RELATED REQUIREMENTS

A. Section 016302 - Use of Substitute Materials on Historic Exteriors.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. Florida Building Code, 5th edition; 2014 (FBC):

1. FBC-EB - Florida Building Code, Existing Building.

a. FBC-EB APPENDIX B -- The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

C. U.S. Department of the Interior (DOI):

1. DOI (REHAB) -- The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

D. U.S. General Services Administration (GSA):

1. GSA 0163002S -- Use of Substitute Materials on Historic Building Exteriors.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide manufacturer’s product data for cleaning and sealing products.

1. Include manufacturer’s recommendations for use on coral stone, surface preparation, limitations and precautions, and application procedures.

1.05 QUALITY ASSURANCE

A. Work of this section shall comply with applicable requirements of governing building code, including but not limited to FBC-EB Appendix B.

B. Safety Precautions:

1. Precautions should be taken to guard against unnecessary water infiltration.

a. Monitors should be set within the walls to determine moisture content and possible problems.

2. Caution should be provided concerning possible oxide `blooms' caused by some cleaning products, including the water soak process.

C. Coral Stone Restoration Contractor Qualifications: The work of this section shall be performed by a qualified restoration contractor experienced in cleaning and restoration of historic coral stone paving and flooring.

1.06 MOCK-UP

A. Remove dirt build-up from a 1 ft by 1 ft areal of coral stone flooring, to determine extent of cleaning.

1. Water-soak the test area.

a. Hang or support a 1/2-inch plastic pipe water spray array under a designated section to thoroughly and uniformly wet the area, soften any gypsum encrustation, and prepare it for final rinsing off with a plain water pressure washing.

b. Connect the spray array to a building water hydrant with 5/8-inch garden hose as required.

c. Fit the plastic pipe array with four to six fixed fine spray or mist garden sprinkler heads to cover the area and wet all face and side surfaces.

d. Provide a mechanical or electric timer control valve with adjustable time settings, lawn sprinkler type, with the capability of cycling the spray water on and off continuously for four hour cycles, or other timed periods as directed, 24-hours per day.

2. Following approval of the test installation, operate the water soak test spray system for a 24-hour period with a repeat test as directed.

3. Follow the 24-hour water soaking by a plain water pressure washing.

a. Record the effectiveness of the cleaning.

b. Include a repeat test cleaning on the same area, with a different timed cycle for sprays, for up to an additional 48-hour period followed by the same pressure wash rinse.

c. The repeat test may be waived by the Architect if the initial test results are conclusive.

B. Locate where directed.

C. Acceptable panel and procedures employed will become the standard for work of this section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Cleaning Products:

1. ProSoCo, Inc.: Lawrence, KS 66117; Tel. 800-255-4255

B. Sealer Products:

1. BASF

2.02 MATERIALS

A. For Removing Mold and Mildew:

1. Non-sudsing ammonia, or one of the following bleaches:

CAUTION: Do not mix ammonia with chlorine bleach.

CAUTION: Do not use bleach on bird droppings.

a. Sodium Hypochlorite (NaOCl): An unstable salt produced usually in aqueous solution and used as a bleaching and disinfecting agent.

(1) Other chemical or common names include: bleaching solution; household bleach; laundry bleach; solution of chlorinated soda.

(2) Potential Hazards: Corrosive to flesh.

b. Hydrogen Peroxide (H202): An unstable compound used especially as an oxidizing and bleaching agent.

(1) Other chemical or common names include: peroxide of hydrogen (commonly sold as a 3-percent solution); solution of hydrogen dioxide; Superoxol (commonly sold as a 30-percent solution).

(2) Potential Hazards: Toxic (when concentrated); corrosive to flesh; flammable (in high concentration).

c. Calcium Hypochlorite (CaCl2O2): A white powder used especially as a bleaching agent and disinfectant.

(1) Other chemical or common names include: chlorinated calcium oxide; bleaching powder; calcium oxymuriate; chloride of lime; chlorinated lime; hypochlorite of lime; oxymuriate of lime.

(2) Potential Hazards: Corrosive to flesh; flammable (when in contact with organic solvents).

d. Chloramine-T: Chloramine is any of various compounds containing nitrogen and chlorine.

2. Trisodium Phosphate: Strong base-type powdered cleaning material.

a. Other chemical or common names include: sodium orthophosphate; tribasic sodium phosphate; trisodium orthophosphate; TSP; phosphate of soda.

b. Potential Hazards: Corrosive to flesh.

3. Proprietary Cleaners:

a. Powdered Detergent: “Tide” by Proctor & Gamble, or approved equal

b. Acidic Cleaner: "Limestone Restorer” by ProSoCo, Inc., or approved equal.

B. Sealer Products:

1. Clear Penetrating Sealer: Clear, breathable, high-performance, 100-percent silane, penetrating sealer, with an oleophobic additive.

a. Product: “MasterProtect H 1001” (formerly Hydrozo 100 Plus) by BASF.

C. Water: Clean, potable water (at a temperature effective and tested for cleaning procedure).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine site conditions to determine that current drainage is sufficient for adequately and safely removing cleaning waste and run-off from the site.

B. Test-clean a small, inconspicuous area to check for adverse effects and damage to the material.

3.02 PREPARATION

A. Protect surrounding elements from damage due to restoration procedures.

B. Separate areas to be protected from restoration areas using means adequate to prevent damage.

C. Cover adjacent landscaping with tarpaulins or similar covers.

D. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

E. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

F. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 CLEANING

A. General:

1. Do not use more than one treatment on a given area unless the chemicals used from prior treatment have been washed away.

B. Removing Lichens and Algae (ONLY):

1. Remove as much plant growth as possible using a knife blade and stiff bristle

brush.

2. Water rinse the surface to remove plant material.
    a. If the substrate is sound and dense, use low to medium water pressure (100-400 psi).
    b. If the coral stone flooring is softer, use standard water pressure from the spigot.
3. Allow water to soak plant growth for approximately 30 minutes.
4. Gently scrub the surface with a stiff, natural bristle brush.
5. Thoroughly rinse the surface again with clean, clear water at low pressure from a garden hose.

C. Removing Mold and Mildew (ONLY):
1. General:
    a. Do not mix ammonia with chlorine bleaches - a poisonous gas will result.
2. Mix one of the following solutions:
    a. Solution 1:
        (1) 3 oz. (2/3 cup) trisodium phosphate (TSP) cleaner.
        (2) 1 oz. (1/3 cup) powdered detergent (i.e. Tide).
        (3) 1 qt. 5-percent sodium hypochlorite bleach (laundry bleach).
        (4) 3 qts. warm water.

    -OR-

    b. Solution 2:
        (1) 1 part ammonia.
        (2) 3 parts water.
3. Apply the solution to the affected area and scrub with a medium-hard natural bristle brush. Keep the surface saturated until the stain is bleached,
4. Thoroughly rinse the surface with clean, clear water from a garden hose and allow to dry.
5. Repeat the process as necessary to achieve the desired level of cleanliness

D. Removing Lichens, Algae, Mold and Mildew: Proprietary Cleaner may be used for treating any of the above (lichens, algae, mold or mildew).
1. Add 1 part Proprietary Cleaner to 3 parts water and mix in a rubber or polyethylene bucket.
2. Apply a flood coat of this mixture to the coral stone flooring using a low pressure spray (approximately 50 psi).

    CAUTION: Do not use a high pressure spray when applying this solution as this

may cause the solution to be driven deeper into the pores of the coral stone flooring, making removal of the solution difficult.

a. Begin spraying at the high point and move across horizontally. Allow 4 inches (100 mm) rundown.

b. Continue the next horizontal pass across the previous run down.

c. Allow the solution to remain on the surface approximately 5-30 minutes depending upon the thickness of the growth.

d. Gently scrub the surface with a stiff, natural bristle brush.

e. Thoroughly rinse the treated area using pressure-applied water (approximately 400 to 1500 psi) with a 40-60 degree fan spray or garden hose with nozzle adjusted to a tight stream. Rinse from the bottom of the treated area to the top.

f. Allow the surface to dry a minimum of 24 hours.

3.04 SEALING

A. Seal concrete pavers in accordance with the manufacturer's written recommendations.

3.05 PROTECTION

A. Protect finished work against exposure to weather and immersion in water per mortar and grout manufacturer's recommendations.

B. Protect coral stone paving from construction-related foot traffic for at least 24 hours after completion of the installation, and general foot traffic for at least 72 hours after installation.

C. Protect textured material during installation and afterwards. Seal architectural finishes of coral stone paving immediately after the grout is dry. Cover and protect the textured surface from vehicular traffic during the construction period.

D. After work in this section is complete, the Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 090561

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:

1. Porcelain tile flooring on mortar bed over concrete slab-on-grade.

2. Wood strip and plank flooring on secondary wood subfloor over concrete slab.

3. Paint floor finish on concrete slab.

B. Preparation of new concrete floor slabs for installation of floor coverings.

C. Testing of concrete floor slabs for moisture and alkalinity (pH).

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.

B. Section 093013 - Tiling: Porcelain tile flooring on mortar bed over concrete slab-on-grade.

C. Section 096429 - Wood Strip and Plank Flooring.

D. Section 099000 - Painting and Coating: Paint/coating floor finish on concrete.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C109/C109M -- Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

2. ASTM C472 -- Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).

3. ASTM F710 -- Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

4. ASTM F1869 -- Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:

1. Moisture and alkalinity (pH) limits and test methods.

2. Manufacturer's required bond/compatibility test procedure.

C. Testing Agency's Report:

1. Description of areas tested; include floor plans and photographs if helpful.

2. Summary of conditions encountered.

3. Moisture and alkalinity (pH) test reports.

4. Copies of specified test methods.

5. Recommendations for remediation of unsatisfactory surfaces.

6. Submit report not more than two business days after conclusion of testing.

D. Adhesive Bond and Compatibility Test Report.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.

1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.07 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:

1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.

2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.

C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

1. Thickness: As required for application and in accordance with manufacturer's installation instruction.

2. If testing agency recommends any particular products, use one of those.

PART 3 - EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:

1. Preliminary cleaning.

2. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.

3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.

4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.

5. Specified remediation, if required.

6. Patching, smoothing, and leveling, as required.

7. Other preparation specified.

8. Adhesive bond and compatibility test.

9. Protection.

B. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.

2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.

3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.

F. Report: Report the information required by the test method.

3.04 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.

D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.05 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.06 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.07 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.08 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 092116

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal framing and support systems for interior partitions, ceilings, and soffits.

B. Gypsum board.

C. Cementitious backing board.

D. Joint treatment and accessories.

E. Concealed backing systems, for support of wall-mounted items.

F. Acoustic materials.

1.02 RELATED REQUIREMENTS

A. Section 072100 - Thermal Insulation.

B. Section 079200 - Joint Sealants: Caulking of joints between gypsum board and other materials.

C. Section 093000 - Tiling: Wall tile installed on cementitious backing board.

D. Section 099000 - Painting and Coating: Field application of paint finish on gypsum board assemblies.

E. Division 22 - Plumbing: Plumbing fixtures, including concealed carriers installed in walls for support of wall-mounted fixtures.

1.03REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Iron and Steel Institute (AISI):

1. AISI S100 -- North American Specification for the Design of Cold-formed Steel Structural Members; 2007, with Supplements 1 and 2, dated 2010.

2. AISI S200 -- North American Standard for Cold-formed Steel Framing-General Provisions; 2007.

3. AISI S211 -- North American Standard for Cold-formed Steel Framing-Wall Stud Design; 2007.

4. AISI S212 -- North American Standard for Cold-formed Steel Framing-Header

Design; 2007.

C. American Society for Testing and Materials (ASTM):

1. ASTM A525 -- Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process; 1987.
2. ASTM A641A641M -- Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a.
3. ASTM A653/A653M -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2008.
4. ASTM C475/C475M -- Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012
5. ASTM C645 -- Standard Specification for Nonstructural Steel Framing Members; 2008a.
6. ASTM C665 -- Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
7. ASTM C754 -- Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2008.
8. ASTM C840 -- Standard Specification for Application and Finishing of Gypsum Board; 2008.
9. ASTM C954 -- Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2007.
10. ASTM C1002 -- Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.
11. ASTM C1047 -- Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2009.
12. ASTM C1278/C1278M -- Standard Specification for Fiber-Reinforced Gypsum Panel; 2007a.
13. ASTM C1396/C1396M -- Standard Specification for Gypsum Board; 2006a.
14. ASTM D638 -- Standard Test Method for Tensile Properties of Plastics; 2003.
15. ASTM D790 -- Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2015e2.
16. ASTM D3273 -- Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012e1.
17. ASTM D3678 -- Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Interior-Profile Extrusions; 2014.

18. ASTM E84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.
19. ASTM E90 -- Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2004.
20. ASTM E119 -- Standard Test Methods for Fire Tests of Building Construction and Materials; 2008a.
21. ASTM E413 -- Classification for Rating Sound Insulation; 2016.

D. Florida Building Code, 5th edition - 2014 (FBC):
   1. FBC-B -- Florida Building Code, Building.

E. Gypsum Association (GA):
   1. GA-214 -- Recommended Levels of Gypsum Board Finish; 2010.
   2. GA-216 -- Application and Finishing of Gypsum Board; 2007.

F. International Code Council, Inc. (ICC):
   1. ICC Evaluation Service, Inc. (ICC-ES):
      a. ICC-ES AC38 -- Acceptance Criteria for Water-Resistive Barriers.

G. Steel Framing Industry Association (SFIA):
   1. SFIA (TG) -- Technical Guide for Cold-Formed Steel Framing Products.

H. Steel Stud Manufacturers Association (SSMA):
   1. SSMA (PTI) -- Product Technical Information.

I. The Society for Protective Coatings (SSPC):
   1. SSPC-Paint 20 -- Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (ed. 2004).

J. Underwriters Laboratories, Inc. (UL):
   1. UL (FRD) -- Fire Resistance Directory.

1.04 SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS

A. Fabricate and install systems as indicated but not less than that required to comply with applicable requirements of the governing building code and ASTM C754.

B. Fabricate and install framing assemblies and components of sufficient strength to support the loads and forces encountered, or combinations thereof, without exceeding in any of its structural elements the stresses prescribed the governing building code and referenced standards.
   1. Live Loads and Deflection Requirements:
      a. Stud Framing Assemblies for Interior Partitions: Shall be designed, fabricated and installed to resist all loads to which they are subjected, but not less than

uniform live load of 5 PSF (240 Pa) applied perpendicular to the wall.

(1) Deflection: L/120, unless otherwise noted.

2. Limiting height/span for studs is to be calculated using specified uniform live load (as specified) perpendicular to studs, based on studs alone.

3. Maximum end bearing reaction load shall be calculated with minimum safety factor of 3.

C. Fire Resistance Ratings: Where fire resistance classification is indicated, provide materials and application procedures identical to that listed by UL or tested in accordance with ASTM E119 for the type of construction shown.

1. In addition, fire-resistance rated assemblies shall conform to requirements of the applicable UL Design as described in the UL (FRD).

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data:

1. Submit properly identified product data for each product specified, including materials specifications, installation recommendations, and other data as may be required to show compliance with specifications.

a. For each type of framing and furring system, provide data describing materials and finish, product criteria, charts and tables, and limitations.

b. For each type of gypsum board, accessories, joint finishing system, and other board materials, provide manufacturer's data showing compliance with requirements.

c. For each type of acoustical insulation and other sound attenuation materials, provide manufacturer's data showing compliance with requirements.

d. For each type of head-of-partition system, provide manufacturer's data showing compliance with requirements.

e. For each type of concealed backing system, provide manufacturer's data showing compliance with requirements.

f. Provide product data for screws and fasteners.

(1) Power-Actuated Fasteners: Include allowable loads, embedment, and spacing criteria.

2. For each type of partition assembly, provide manufacturer's data showing compliance with specified acoustic attenuation and fire resistance rating performance requirements.

3. Test Reports: For all stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

4. Fire-Test-Response Characteristics: Rated assemblies to be substantiated from applicable testing using proposed products, by Contractor.

    a. Both metal framing and wallboard manufacturers must submit written confirmation that they accept the other manufacturer's product as a suitable component in the assembly. Acceptance is as follows:

        (1) If installation of both products is proper, no adverse effect will result in the performance of one manufacturer's product by the other's product.

        (2) Combining products can be substantiated by required assembly tests.

C. Shop Drawings:

1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.

2. Describe method for securing tracks to building structure, and studs to tracks, and for blocking and reinforcement of framing connections.

    a. Include allowable shear and tension load limits for fasteners and anchors, and calculations showing that they can meet applicable SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS.

3. For each stud framing condition, identify framing member properties using four-part member identification codes per industry standard nomenclature published in AISI S200 (e.g., 362S125-33) and material yield strength (e.g., Fy = 33 ksi).

4. Indicate related work specified in other sections, including but not limited to concealed anchor plates, metal fabrications, concealed backing system for wall-mounted items (e.g., cabinets, toilet compartments, surface-mounted toilet accessories, grab bars, or other surface-mounted fittings and accessories) to be attached to stud-framed or furred walls/partitions.

5. For steel stud ceiling and soffit framing conditions where framing members are suspended from building structure above, include shop drawings and engineering calculations signed and sealed by a qualified structural engineer licensed in the State of Florida.

6. Indicate related work specified in other sections, including but not limited to concealed anchor plates, metal fabrications, concealed backing system for wall-mounted items (e.g., cabinets, toilet compartments, surface-mounted toilet accessories, grab bars, or other surface-mounted fittings and accessories) to be attached to stud-framed or furred walls/partitions.

7. Indicate details associated with fireproofing, acoustic seals, and draftstopping, fireblocking and firestopping.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Metal Framing Materials Manufacturer: Shall be a firm or company that is currently a full member of the SSMA or SFIA.

2. Gypsum Board Materials Manufacturer: Obtain each type of gypsum board and related joint treatment material from a single manufacturer.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

C. Contractor shall provide full time quality control over all fabrication and erection to ensure compliance with applicable requirements of the governing building code and regulations of the authority having jurisdiction.

1. Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials to site promptly without undue exposure to weather.

2. Deliver materials in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.

B. Storage:

1. Store materials above ground in dry, ventilated space.

2. Protect materials from soiling, rusting and damage.

3. Protect metal framing from corrosion, deformation, and other damage during delivery, storage, and handling in accordance with AISI standards.

C. Notify manufacturer of damaged materials received prior to installation.

1.08 PROJECT CONDITIONS

A. Environmental Requirements:

1. Proceed with installation of gypsum board materials only after building is weather tight. Maintain temperature in areas receiving gypsum board materials between 55 degrees and 90 degrees F. during and after installation and provide adequate ventilation.

2. For finishing of gypsum board, maintain ambient temperature above 55 degrees F from one week prior to joint treatment, and until joint treatment is complete and dry.

B. Coordinate the placement of components to be installed within stud framing system.

C. Coordinate layout and installation of suspension system components for suspended ceilings with other work supported by or penetrating through ceiling.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide completed assemblies complying with applicable requirements of the governuing building codc, ASTM C840 and GA-216.

1. The unsupported height of partitions shall comply with the loads and deflections set forth in the governing building code, including but not lkimited to FBC-B SECTION 1607.14 and TABLE 1604.3.

2. See PART 3 for finishing requirements.

B. Fabrication:

1. Fabricate assemblies of framed sections to sizes and profiles required.

2. Fit, reinforce, and brace framing members to suit design requirements.

3. Fit and assemble in largest practical sections for delivery to site, ready for installation.

C. Acoustic Attenuation: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Fire / Smoke Rated Assemblies: Comply with applicable requirements of the governing building code, including but not limited to FBC-B CHAPTER 7, and as indicated on drawings.

1. Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction indicated.

2.02 MANUFACTURERS

A. Metal Framing Materials:

1. Allsteel & Gypsum Products Inc.: www.allsteelproducts.com.

2. Clarkwestern Dietrich Building Systems, LLC: www.clarkdietrich.com.

3. Marino-Ware: www.marinoware.com.

4. Phillips Manufacturing Company: www.phillipsmfg.com.

5. The Steel Network Inc: www.SteelNetwork.com.

6. Telling Industries, LLC: www.tellingindustries.com.

B. Proprietary Suspended Drywall Ceiling Framing System:

1. United States Gypsum Company (USG): www.usg.com.

C. Board Materials:

1. Georgia-Pacific Gypsum Corporation (G-P): ww.gp.com.
2. National Gypsum Company (NGC): www.nationalgypsum.com.
3. United States Gypsum Company (USG): www.usg.com.

D. Drywall Beads and Trim:

1. Alabama Metal Industries Corporation (Amico): www.amico-online.com.
2. Clarkwestern Dietrich Building Systems, LLC: www.clarkdietrich.com.
3. Plastic Components, Inc. (PCI): www.plasticomponents.com.
4. United States Gypsum Company (USG): www.usg.com.
5. Vinyl Corporation: www.vinylcorp.com.

E. Anchorage Devices (for attaching metal framing components to concrete):

1. Hilti North America: www.hhilti.com.
2. ITW Ramset: www.ramset.com.

2.03 METAL FRAMING MATERIALS AND COMPONENTS

A. General:

1. Structural properties of studs and runners shall comply with ASTM C645.
2. Steel studs and track runners in walls shall comply with ASTM A525.
3. Metal framing materials shall conform to requirements of governing building code, including but not limited to FBC-B CHAPTER 25.

B. Metal Studs and Runners: ASTM C645, G60 galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing as specified in SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS, except as otherwise indicated.

1. Studs: C-shaped steel studs.

a. Depth (flange): 1-1/4 inches (35 mm) minimum, except as follows:

(1) Where stud depth greater than 1-1/4 inches is required per UL Design assembly referenced on Drawings, provide studs of depth specified in the UL (FRD) assembly description for the referenced UL Design assembly.

b. Return: Provide 1/4 inch (6 mm) minimum folded back return flange leg at each side of stud, except as follows:

c. Size (width): 1-5/8 inches, 2-1/2 inches, 3-5/8 inches, 4 inches, or 6 inches, as indicated on Drawings.

d. Thickness (gage): 25-gage, 22-gage or 20-gage, as required to meet applicable requirements of governing building code and specified SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS (e.g., load, deflection, and SSMA/SFIA limiting heights), except as follows:

(1) Where Thickness is Indicated on Drawings: Minimum thickness to be not less than so indicated.

(2) Metal Stud Framing for Support of Cementitous Backer Board: Shall be minimum 20 gage.

e. Yield Strength (Fy): As required to meet or exceed applicable requirements of governing building code and specified SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS (e.g., load, deflection, and SSMA/SFIA limiting heights), except as follows:

(1) Minimum yield strength be not less than 33 ksi.

2. Runners / Tracks (except Slotted Deflection Tracks): U-shaped, sized to match studs.

a. Size (width): Sized to match studs.

b. Depth: Leg height to be not less than 1-1/4 inches (32 mm).

(1) Where greater track depth is required per UL Design Assembly referenced on drawings, provide tracks of depth specified in the UL (FRD) assembly description for the referenced UL Design Assembly.

c. Metal Thickness (gage): Same as studs.

3. Slotted Deflection Tracks (Partition Head-to-Structure Connections): Provide U-shaped channel with mechanical anchorage devices designed to accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.

a. Structural Performance:

(1) Maintain lateral load resistance and vertical movement capacity required by applicable requirements of the governing building code, when evaluated in accordance with AISI S100.

(2) Allow for vertical deflection of structure of up to 1 inch (1/2 inch up and 1/2 inch down), except as otherwise indicated.

b. Fire-Resistance: Provide components certified for use in UL-listed fire-rated head of partition joint systems of fire rating and movement required.

c. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.

(1) Thickness: 18 or 20 gauge, as required to comply with manufacturer's published Allowable Lateral Loads criteria; but in no instance shall thickness be less than 20 gauge.

d. Dimensions:

(1) Size (width): Sized to match studs.

(2) Depth (flange): Leg height to be not less than 2-1/2 inches; with vertical slots 1/4 inch wide x 1-1/2 inches long, spaced at 1 inch o.c.

e. Acceptable Products: Equivalent to MAXTRAK SLOTTED DEFELCTION TRACK or BRADY'S SLP-TRK SLOTTED DEFELCTION TRACK by Clarkwestern Dietrich.

4. Radius Runners (for curved wall framing): Manufactured, hand-bendable, U-shaped runner specifically designed for use in curved drywall assemblies; shall holds its shape once formed.

a. Minimum Bend Radius Capability: 20 inches.

b. Material: ASTM A653 steel sheet, with G60/Z180 hot dipped galvanized coating.

c. Size (width): Sized to match studs.

d. Metal Thickness (gage): 20 gage (33 mils).

e. Product: READY-TRACK by RadiusTrack, or equal.

C. Furring Systems: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

1. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).

a. Size (width): 7/8 inch (22 mm) or 1-1/2 inches (38 mm), as indicated on Drawings; if not indicated, provide 7/8 inch (22 mm).

b. Metal Thickness (gage): 25 gage or 20 gage, as indicated on drawings, except as follows:

(1) Where Thickness is Not Indicated on Drawings: Minimum to be not less than 25 gage.

(2) Metal Furring for Support of Cementitous Backer Board: Shall be minimum 20 gage.

2. Resilient Furring Channels: Double-leg sections, designed to reduce airborne sound through a partition assembly, or to comply with requirements for fire-rated assembly.

a. Size (width): 1/2 inch (12 mm).

b. Metal Thickness (gage): 25 gage or 20 gage, as indicated on drawings, except as follows:

(1) Where Thickness is Not Indicated on Drawings: Minimum to be not less than 25 gage.

3. Z Furring: Z-shaped sections.

a. Size (width): 1 inch (25 mm), 1-1/2 inches (38 mm), 2 inches (51 mm) or 2-1/2 inches (64 mm), as indicated on drawings; if size is not indicated, provide 1-1/2 inch (38 mm).

b. Leg Dimensions: 3/4 inch (19 mm) x 1-1/4 inches (32 mm); the 1-1/4 inch (32 mm) leg is to be slightly toed in for a positive grip on the insulation.

c. Metal Thickness (gage): 25 gage or 20 gage, as indicated on drawings, except as follows:

(1) Where Thickness is Not Indicated on Drawings: Minimum to be not less than 25 gage.

D. Soffit and Ceiling Support Materials (Interior): ASTM C645, G60 galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with specified deflection limits.

1. General:

a. Hanger Anchorage Devices: Screws, clips, bolts or other devices compatible with indicated structural anchorage for ceiling hangers and whose suitability has been proven through standard construction practices or by certified test data.

b. Power-Actuated Fasteners in Concrete: Fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers and with capability to sustain, without failure, a load equal to 10x calculated loads.

c. Post-Tensioned Concrete Slabs:

(1) For inserts placed in post-tensioned concrete work, maintain 3 inch clearance between inserts and prestressing strands.

(2) If insert is in conflict with strand, insert must be moved to avoid strand. Do not move strands to avoid inserts.

d. Hangers:

(1) Steel wire or rods, sizes to comply with requirements of ASTM C754 for ceiling or soffit area and loads to be supported.

(2) Wire: ASTM A641, soft, Class 1 galvanized.

(3) Rods and Flats: Mild steel components; Galvanized with G40 hot-dip galvanized coating per ASTM A525.

e. Framing System:

(1) Main Runners: Cold-rolled, "C" shaped steel channels, 16 gauge minimum; galvanized with G40 hot-dip galvanized coating per ASTM A525.

(2) Cross Furring: Hat-shaped steel furring channels, ASTM C645, 7/8 inch high, 25 gauge, galvanized.

(3) Furring Anchorages: 16 gauge galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws recommended by furring manufacturer and complying with ASTM C754.

2. Steel Stud-Framed Ceilings, Braced Soffits, and Soffit Support Systems:

a. Framing: C-shaped steel studs and runners.

(1) Depth (flange): 1-1/4 inches (35 mm) minimum.

(2) Return: 1/4 inch (6 mm) minimum folded back return flange leg at each side of studs.

(3) Size (width): 1-5/8 inches (41 mm), 2-1/2 inches (64 mm), 3-5/8 inches (92 mm), 4 inches (102 mm), or 6 inches (152 mm), as indicated on Drawings.

(4) Metal Thickness (gage): Minimum thickness to be not less than that required to meet or exceed applicable requirements of the governing building code based on span distance, stud spacing, stud size, loads, and deflection criteria, in accordance with Limiting Span Charts and Tables for Steel Stud Ceiling Systems per SFIA (TG) or SSMA (PTI).

3. Suspended Grillage Ceiling Support System:

a. Hanger Devices for Concrete: Post-installed, expansion anchor or chemical anchor, fabricated from corrosion-resistant materials, with holes or loops for attaching hanger wires.

(1) Hanger devices shall be capable of sustaining, without failure, a load equal to not less than 10 times that imposed by construction, as determined by testing in accordance with ASTM E488 by a qualified independent testing agency.

b. Hangers: Hangers shall comply with applicable requirements of the governing building code.

(1) Hanger Wire: ASTM A641 galvanized steel wire, pre-straightened.

(2) Hanger Rods: Mild steel, zinc coated.

(3) Flat Bar: Mild steel, zinc coated; 1 inch x 3/16 inch.

(4) Angle-Type Hangers: Angles with legs not less than 7/8 inch wide, formed from 0.0312 inch thick galvanized steel sheet per ASTM A653/A653M, G 60 coating, with bolted connections and 5/16 inch diameter bolts.

c. Tie Wire: Tie wire shall comply with applicable requirements of the governing building code.

(1) Cross furring shall be securely saddle-tied to the main runners by not less than two strands of No. 16 W and M gauge galvanized wire or equivalent approved attachments.

(2) Cross furring shall be attached to joists or beams with double No. 14 W and M gauge galvanized wire or equivalent approved attachments.

(3) Splices in cross furring shall be lapped 8 inches and tied, each end, with double loops of No. 16-gauge wire.

d. Main Carrying Channels (Runners): Main runners or carriers shall be minimum 1-1/2 inch rolled galvanized steel channels.

e. Cross Furring - Metal Lath and Plaster Ceiling: Cross furring for various spacing of main runners or other supports shall be 3/4-inch galvanized steel channels.

f. Cross Furring - Gypsum Board Ceiling: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).

(1) Furring size (width): 7/8 inch (22 mm) or 1-1/2 inches (38 mm), as indicated on Drawings; if not indicated, provide 7/8 inch (22 mm).

(2) Furring thickness (gage): 25 gage or 20 gage, per ASTM C754 and manufacturer's Limiting Ceiling Span Charts and Tables; if gage is not indicated, provide 20 gage.

4. Proprietary Suspended Drywall Ceiling Framing System:

a. Material: Commercial-quality, cold-rolled steel, hot-dipped galvanized finish.

b. Components:

(1) Main Tees: Fire-rated, heavy-duty classification, with integral reversible splice with knurled face; 1.617 inches high x 144 inches long, with 1-1/2 inches face width.

(2) Cross Members (Cross Tees): Fire-rated, with knurled face; 1-1/2 inches high x 48 inches long, with 1-1/2 inches face width.

(a) Tees must have quick-release cross tee ends to provide positive locking and removability without the need for tools.

(3) Furring Channel: Fire-rated; 7/8 inches high x 48 inches long, with 1-1/2 inches face width.

(4) Accessory Cross Tees: Fire-rated, with knurled faces; 1-1/2 inches high x 48 inches long, with 1-1/2 inches face width.

(a) Tees must have quick-release cross tee ends to provide positive locking and removability without the need for tools.

(5) Wall and Channel Moldings: Single web with knurled face.

c. Accessories: Provide transition clips, splice clips, wall attachment clips, splice plates, drywall clips, and other accessories as necessary for a complete installation.

d. Product: "FLAT DRYWALL SUSPENSION SYSTEM" by USG, or equal by

Armstrong..

E. Accessories and Fasteners:

1. Miscellaneous Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

2. Metal Angle (for shaftwall construction, corner framing at braced soffits, and other similar applications): Of same material as studs; 24-gage thickness; size 2-1/2 x 2-1/2 inches, unless otherwise indicated; complying with applicable requirements of ASTM C754.

3. Screw Fasteners: ASTM C1002 self-piercing tapping screws; shall comply with applicable requirements of governing building code, including but not limited to FBC-B CHAPTER 25.

   a. Fasteners for attaching steel studs to steel runners shall be Type S (for 25- and 22-gage) pan head or Type S-12 (for 20-gage or thicker) low profile head.

   b. Fasteners for attaching steel studs to door frames shall be Type S-12 pan head.

   c. Fasteners for attaching steel studs to jamb anchors shall be Type S-12 low profile head.

   d. Fasteners for attaching gypsum board to metal framing shall be Type S bugle-head, or length appropriate for thickness of board(s).

   e. Fasteners used for attaching cementitious backer board to metal studs shall be corrosion-resistant, wafer head type with countersinking ribs, specifically designed to allow for flush seating while preventing strip-outs; length and product per backer board manufacturer's recommendation. Do not use standard drywall screws.

4. Track Fasteners: High-quality fasteners conforming to the following criteria:

   a. General:

      (1) When used in a fire-rated wall/partition assembly, fasteners shall conform to applicable UL Design specification.

      (2) Allowable Service Load: As required to meet applicable design loads, but not less than the following:

         (a) Tension: 115 lbs.

         (b) Shear: 220 lbs.

      (3) When drywall framing is suspended from underside of floor/roof deck above (e.g., soffit, ceiling), track fasteners shall be minmum 1/4 inch diameter concrete anchor screws with minimum 1 inch fender washers, unless otherwise noted.

   b. Products:

      (1) Fastener for Attaching Metal Framing Components (e.g., drywall runners)

to Concrete Masonry at Floor or Wall: HILTI X-GN, or equal

(2) Fastener for Attaching Metal Framing Components (e.g., drywall runners) to Steel: HILTI X-GHP, or equal.

(3) Fastener for Attaching Metal Framing Components (e.g., drywall runners) to Underside of Concrete Floor/Roof Deck at Soffit/Ceiling Assembly: Tapcon Maxi-Set with additional 1-inch diameter fender washer.

5. Tie Wires: Use tie wires not less than 16 gage galvanized annealed wire.

2.04 BOARD MATERIALS

A. General:

1. All types of gypsum board materials shall comply with applicable requirements of:

a. Governing building code, including but not limited to FBC-B CHAPTER 25.

b. ASTM C1396/C1396M.

2. All types of gypsum board panels shall be mold and mildew resistant.

a. Mold and Mildew Resistance (ASTM D3273): Panel score of 10, except as otherwise indicated.

3. Panel sizes to minimize joints in place; ends square cut, except as otherwise indicated.

B. Regular Gypsum Board: ASTM C1396/C1396M (Section 5), regular type.

1. Edges: Tapered long edge.

2. Thickness: Use 5/8 inch thick for all applications, except where otherwise indicated on Drawings.

3. Product: SHEETROCK brand MOLD TOUGH gypsum panels by USG, or equal.

C. Type X (Fire-Resistant) Gypsum Board: ASTM C1396/C1396M (Section 5), Type X.

1. Edges: Tapered long edge.

2. Thickness: Use 5/8 inch thick for all applications, except where otherwise indicated on Drawings.

3. Product: SHEETROCK brand MOLD TOUGH FIRECODE gypsum panels by USG, or equal.

D. Ceiling Board: ASTM C1396/C1396M (Section 12), non-sag type.

1. Thickness: 1/2 inch.

2. Product: SHEETROCK brand SAG-RESISTANT INTERIOR GYPSUM CEILING BOARD by USG, or equal.

E. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (610 mm) wide, beveled long edges, ends square cut.

1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.

2. Product: SHEETROCK brand GYPSUM LINER PANELS - Enhanced (mold-resistant) by USG, or equal.

F. Flexible Gypsum Board:

1. Specifically designed for use in curved applications without wetting.

a. Minimum Inside (Concave) Dry Bending Radius: 20 inches (widthwise, w/ stud spacing at maximum 9 inches o.c.).

2. Thickness: 1/4 inch.

3. Acceptable Product: SHEETROCK brand FLEXIBLE GYPSUM PANELS by USG, or equal.

G. Cementitious Backer Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.

1. Thickness: 5/8 inch, unless otherwise noted.

2. When used in fire-rated assembly, Cementitious Backer Board shall bear UL Classification Mark in accordance with requirements of applicable UL Design Assembly (e.g., UL Design No. U457).

3. Acceptable Product: DUROCK brand CEMENT BOARD by USG, or equal

2.05 JOINT TREATMENT MATERIALS

A. General:

1. Joint materials shall conform to ASTM C475/C475M.

B. Joint Compounds:

1. All-Purpose Joint Compound: Drying type (ready-mixed) joint compound recommended for embedding, finishing, laminating and skim coating.

a. Product: SHEETROCK brand all purpose joint compound by USG, or equal.

2. Setting-Type Joint Compound: Chemically-hardening joint compound recommended for use with cement backer board, and for treating fastener heads in areas to receive metal lath and cement plaster.

a. Product: SHEETROCK brand setting-type joint compound by USG, or equal.

C. Primer Surfacer: Spray-applied vinyl acrylic latex-based coating, designed especially for interior application over Finish Level 4 (GA-214 / ASTM C840) drywall surface in order to achieve Finish Level 5 gypsum board finish.

1. Product: SHEETROCK brand TUFF-HIDE Primer-Surfacer by USG, or equal.

D. Joint Treatment Tape: Type and width recommended by gypsum board manufacturer

for project conditions.

2.06 BEADS, TRIMS AND MOLDINGS

A. PVC Drywall Beads and Trim: One-piece extruded vinyl trim manufactured of high-impact resistant PVC, and conforming to ASTM D3678 and ASTM C1047; supplied by board manufacturer.

1. Flanges of PVC trim components shall have punch hole pattern for positive bonding of joint compound and other finishes to surface of gypsum board; PVC material shall have excellent paintability.

2. Physical Characteristics:

a. Tensile Strength / Tensile Modulus, min. (ASTM D638): 6,200 psi / 390,000 psi.

b. Flexural Strength / Flexural Modulus, min. (ASTM D790): 11,000 psi / 35,000 psi.

c. Flammability (ASTM E84):

(1) Flame Spread: 18, maximum.

(2) Fuel Contribution: ND.

(3) Smoke Density, at 35 mils: 250, maximum.

(4) Fire Rating: Class A.

3. Components:

a. "J" Bead (Casing Bead): Tapered face return; back flange 1-3/16 inch; front return 1/2 inch.

(1) Product: Equivalent to Product #200X- series by PCI; size as appropriate for thickness of gypsum board.

b. Fillable "J" Bead: For use in encasing raw edges of drywall so as to prevent moisture from migrating into board; 1-1/16 inch wide perforated flange; back flange 3/8 inch.

(1) Product: Equivalent to Product #201- series by PCI; size as appropriate for thickness of gypsum board.

c. Fillable "L" Bead: For use in creating a clean detail at any point of termination of drywall into windows, doors, etc.; 1-1/16 inch wide perforated flange.

(1) Product: Equivalent to Product #221- series by PCI; size as appropriate for thickness of gypsum board.

d. Shadow Molding ("Z" Molding): For use in creating a reveal or relief detail around windows, doors, etc., and wall to wall details; 1-1/8 inch wide perforated flange; reveal size as indicated on drawings.

(1) Product: Equivalent to Product #202/203/204 series by PCI; size as

appropriate for reveal dimension.

e. Corner Bead:

(1) Regular Leg: For use on 90 degree outside corners; 1-1/4 inch perforated and striated tapered legs.

(a) Product: Equivalent to Product #209 by PCI.

(2) Long Leg: For use on 90 degree outside corners; 1-5/8 inch perforated and striated tapered legs.

(a) Product: Equivalent to Product #209-XL by PCI.

f. Inside Corner Bead: For use on 90 degree inside corners; 1-1/4 inch perforated and striated tapered legs for better adhesion.

(1) Product: Equivalent to Product #209-IC by PCI.

g. Splayed Corner Bead: For use on 120 to 135 degree inside corners; 1-1/4 inch perforated and striated tapered legs for better adhesion.

(1) Product: Equivalent to Product #209-135 by PCI.

h. Drywall Reveal: Perforated flanges with a "U" channel; built-in stops for proper finish thickness.

(1) Reveal Dimensions: Width as indicated on drawings x 1/2-inch depth.

(2) Product: PCI Drywall Reveal, or equal.

i. Control Joint: 1 inch wide perforated flanges with a "V" channel; built-in stops for proper finish thickness.

(1) Product:

(a) Where Joint Movement Is Not Indicated: Equivalent to Product #2027-16 by PCI.

(b) Where Joint Movement Is Not Indicated: Equivalent to Product #PL093-16 by PCI.

B. Paper-Faced Metal Drywall Beads and Trim: Products shall comply with ASTM C1047, and shall be type recommended by manufacturer to reinforce architectural edges and corners protecting them from chipping and cracking due to normal building movement and everyday wear-and-tear.

1. Materials: Shall be made with a strong, paper tape laminated to a sturdy, rust-resistant metal form, ensuring excellent adhesion of joint compounds, textures, and paints

2. Profiles: Provide suitable trim profile for each edge and corner condition.

a. Trims shall be available in a variety of profiles, including 90-degree and offset outside corner bead; 90-degree and offset inside corner bead; “L” shaped tape-on trim; "J” shaped tape-on trim; reveal tape-on trim; tape-on flexible corner;

and tape-on flexible outside corner.

b. Trims shall conform to profile and dimensions indicated on drawings; or if not indicated, conform to trim profile and dimensions suitable for each applicable condition in accordance with trim manufacturer's recommendations.

3. Product: Equivalent to SHEETROCK brand PAPER-FACED METAL BEAD AND TRIM by USG.

2.07 ACOUSTICAL MATERIALS

A. Acoustical Sealant: A highly elastic, water-based caulking for sound-rated partition systems, and sealing exterior walls to reduce infiltration; non-bleeding and non-staining; pumpable; easily applied in beads.

1. Shall provide excellent adherence to most surfaces, permanent flexibility and lasting seal.

2. Shall meet or exceed ASTM C919 and ASTM C834.

3. Acceptable Product: Sheetrock brand Acoustical Sealant by USG, or equal.

4. Refer to Section 079200 - Joint Sealants, for additional requirements.

B. Sound Attenuation Batts/Blankets (SAFB): Paperless, semi-rigid mineral fiber batts designed to improve STC ratings when installed in partitions.

1. Mineral fiber, conforming to ASTM C665, Type I.

2. Surface burning characteristics per ASTM E84:

a. Flame spread: 15 or less.

b. Smoke developed: 0.

3. Thicknesses: As indicated.

4. Acceptable Product: Thermafiber LLC Sound Attenuation Fire Blankets SAFB (Fire Safety FS-15 Blankets), or equal.

2.08 CONCEALED BACKING SYSTEMS

A. Concealed Backer Plates:

1. At locations where cabinets, toilet compartments (e.g., toilet compartment wall brackets, urinal screen wall brackets, head rail brackets), surface-mounted toilet accessories (e.g., waste receptacles, mirrors, etc.), chair rails, or other surface-mounted fittings and accessories are to be attached to stud-framed or furred walls/partitions, provide backer plate(s) as follows:

a. Backer plate(s) shall be of sufficient size and strength to provide secure attachment and support for item(s) being attached thereto.

b. Material: Galvanized steel sheet, of dimensions as follows:

(1) Width: 12 inches.

(2) Length: 10 feet.

(3) Metal Thickness: 20 gage, minimum.

c. Product: Backing Plate (BPE) by Clarkwestern Dietrich, or equal.

2. Failure to provide backer plates for attachment of cabinets, toilet compartments, surface-mounted toilet accessories, or other surface-mounted fittings and accessories to stud framing or furring will not be allowed, regardless of whether or not such backing plates are indicated on the drawings.

3. Direct attachment of cabinets, toilet compartments, surface-mounted toilet accessories, or other surface-mounted fittings and accessories to stud framing or furring will not be allowed, except with written approval by Architect.

B. Concealed Anchor Plates: N/A.

C. Concealed Backing System (alternative, for use in lieu of Concealed Anchor Plates):

1. At locations where grab bars are to be attached to stud-framed walls/partitions, provide concealed backing system as follows:

a. Concealed backing system shall be of sufficient size and strength to provide secure attachment and support for item(s) being attached thereto.

b. Materials: Concealed backing system shall be proprietary system including galvanized steel clips and fire-retardent-treated wood backing, designed for attachment to studs.

(1) Metal Clips: Shall conform to system manufacturer's standard.

(a) Size: 10-1/4 in., unless otherwise noted.

(2) Wood Components: Shall be fire-retardent-treated (DriconR Wood Backing) lumber; minimum 2x12 in size; length, as follows:

(a) At locations where concealed backing system is for attachment of wall-hung elements (except grab bars): Pre-cut length to fit 16 in. o.c. stud spacing, unless otherwise noted.

(b) At locations where concealed backing system is for attachment of grab bars: Pre-cut length to fit 12 in. o.c. stud spacing, unless otherwise noted.

c. Product: Clark-Dietrich "Fastback Backing System" (FBBS), or equal.

2. Failure to provide concealed backing system for attachment of grab bars to stud framing will not be allowed, regardless of whether or not such concealed backing system is indicated on the drawings.

3. Direct attachment of grab bars to stud framing or furring will not be allowed, except with written approval by Architect.

2.09 ACCESSORY MATERIALS

A. Gypsum Board Screws: Self-drilling, self-tapping steel screws.

1. For Steel Framing Less Than 0.03 Inch Thick: Comply with ASTM C1002.

2. For Steel Framing from 0.033 Inch Thick to 0.112 Inch Thick: Comply with ASTM C954.

3. Provide Type S or Type S-12 screws.

B. Hanger Wire Sound Isolators: Provide where indicated for sound-rated suspended ceilings.

C. Thermal Insulation: Refer to Section 072100 - Thermal Insulation.

D. Water-Resistive Barrier: Plastic sheet complying with ICC-ES AC38.

E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

F. Miscellaneous Accessories: Provide as required for complete installations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 INSTALLATION – GENERAL

A. Install in accordance with most stringent requirements of the governing building code (including but not limited to HVHZ requirements) and the following:

1. Metal Framing: ASTM C754.

2. Gypsum Board and Joint Treatment: ASTM C840.

3. Gypsum panel manufacturer's published recommendations.

B. Tolerances:

1. Do not exceed 1/8 inch in 8 ft variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.

2. Do not exceed 1/16 inch variation between planes of abutting edges or ends.

3. Shim as required to comply with specified tolerances.

C. Fire-Rated Assemblies: Install in accordance with specified UL Design as described in the UL (FRD).

D. Finishing: Perform in accordance with ASTM C840, to achieve finish levels specified in Finish Level Schedule included at end of this Section.

3.03 INSTALLATION - METAL FRAMING

A. Metal Runners:

1. Align and secure runner tracks accurately to partition layout at both floor and

ceiling.

2. Provide fasteners appropriate to substrate construction as recommended by manufacturer.

B. Metal Studs:

1. Position metal studs vertically in the runners, spaced as indicated.

a. Install studs at the following spacing:

(1) Partitions: Install studs vertically at maximum 24 inches on center, except where closer spacing is indicated on drawings or where limiting height load tables indicate that stud spacing must be less in order to meet specified SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS (e.g., load and deflection criteria).

(2) Soffits, Braced: Install studs at maximum 16 inches on center, except where where manufacturer's load tables indicate that stud spacing must be less in order to meet specified SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS (e.g., load and deflection criteria). Unbraced soffits are not allowed.

(3) Curved Gypsum Board Construction (e.g., Curved Walls, Soffits): Install studs at maximum 9 inches on center.

(4) Shaftwall Partitions: Install studs vertically at 24 inches on center.

b. Where limiting height load tables indicate that stud spacing must be less than indicated above in order to meet specified SYSTEM DESIGN AND PERFORMANCE REQUIREMENTS (e.g., load and deflection criteria), comply with spacing indicated in limiting height load tables.

c. Provide double stud at the following locations:

(1) Wall openings.

(2) Door and window jambs; storefront mullions.

(3) Not more than 2 inches from each side of openings.

(4) Locations where necessary to provide adequate anchorage, bracing or support for wall-mounted items (e.g., handrail brackets, plumbing fixtures, toilet compartment partitions, wall cabinets, shelving standards, toilet accessories, hardware, etc.).

(5) Other locations as indicated on Drawings.

2. Place studs so that flanges face in same direction.

3. Cut studs 1/2 inch short of full height to provide perimeter relief.

4. Align and plumb partition framing accurately.

5. Where partitions abut ceiling or deck construction or vertical structural elements,

provide slip or cushion type joint between partition and structure as recommended by stud manufacturer to prevent transfer of structural loads or movements to partitions, and to provide lateral support.

6. Where studs are installed directly against exterior walls, install asphalt felt strips or glass fiber strips between studs and wall.

7. Provide horizontal bracing where necessary for lateral support.

8. Chase Walls:

    a. Position steel studs on opposite sides of chase directly across from each other.

    b. Cut cross-bracing from gypsum board 12 inches high by chase wall width.

C. Hat Channel Furring:

1. Attach hat-shaped furring channels either vertically or horizontally with fasteners through alternate wing flanges (staggered).

2. Space furring channels at 24 inches on center, unless otherwise indicated. Where furring is indicated to receive backer board with metal lath and cement plaster, space at 16 inches on center.

3. Install furring channels within 4 inches of floor line and ceiling line.

D. Z-Furring:

1. Securely attach narrow flanges of members to wall with concrete stub nails or power-driven fasteners, except as otherwise indicated.

2. Sequence furring installation with installation of insulation.

E. Ceiling and Soffit Support Systems:

1. General:

    a. Maximum unsupported drywall area shall not exceed 48 inches x 24 inches.

2. Suspended Ceiling Grillage System:

    a. Secure hangers or rods to structural support by connecting directly to structure where possible; otherwise connect to inserts, clips or other anchorage devices or fasteners indicated.

    b. Space main runners, hangers and furring according to requirements of ASTM C754, except as otherwise indicated.

    c. Where spacing of structural members, or width of ducts or other equipment, prevents regular spacing of hangers, provide supplemental hangers and suspension members and reinforce nearest affected hangers to span extra distance.

    d. Limitations:

        (1) Steel studs are not designed to carry live loads, mechanical equipment, or

material storage.

(2) Maximum Spacing:

(a) 1-1/2 inch cold-rolled channels and hangers: 48 inches on center.

(b) For single-layer panels, maximum steel stud and furring channel spacing is 24 inches on center for perpendicular application and 16 inches on center for parallel application.

(c) For panels used as base for spray-applied ceiling texture finish, maximum frame spacing is 16 inches on center for 1/2 inch thick panels perpendicularly applied (parallel panel application not recommended); 24 inches on center for 5/8 inch thick panels perpendicularly applied, 16 inches on center for parallel application.

e. Attach directly to structural elements only; do not attach to metal deck. Loop hangers and wire-tie directly or provide anchors or inserts.

f. Extend runners to within 6 inches of walls.

g. Wire-tie or clip furring members to main runners and to other structural supports indicated. In fire resistance rated assemblies, wire-tie furring members; do not clip.

h. Do not permit furring or runners to contact masonry or concrete walls.

i. Provide 1 inch clearance between furring or runners and abutting walls and partitions.

3. Steel Stud Ceiling System:

a. Steel stud framed ceilings may be installed at interior spaces not wider than (8) eight feet.

b. At spans greater than 8 feet, install Suspended Ceiling Grillage System unless framing members and spacing are specifically designed and recommended by manufacturer for proposed span and loading with specified deflection limits.

c. Install runner channels around perimeter of ceiling area where steel stud framing is to be installed.

d. Space main framing members at 16 inches o.c., with cross bracing at 48 inches o.c.

e. Where 25-gage steel studs are used, stud-end stiffeners are required. Install per manufacturer’s installation instructions.

4. Proprietary Suspended Drywall Ceiling Framing System:

a. Install in accordance with manufacturer’s current printed recommendations.

b. Component and Hanger Wire Installation:

(1) Flat Ceilings:

(a) Main tees shall be spaced a maximum of 48 inches on center and supported by hanger wires spaced a maximum 48 ionches on center, attaching hanger wires directly to structure above.

(b) Cross tees shall be spaced per manufacturer's recommendations.

(2) Transitions (Changes in Elevation in Soffit and Fascia Ceiling Applications):

(a) When constructing stepped soffits, bracing of the drywall suspension system and/or additional hanger wires may be necessary to ensure stability and structural performance during and after drywall attachment.

(b) The maximum vertical soffit height is 48 inches.

(c) Intermediate cross tees are not necessary when soffit dimensions do not exceed 24 inches.

(d) Cross tee spacing in horizontal soffit plane is not to exceed 24 inches.

(e) Intermediate cross tees may be necessary to maintain visually acceptable drywall planes and drywall corners.

(3) Hanger wires are required within 12 inches on both sides of a pivoted splice clip.

(4) At least one hanger wire is required within 12 inches of a transition clip.

(5) Limitations: Do not support wires from mechanical and/or electrical equipment occurring above ceiling.

c. Accessories: Install accessories as applicable to meet project requirements.

3.04 INSTALLATION – FASTENERS AND ATTACHMENTS

A. Gypsum wallboard shall be attached to metal members by self-drilling, self-tapping sheet metal screws.

B. Screws used for attaching gypsum wallboard to metal framing members:

1. Shall be driven below the surface of gypsum wallboard without substantially fracturing the surface paper, and then spotted with finishing joint compound.

2. Shall be not less than 7/8 inch (22.2 mm) long for 1/2 inch (17.7 mm) wallboard or 1 inch (25.4 mm) long for 5/8 inch (17.1 mm) wallboard.

a. At fire-resistance rated assembly, screw type and size shall comply with requirements of applicable UL Design as described in the UL (FRD).

C. The spacing of screws attaching gypsum wallboard to metal framing members shall comply with board manufacturer’s installation instructions, but in no instance shall screw spacing be more than 12 inches (305 mm) on center.

1. At fire-resistance rated assembly, install in accordance with screw spacing

requirements per applicable UL Design as described in the UL (FRD).

3.05 INSTALLATION – BOARD MATERIALS

A. General:

1. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

2. Board materials to be applied vertically, except as otherwise required for fire-rated assemblies.

3. Loosely butt board joints together and neatly fit.

4. Do not place butt ends against tapered edges.

5. Maximum Allowable Gap at End Joints: 1/8 inch, except as otherwise required for fire-rated assemblies.

6. Vertical joints to be centered over studs and staggered one stud cavity on opposite sides of studs.

7. Horizontal joints to be backed by steel framing, unless otherwise recommended by gypsum board manufacturer.

8. Apply ceiling boards first where gypsum board ceilings and wall occur, except as otherwise required for fire-rated assemblies.

9. Cut openings in board to fit electrical outlets, plumbing, light fixtures and piping snugly and small enough to be covered by plates and escutcheons. Cut both face and back paper.

   a. For fire-rated assemblies, comply with penetration firestopping requirements specified in Section 078400 - Firestopping.

10. Screw board in place securely with screws spaced according to manufacturer's recommendations.

    a. For fire-rated assemblies, comply with attachment requirements specified in applicable UL Design Assembly.

B. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

C. Gypsum Board:

1. Single Layer Gypsum Board on Furring:

   a. Apply gypsum board with long dimension at right angles to furring channel.

   b. Center end joints over channel web; stagger end joints from those in adjacent rows of board.

   c. Fasten boards to furring channels with screws spaced according to manufacturer's recommendations.

2. Double Layer Gypsum Board:

    a. Both layers to be fastened to studs or furring with screws in accordance with manufacturer's instructions.

    s. Offset face-layer joints at least one stud cavity from parallel base-layer joints.

D. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226 and manufacturer’s instructions.

3.06 INSTALLATION - SOUND-RATED CONSTRUCTION

A. Insulation:

1. Install sound attenuation blankets in sound-rated partitions and ceilings where indicated.

2. Completely fill space between studs and framing to full height of partition wall or full area of ceiling.

3. Fit carefully behind electrical outlets and other work penetrating sound-rated construction.

4. Install sound attenuation blankets in gaps between steel deck flutes and tops of sound-rated partitions, which are not fire-rated. Attach blankets in accordance with manufacturer's instructions.

B. Gypsum Board:

1. Install gypsum board same as for interior partitions and ceilings.

2. Coordinate with installation of perimeter sealants.

C. Acoustical Sealant:

1. At partition walls, provide continuous beads of acoustic sealant at juncture of both faces of runners with floor and ceiling construction, and wherever gypsum board abuts dissimilar materials, prior to installation of gypsum board.

2. At ceilings, provide continuous beads of sealant wherever gypsum board abuts dissimilar materials.

3. Provide continuous bead of sealant behind faces of control joints prior to installation of control joint accessories.

4. After installation of gypsum board base layers, cut face layer sheets 1/2 inch less than floor-to-ceiling height and position with 1/4 inch open space between gypsum board and floor, ceiling and dissimilar vertical construction. Fill 1/4 inch open space with continuous sealant beads after installation of face layer.

5. At openings and cutouts, fill open spaces between gypsum board and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.

6. Seal sides and backs of electrical boxes to completely close off openings and joints.

D. Sound Flanking Paths:

1. Where sound-rated partition walls intersect non-rated gypsum board partition walls, extend sound-rated construction to completely close sound flanking paths through non-rated construction.

2. Seal joints between face layers at vertical interior angles of intersecting partitions.

3.07 INSTALLATION - ACCESSORY MATERIALS

A. General:

1. Use longest practical lengths.

2. Place components consistent with lines of building spaces, except as indicated on drawings.

3. Treat metal accessories with not less than 2 coats of joint compound in the same manner as joints.

4. Feather joint compound out from 8 to 10 inches on both sides of corners.

5. Sand after application of final joint treatment coat and leave surface smooth and ready for work by other trades.

B. Control Joints and Expansion Joints: Install control joints and expansion joints in accordance with manufacturer's instructions, and as follows:

1. Install control joints and expansion joints as detailed.

2. Install at locations where indicated, and as follows:

a. Install control joints at junction of gypsum board partitions with walls or partitions of other finish material.

b. Install control joints within long runs of partitions, ceilings or soffits as indicated; if not indicated, then as directed by Architect.

c. Where gypsum board is vertically continuous, as at stairwells, provide horizontal control joints at each floor level or as directed by Architect.

C. Beads, Trim, and Moldings: Install beads, trim, and moldings in accordance with manufacturer's instructions, and as follows:

1. Trim: Install as indicated on drawings.

a. Install metal trim at intersections where gypsum board abuts other materials, unless detailed otherwise, and at all other locations indicated.

2. Corner Beads: Install at inside and outside corners.

a. Neatly fit and secure corner beads over external corners.

3. Reveals: Install as indicated on drawings.

D. Trim:

1. General:

    a. Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.

    b. Install metal corner beads at external corners.

    c. Install metal casing bead trim whenever edge of gypsum base would otherwise be exposed or semi-exposed, and where gypsum base terminates against dissimilar material.

2. Control Joints: Install where indicated or specified.

3. Special Trim and Reveal Joints: Install as indicated on drawings and in accordance with manufacturer's instructions.

4. “Knife-Edge” Ceiling Trim: Install in accordance with manufacturer’s installation instructions.

E. Metal Lath and Plaster (applied over cement backer board): Refer to Section 092236 - Metal Lath and Section 092400 - Portland Cement Plastering.

3.08 FINISHING

A. Gypsum Board Surfaces:

1. General:

    a. Joint Compound:

        (1) After skim coat sets, apply finish coat of compound feathering 3 to 4 inches beyond tape edges.

        (2) Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

    b. Joint treatment and finishing of fire-rated assemblies shall conform to requirements of specified UL Design Assembly as described in the UL (FRD).

    c. For gypsum board surfaces designated to be painted, coordinate surface finishing with requirements specified in Section 099000 - Painting and Coating.

2. Level of Finish: Provide levels of gypsum board finish in accordance with GA-214 / ASTM C840.

    a. Refer to FINISH LEVEL SCHEDULE - GYPSUM BOARD SURFACES at the end of this section.

3. Prefill:

    a. Use setting-type joint compound. Mix joint compound according to manufacturer’s directions.

    b. Fill joints between boards flush to top of eased or beveled edge.

c. Fill joints of gypsum board above suspended ceilings in fire-rated partitions.

d. Wipe off excess compound and allow to harden.

4. Taping (ASTM C840 Level 1):

a. Use taping joint compound or all-purpose joint compound.

b. Butter taping compound into inside corners and joints.

c. Center tape over joints and press down into fresh compound.

d. Remove excess compound.

e. Tape joints of gypsum board above suspended ceilings.

5. First Coat (ASTM C840 Level 2):

a. Use taping joint compound or all-purpose joint compound, or setting-type joint compound.

b. Immediately after bedding tape, apply skim coat of compound over body of tape and allow to dry completely in accordance with manufacturer's instructions.

c. Apply first cost of compound over flanges of trim and accessories, and over exposed fastener heads; finish level with board surface.

6. Second Coat (ASTM C840 Level 3):

a. Use all-purpose joint compound or topping joint compoind.

b. After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 2 inches beyond edge of first coat.

7. Third Coat (ASTM C840 Level 4):

a. Use all-purpose joint compound or topping joint compound.

b. After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2 inches beyond edge of second coat.

c. Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

8. Skim Coat (ASTM C840 Level 5):

a. Apply skim coat of all-purpose joint compound or spray-applied primer surfacer over exposed surfaces of gypsum board.

b. After skim coat has dried, touch-up and sand to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

B. Cementitious Backer Board: Prepare and finish joints in accordance with manufacturer's instructions and the following:

1. Cementitious Backer Board as Substrate for Tile Wall Finish: Coordinate installation of cementitious backer board with requirements specified in Section 093000 - Tiling.
2. Cementitious Backer Board as Substrate for Metal Lath and Cement Plaster Wall Finish: Coordinate installation of cementitious backer board with requirements specified in Section 092236 - Metal Lath and Section 092400 - Portland Cement Plastering.

C. Field Painting: As specified in Section 099000 - Painting and Coating; sheen(s) and color(s) as selected by Architect.

3.09 ADJUSTING

A. Correct damage and defects which may telegraph through finish work.

B. Leave work smooth and uniform.

3.10 TOLERANCES

A. Support Metal and Framing:
1. Maximum Variation from True Position: 1/8 inch in 10 feet (3 mm in 3 m).
2. Maximum Variation from Plumb: 1/8 inch in 10 feet (3 mm in 3 m).
3. Maximum Variation from Level: 1/8 inch in 10 feet (3 mm in 3 m).
4. Spacing of Studs and Other Framing Members: Variation not to exceed 1/8 inch.
5. Fastening Surfaces: Variation between adjacent members not to exceed 1/8 inch.
6. Additional Requirements for Walls/Partitions Where Cement Plaster Wall Finish Is Indicated: Refer to Section 092236 - Metal Lath and Section 092400 - Portland Cement Plastering.

B. Maximum Variation from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.
1. Finished Gypsum Board Surface: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.
2. Cementitious Backer Board Surface:
a. General:
(1) Surface shall not vary by more than 1/8 inch in 10 feet (3 mm in 3 m) in any direction.
(2) Surface shall not vary by more than 1/16 inch over 1 foot, nor more than 1/32 inch between adjoining edges.
b. Where Used as Substrate for Tile Wall Finish: For additional requirements, refer to Section 093000 - Tiling.
c. Where Used as Substrate for Metal Lath and Cement Plaster Wall Finish: For

additional requirements, refer to Section 092236 - Metal Lath and Section 092400 - Portland Cement Plastering.

3.11 FINISH LEVEL SCHEDULE - GYPSUM BOARD SURFACES

A. Provide levels of gypsum board finish for locations as follows, in accordance with GA-214 / ASTM C840.

1. Level 1: Gypsum board surfaces within ceiling plenum areas and other concealed areas, except provide higher level of finish as required to comply with fire resistance rating or acoustical rating.

2. Level 2: Refer to Level 3.

3. Level 3:

a. Gypsum board surfaces of fire-rated assemblies that are entirely concealed from view; finishing system shall meet requirements of specified UL Design Assembly.

b. Gypsum board surfaces designated to receive textured finish or heavy vinyl wall papering.

4. Level 4: Gypsum board surfaces, except where another finish level is indicated or selected by Architect.

5. Level 5: Gypsum board surfaces requiring extra smooth surface for critical light, including but not limited to surfaces where semi-gloss or gloss paint finish is designated or selected by Architect.

END OF SECTION

SECTION 092236

METAL LATH

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal lath for Portland cement plaster / stucco.

B. Plaster/stucco beads, screeds, joint accessories, and other trim.

1.02 RELATED REQUIREMENTS

A. Section 092400 - Portland Cement Plastering.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C841 -- Standard Specification for Installation of Interior Lathing and Furring; 2003(2008)e1.

2. ASTM C847 -- Standard Specification for Metal Lath; 2009.

3. ASTM C933 -- Standard Specification for Welded Wire Lath; 2007b.

4. ASTM C1063 -- Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2012a.

5. ASTM D226/D226M -- Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2006.

C. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

D. The National Association of Architectural Metal Manufacturers (NAAMM):

1. NAAMM ML/SFA 920 -- Guide Specifications for Metal Lathing and Furring; 2009.

E. Steel Framing Industry Association (SFIA):

1. SFIA (TG) -- Technical Guide for Cold-Formed Steel Framing Products.

F. Steel Stud Manufacturers Association (SSMA):

1. SSMA (PTI) -- Product Technical Information.

G. Technical Services Information Bureau (TSIB):

1 TSIB (PAM) -- TSIB Plaster Assemblies Manual; Oct 2015.

a. TSIB (PAM) Chapter 2 -- Plaster Substrates, Lath.

2. TSIB TB -- TSIB Technical Bulletins:

a. TSIB TB-60.281 -- Exterior Stucco Soffits and Ceilings; Oct 2009.

H. Underwriters Laboratories, Inc. (UL):

1. UL (FRD) -- Fire Resistance Directory.

I. U.S. Federal Specifications (FS):

1. FS UU-B-790A -- Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant).

1.04 PERFORMANCE REQUIREMENTS

A. Lathing Assemblies: Furnish and install framing and lath systems to limit deflection of finished assembly as follows:

1. Maximum Deflection of Vertical Assemblies: L/360, under lateral point load of 100 lbs (445 N).

2. Maximum Deflection of Horizontal Assemblies: L/240, under dead loads and wind uplift, except where L/360 is required for compliance with applicable requirements of the governing building code.

B. Fire Rated Assemblies: Provide components complying with requirements for fire rated assemblies specified in the section where the plaster finish is specified.

1.05 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

2. Submittals required per this section shall be coordinated and submitted with submittals required in the following sections:

a. Section 092400 - Portland Cement Plaster.

B. Product Data:

1. Metal Lath: Provide product data, structural characteristics, material limitations, and finish. Indicate products proposed for use in each application.

2. Beads, Screeds, Joint Accessories, and Other Trim: Provide product data, structural characteristics, material limitations, and finish. Indicate products proposed for use in each application.

C. Shop Drawings:

1. Cement Plaster Ceilings and Soffits - Exterior: Where shop drawing submittal is required in Section 092400 - Portland Cement Plastering, such shop drawings shall

include work of this section.

a. Indicate type of metal lath in each application, support spacing, attachment to metal framing, etc.

b. Include details for beads, screeds, and joint accessories; indicate locations.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Plastering Subcontractor specializing in performing the work of this section with minimum five years documented experience.

1.07 COORDINATION

A. Coordinate work of this section with installation of work specified in other sections, including but not limited to:

1. Portland cement plastering for interior and exterior plaster partitions, ceilings and soffits, as specified in Section 092400 - Portland Cement Plastering.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Metal Lath:

1. Alabama Metal Industries Corporation (AMICO): www.amico-online.com.
2. Clarkwestern Dietrich Building Systems, LLC: www.clarkdietrich.com
3. CEMCO: www.cemcosteel.com.
4. Southeastern Metals (SEMCO): www.semetals.com.

B. Beads, Screeds, Joint Accessories, and Other Trim:

1. Alabama Metal Industries Corporation (AMICO): www.amico-online.com.
2. Clarkwestern Dietrich Building Systems, LLC: www.clarkdietrich.com
3. CEMCO: www.cemcosteel.com.
4. Southeastern Metals (SEMCO): www.semetals.com.

2.02 FRAMING MATERIALS

A. ___.

2.03 METAL LATH

A. General:

1. Metal lath shall comply with applicable requirements of the governing building code, including but not limited to FBC-B TABLE 2514.3.2.
2. Weight: All metal lath to be 3.4 lbs/sq yd., unless otherwise noted.

B. Diamond Mesh Metal Lath: ASTM C847; G60 galvanized steel.

C. Flat Rib Metal Lath: ASTM C847; G60 galvanized steel; 1/8 inch (3 mm) thick.

D. Ribbed Metal Lath: ASTM C847; G60 galvanized steel; 3/8 inch (9 mm) thick.

E. Welded Wire Lath: ASTM C933; G60 galvanized steel; with 2 inch (50 mm) square openings, paper or felt backing.

F. Corner Mesh: Formed sheet steel, minimum 0.018 inch (0.5 mm) thick, expanded flanges shaped to permit complete embedding in plaster, minimum 2 inch (50 mm) size; G60 galvanized steel.

G. Strip Mesh: Expanded metal lath, same weight as lath, 2 inch (50 mm) wide x 24 inch (600 mm) long; G60 galvanized steel.

2.04 BEADS, SCREEDS, AND JOINT ACCESSORIES

A. General:

1. Material: Solid zinc alloy meeting requirements of ASTM B69.

2. Ground Depth (e.g., 1/2 inch, 5/8 inch, 3/4 inch, 7/8 inch): Shall be governed by plaster thickness; refer to Section 092400 - Portland Cement Plastering.

3. Use maximum possible lengths.

B. Casing Bead / Base Screed: Square edges; 3 inch expanded metal flange.

1. Product: Amico X-66 Casing Bead, or equal.

C. Corner Bead (outside corner): Smooth round nose bead; 3 inch expanded metal flange wings.

1. Product: Amico X-1 Corner Bead, or equal.

D. Control Joint: Two-piece type consisting of a pair of casing beads with back flanges formed to provide slip-joint action, adjustable for joint widths form 1/8 inch to 5/8 inch; no removable protective tape on the plaster face.

E. Reveal Screed:

1. Face opening width(s) as indicated on drawings.

2. Provide back-up plates at joints and outside corners.

3. Product: ____ Reveal Screed, or equal.

2.05 FASTENERS, ANCHORS AND ACCESSORIES

A. Fasteners and Anchorage:

1. General: Tie wire, drive pins, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place; galvanized.

2. Anchors: Shall be fabricated from corrosion-resistant materials, with holes or loops for attaching hangers.

a. Type: Cast-in-place type (designed for attachment to concrete forms), chemical anchor, or expansion anchor, as appropriate for the application.

b. Size and Strength: Anchor shall be capable of sustaining, without failure, a

load equal to 5 times that imposed by ceiling construction. Testing to be performed by a qualified independent testing agency in accordance with ASTM E488.

B. Water Resistive Barrier: Where water resistive barrier is indicated on drawings, provide one of the following:

1. Asphalt Paper-Backing (APB) Breather Sheet: FS UU-B-790A, Type 1, Grade-D, Style 2, factory-applied paper backing; shall be printed on the face of the paper for easy identification.

2. Asphalt Felt: ASTM D226, Type I (No.15).

C. Sealant:

1. For Bedding of Control Joint during Installation over Solid Base: Per control joint manufacturer's recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that substrates are ready to receive work and conditions are suitable for application.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

A. Install work of this section in accordance with applicable requirements of the governing building code, NAAMM ML/SFA 920, ASTM C841 and ASTM C1063.

B. Unrestrained Ceilings: Furred or suspended ceilings constructed with cement plaster/stucco must be unrestrained.

1. Isolate ceiling lath and plaster from ceiling intersecting vertical surfaces with casing beads, control joints, or similar devices designed to keep the ceiling isolated from the adjacent vertical surfaces (walls, partitions, beams, and columns).

2. Do not use corner reinforcement at the internal angle between the ceiling and the vertical surfaces.

C. Fire-Resistant Assemblies: Provide materials and installation methods, including but not limited to types and spacing of fasteners, in accordance with UL (FRD) specifications for the UL Design assembly indicated.

3.03 INSTALLATION - FRAMING MATERIALS

A. ____.

3.04 INSTALLATION - BEADS, SCREEDS, AND JOINT ACCESSORIES

A. Casing Beads:

1. Comply with manufacturer's recommendations and instructions.
2. Install casing bead at locations indicated on drawings, and as follows:
    a. At the edges of plaster which abuts or adjoins an unplastered surface.
    b. On each surface at the internal angle formed by load bearing and non-loadbearing walls and partitions abutting structural walls, columns, or floor-ceiling slabs.
    c. On each side of the joint between walls or partitions constructed of dissimilar materials which require plastering.
    d. At terminations of plaster finish.
3. Butt and align ends.
4. Secure rigidly in place.

B. Corner Beads:

1. Comply with manufacturer's recommendations and instructions.
2. Install corner bead at all external corners of plaster/stucco walls, beams and soffits.
3. Butt and align ends.
4. Fill voids formed in corners with plaster/stucco.
5. Fasten at outer edges of lath only.

C. Control Joints:

1. Cement Plaster/Stucco over Solid Base (CMU/concrete walls without metal lath): N/A.
2. Cement Plaster/Stucco over Metal Base (including metal lath over solid base): Install control joints in accordance with ASTM C1063 and the following:
    a. At plaster/stucco ceilings and walls, install control joints in locations indicated on the drawings.
    b. When installing control joints over solid base, apply sealant to substrate and embed control joint in sealant; follow control joint manufacturer's instructions.
    c. Terminate metal lath at each side of joint and fasten control joints securely to lath.
    d. Butt and align ends.

3.05 INSTALLATION - METAL LATH

A. Comply with manufacturer's recommendations and instructions.

B. Apply metal lath taut, with long dimension perpendicular to supports.

C. Lap ends minimum 1 inch (25 mm). Secure end laps with tie wire where they occur

between supports.

D. Lap sides of diamond mesh lath minimum 1-1/2 inches (38 mm).

E. Nest outside ribs of rib lath together.

F. Attachment: Attach metal lath to metal supports using screws at maximum 6 inches (150 mm) on center.

1. Metal and wire lath shall be attached to horizontal and vertical metal supports with the equivalent of No. 8 galvanized sheet-metal screws.

G. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches (75 mm) from corner to form the angle reinforcement; fasten at perimeter edges only.

1. Do not use corner reinforcement at the internal angle between the ceiling and the vertical surfaces.

H. Place 4 inch (100 mm) wide strips of metal lath centered over junctions of dissimilar backing materials; secure rigidly in place.

I. Place lath vertically above each top corner and each side of door frames to 6 inches (150 mm) above ceiling line.

J. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.06 INSTALLATION - ACCESSORIES

A. Water Resistive Barrier:

1. Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

3.07 ERECTION TOLERANCES

A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from True Position: 1/8 inch (3 mm).

END OF SECTION

SECTION 092400

PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Portland cement plaster (stucco).

B. Beads, screeds, reveals, control joints, and other plaster accessories.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealant for plaster control joints.

B. Section 092236 - Metal Lath: Metal lathing for cement plaster (stucco) ceilings/soffits; plaster accessories.

C. Section 099000 - Painting and Coating.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C150/C150M -- Standard Specification for Portland Cement; 2007.

2. ASTM C206 -- Standard Specification for Finishing Hydrated Lime; 2003.

3. ASTM C897 -- Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters; 2005.

4. ASTM C926 -- Standard Specification for Application of Portland Cement-Based Plaster; 2011a.

5. ASTM C932 -- Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering; 2006.

6. ASTM C1059/C1059M -- Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.

7. ASTM C1063 -- Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2012a.

8. ASTM C1116/C1116M -- Standard Specification for Fiber-Reinforced Concrete; 2010a (R2015).

9. ASTM C1328 -- Standard Specification for Plastic (Stucco) Cement; 2005.

10. ASTM D412 -- Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension; 1998a(2002)e1.
11. ASTM D1970 -- Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2009.
12. ASTM D4258 -- Standard Practice for Surface Cleaning Concrete for Coating; 2005 (R2012).
13. ASTM D4259 -- Standard Practice for Abrading Concrete; 1988 (R2012).
14. ASTM D4261 -- Standard Practice for Surface Cleaning Concrete Masonry Units for Coating; 2005 (R2012).
15. ASTM D4262 -- Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces; 2005 (R2012).
16. ASTM D4263 -- Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method; 1983 (R2012).
17. ASTM E96/E96M -- Standard Test Methods for Water Vapor Transmission of Materials; 2005.

C. Florida Building Code, 5th edition - 2014 (FBC):
   1. FBC-B -- Florida Building Code, Building.
   2. FBC-EB -- Florida Building Code, Existing Buildings.
      a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

D. Florida Concrete Products Association, Inc. (FCPA):
   1. FCPA TB-ST 01 -- Technical Bulletin, Choosing the Right Block for Stucco.
   2. FCPA TB-ST 02 -- Technical Bulletin, Stucco on Block.

E. Technical Services Information Bureau (TSIB):
   1 TSIB (PAM) -- TSIB Plaster Assemblies Manual; Oct 2015.
      a. TSIB (PAM) Chapter 2 -- Plaster Substrates, Lath.
   2. TSIB TB -- TSIB Technical Bulletins:
      a. TSIB TB-60.281 -- Exterior Stucco Soffits and Ceilings; Oct 2009.

1.04 SUBMITTALS

A. General:
   1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit manufacturer's product data for each product to be used, including but not limited to manufactured cement plaster products, fiber reinforcement, and integral bonding admixture.

1. Include manufacturer’s written specifications, proportion mixes, and installation instructions for factory-prepared materials.

a. Manufacturer’s written specifications shall include physical and performance characteristics, and instructions for storage, handling, and use.

2. Provide documentation certifying that materials used together are mutually compatible (e.g., integral bonding admixture and manufactured cement plaster products).

C. Certificates:

1. Material Certificates: Provide Material Certificate signed by the manufacturer for each kind of plaster aggregate certifying that the materials comply with the specifications.

D. Samples:

1. For each plaster finish to be applied, submit two samples, each 24 x 24 inch (600 x 600 mm) in size, illustrating texture/finish.

1.04 QUALITY ASSURANCE

A. Pre-Installation Conference: Contractor shall hold a meeting with subcontractor, installer, Owner’s authorized representative and A/E, prior to the installation of metal lath and cement plaster work, to review the substrates for acceptability, method of application, applied thickness, patching, repair, inspection and testing procedures.

B. Perform Work in accordance with ASTM C926 and ASTM C1063.

C. Installer/Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

D. Contractor shall not change source or manufacturer of cement plaster materials during the course of the work.

E. Certificates of Compliance:

1. Aggregate Used in Job-Mixed Plasters: Furnish satisfactory documentation to the Architect certifying that aggregate conforms to requirements of ASTM C897; or where aggregate fails to meet the gradation limits in ASTM C897, furnish satisfactory documentation certifying that the plaster made with the aggregate has an acceptable demonstrated performance record in similar construction and climate conditions.

F. Warranty: Contractor shall provide a written warranty against defects in material and installation for a period of not less than ten (10) years.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary coverings and other provisions necessary to minimize harmful spattering of plaster on other work.

B. Comply with requirements of the referenced plaster application standards and plaster manufacturer's requirements for environmental conditions before, during and after plaster application.

C. Apply and cure plaster as required by climatic and job conditions to prevent dry out during the cure period.

1. Do not apply cement plaster when substrate or ambient air temperature is under 50 degrees F or over 90 degrees F.

D. Provide suitable coverings, moist curing, barriers or combinations of these as required to deflect sunlight and wind.

E. Protect plaster against uneven and excessive evaporation; and from strong flows of dry air, natural or artificial.

F. Hot Weather Conditions:

1. Use damp loose sand.

2. Use cool water for mixing.

3. Pre-dampen masonry substrate prior to application of cement plaster scratch coat.

4. Prevent the cement plaster from drying out by covering with a plastic sheet, or moist cure at least twice daily for the first 2 to 3 days.

5. Do not allow fresh cement plaster to be subject to hot, dry winds.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver all products to the site in original packaging, unopened and undamaged, and labeled with manufacturer's name, product brand name, and lot number.

B. Store products and materials in accordance with manufacturer's instructions and as follows:

1. All materials shall be stored inside, under cover, and in a dry location.

2. All materials shall be protected from exposure to weather and direct sunlight, dampness, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

C. Stockpile and handle aggregates in a manner to prevent contamination from foreign materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Bonding Agent/Admix:

1. BASF Construction Chemicals LLC.
2. Lambert Corporation.

2.02 GENERAL

A. Comply with applicable requirements of governing building code, including but not limited to the following:
   1. Lathing and plastering materials shall conform to the standards listed in FBC-B TABLE 2507.2; and, where required for fire protection, shall also conform to the provisions of FBC-B CHAPTER 7.
   2. Exterior and interior cement plaster and lathing shall be installed using the appropriate materials listed in FBC-B TABLE 2507.2.

2.03 PLASTER/STUCCO MATERIALS

A. Cement, Aggregate, and Other Materials for Job-Mixed Cement Plaster: Provide materials in accordance with ASTM C926 and the following requirements:
   1. Portland Cement: ASTM C150, Type I.
   2. Lime: ASTM C206, Type S.
   3. Aggregate: Sand conforming to ASTM C897; aggregate for finish coats shall be natural sand, white in color.
   4. Masonry Cement: Masonry cement is not permitted.
   5. Plastic Cement: Plastic cement is not permitted.

B. Admixtures for Job-Mixed Cement Plasters:
   1. Integral Bonding Agent/Admix: Premium acrylic latex bonding agent admixture; designed to increase the adhesion, cohesion and chemical bond of stucco to concrete/CMU base, thus increasing flexural and shear bond strengths.
      a. Shall comply with requirements of ASTM C932 and ASTM C1059/C1059M Type II (non-rewettable type).
      b. Products: AcrylBond by Lambert Corporation, or equal.
   2. Fiber Reinforcement: 1/2-inch fibers meeting the requirements of ASTM C1116/C1116M; alkali-resistant.

C. Water: Clean, fresh, cool, potable, and free of mineral or organic matter that could adversely affect plaster, and conforming to ASTM C926.

D. Metal Lath: Refer to Section 092236 - Metal Lath.

E. Beads, Screeds, and Joint Accessories: Refer to Section 092236 - Metal Lath.

2.04 PLASTER PROPORTIONS & MIXING

A. Job-Mixed Plaster Materials:

1. All plaster work shall be three-coat application, mixed and proportioned in accordance with ASTM C926 and applicable requirements of the governing building code.

    a. Portland cement plaster shall be mixed and proportioned in accordance with Tables 1, 2, 3 and 4 and accompanying requirements of ASTM C926, with successive batches proportioned alike.

    b. All plaster shall be prepared in a mechanical mixer, using sufficient water to produce a workable consistency.

2. Mix only as much cement plaster as can be used prior to initial set.

    a. Size mixer to produce batches that will be applied within maximum of 1-1/2 hours after mixing.

3. Accurately proportion materials for initial cement plaster mixture using measuring devices or known volume; refer to ASTM C926 article 6.1.3.1 (Measurement of Materials).

    a. Shovels of sand can be used after mixer is calibrated with known volumes of materials, including water.

4. Use damp, loose sand.

5. Mix materials dry, to uniform consistency, before adding bonding admix/water mixing liquid.

6. Add specified admixtures to batch in accordance with manufacturer's recommendations; mix slowly to avoid entrapping air.

7. Protect cement plaster mixture from contamination and excessive evaporation.

8. Do not re-temper mixes after initial set has occurred.

9. Bonding Admix/Water Mixing: Mix in accordance with integral bonding admixture manufacturer's instructions.

    a. Where increased physical and chemical resistance are required, increase the bonding admix content in the mixing liquid in accordance with manufacturer's instructions.

10. Mix Proportions:

    a. Plaster Base Coat Mixes: Plaster mix proportions shall be as shown in ASTM C926 Table 2 (Base Coat Proportions, Parts by Volume) for the mix specified from ASTM C926 Table 1 (Plaster Bases - Permissible Mixes).

        (1) Metal Base (e.g., metal lath):

            (a) First Coat (Scratch Coat): Plaster Mix C (per ASTM C926 Table 2).

            (b) Second Coat (Brown Coat): Plaster Mix C (per ASTM C926 Table 2).

b. Plaster Finish Coat Mixes: Plaster Mix F (per ASTM C926 Table 3).

c. Admixtures: Shall be proportioned, mixed and applied in accordance with printed directions of the admixture manufacturer.

(1) Fiber Reinforcement: Add to Second Coat (Brown Coat) of three-coat mixes after ingredients have mixed for at least two minutes. Do not exceed 1 lb/cu ft of cementitious materials.

B. Mechanical Mixing:

1. Mix each batch separately.

a. Double batching with single batch discharge shall not be permitted.

2. Maintain mixer in clean condition before, during, and after cement plaster preparation.

a. Remove partially set and hardened cement plaster from mixer drum before next batch.

b. If mixer has been previously used in preparing gypsum plaster, thoroughly clean prior to use to prepare cement plaster.

3. Maintain mixer in continuous operation while charging mixer.

a. Add water to bring cement plaster to desired consistency.

b. Continue mixing for 3 to 5 minutes after all ingredients have been added to the mixer.

4. Do not over-mix, aerate, or mix at a high speed.

PART 3 - EXECUTION

3.01 EXAMINATION

A. General:

1. Verify the suitability of existing conditions before starting work.

2. Verify that surfaces to receive plaster are straight and true within 1/4 inch in 10 ft (2.1 mm/m).

3. Verify that no substances detrimental to plaster bond (e.g., bituminous or water repellent coatings, form release agents, paint, etc.) exist on concrete or masonry surfaces.

B. Metal Lath and Plaster Accessories:

1. Verify lath is flat, properly secured to substrate/framing, and joint and surface perimeter accessories are in place.

2. Verify that lath is properly installed in accordance with ASTM C1063 and applicable requirements of the governing building code, including but not limited to FBC-B SECTION 2507.

3.02 PREPARATION

A. Solid Base Surfaces to Receive Plaster/Stucco: N/A.

3.03 PLASTERING

A. Comply with applicable requirements of the governing building code, including but not limited to the following:

1. Minimum thickness of plaster shall conform to the requirements specified in FBC-B TABLE 1405.2 and ASTM C926 Table 4.

2. Cement plaster applied to exterior surfaces shall conform to the requirements specified in FBC-B CHAPTER 25.

3. The second coat shall be brought out to proper thickness, rodded and floated sufficiently rough to provide adequate bond for the finish coat. The second coat shall have no variation greater than 1/4 inch (6.4 mm) in any direction under a 5-foot (1524 mm) straight edge.

B. Plaster Thickness:

1. Three-Coat Application over Metal Lath (including metal lath over solid base):

a. Apply each coat in accordance with thickness requirements specified in ASTM C926 TABLE 4.

b. Minimum overall thickness of plaster shall conform to requirements specified in ASTM C926 and FBC-B TABLE 1405.2.

(1) Exterior Vertical Surfaces: Not less than 7/8-inch.

(2) Exterior Horizontal Surfaces: Not less than 5/8-inch.

(3) Interior Surfaces: Not less than 5/8 inch.

2. Three-Coat Application over Solid Base: N/A.

C. Finishing:

1. Finish Texture:

a. Vertical Surfaces: Sand Float (smooth), unless otherwise noted.

b. Horizontal Surfaces: Sand Float (smooth), unless otherwise noted.

2. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

D. Curing:

1. General: Consider the physical characteristics of the structure as well as the previously mentioned conditions when selecting the method of curing.

(a) For additional information, refer to ASTM C926 Annex XI.4.2 (Time between Coats and Curing for Portland Cement-Based Plaster).

2. First Coat (Scratch Coat) and Second Coat (Brown Coat): First and second coats of cement plaster shall be applied and moist cured as set forth in FBC-B SECTION 2512.6 and ASTM C926.
    a. After curing, dampen previous coat prior to applying next coat.
    b. Cure second coat for a minimum of 5 days before start of finish coat application.
3. Finish Coat: Moist cure finish coat for minimum period required of 48 hours.
    a. For additional requirements, refer to Section 099000 - Painting and Coating.

3.04 PLASTER DETAILS

A. Corners and Angles:
    1. Internal Corners: Internal corners and angles to be square and true.
    2. External Corners:
        a. Interior Applications: External corners to be flush with corner beads, unless otherwise noted.
        b. Exterior Applications: External corners to be square and true with plaster faces.
            (1) Corner beads are not permitted at exterior applications.

B. Relief from Stresses:
    1. Installation of control joints and perimeter relief shall conform to ASTM C926, ASTM C1063, and manufacturer's instructions.
    2. Control Joints:
        a. Install prefabricated control joint members prior to the application of plaster, using longest practical lengths. Where splicing is required, provide matching prefabricated connector clips designed to align control joint and provide a surface area for sealing butt joints. At spliced connections, fully embed control joint ends in sealant.
        b. Fasten prefabricated control joint members to surfaces substrate in accordance with manufacturer's instructions. Embed control joint ends and butts in sealant at time of installation.
        c. On exterior surfaces to be finished with plaster, provide continuous control joint at locations indicated on the drawings (e.g., at interface between new and existing plaster).
            (1) Control joint shall be true and straight.
        d. After plastering work is completed, clean excess material from the joint area, and apply joint sealant along full length of the joint.
            (1) For additional requirements, refer to Section 079200 - Joint Sealants.

3. Dissimilar Base Materials: At locations where dissimilar base materials abut and are to receive a continuous coat of plaster, provide one of the following:

   a. A two-piece expansion joint, casing beads back-to-back, or pre-manufactured control-expansion joint member shall be installed.

   b. The juncture shall be covered with a 6-in. (152-mm) wide strip of galvanized, self-furring metal plaster base extending 3 in. (76 mm) on either side of the juncture.

      (1) For additional requirements, refer to Section 092236 - Metal Lath.

   c. Where one of the bases is metal plaster base, self-furring metal plaster base shall be extended 4 in. (102 mm) onto the abutting base.

      (1) For additional requirements, refer to Section 092236 - Metal Lath.

3.05 ADJUSTING, CLEANING AND PROTECTION

A. Cutting, Patching and Repairing:

1. Cut, patch, replace, repair and point up plaster as necessary to:

   a. Accommodate other work.

   b. Repair cracks and indented surfaces.

   c. Point-up finished plaster surfaces around items that are built into or penetrate plaster surfaces.

   d. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects.

   e. Repair or replace work as necessary to comply with required visual effects.

2. Adjusting:

   a. Point-up cement plaster around trim and other locations where cement plaster abuts dissimilar materials.

   b. Remove defective and damaged cement plaster by cutting it out.

   c. Replace removed cement plaster using specified cement plaster brought to desired texture consistent with surrounding area.

3. For additional requirements, refer to Section 092410 - Portland Cement Plaster Repairing.

B. Cleaning and Protection:

1. Provide temporary covering to minimize spattering of cement plaster on adjacent work.

2. Remove cement plaster materials from door frames, windows, and other surfaces which are not to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged.

3.06 ERECTION TOLERANCES

A. Maximum Variation from True Surface Flatness: 1/8 inch in 10 feet (3 mm in 3 m).

END OF SECTION

SECTION 092410

PATCHING & REPAIRING OF PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Patching and repairing of damaged or defective cement plaster work, including but not limited to:

1. Inspection and evaluation of all existing exterior cement plaster work, and documentation of damaged or defective areas.

2. Patching and repair of damaged or defective cement plaster work, including but not limited to the following:

a. Cracking.

b. Delamination.

c. Impact damage.

d. Rusted or damaged beads.

B. Repair materials, including

1. Cement plaster/stucco materials.

2. Repair mortar.

1.02 RELATED REQUIREMENTS

A. Section 016302 - Use of Substitute Materials on Historic Building Exteriors.

B. Section 024100 – Demolition.

C. Section 042200 - Concrete Unit Masonry.

D. Section 079200 - Joint Sealants: Removal and replacement of joint sealers, backing and bond breakers; joint sealer for stucco crack repair.

E. Section 092236 - Metal Lath.

F. Section 092400 - Portland Cement Plastering: Stucco materials; beads, screeds, reveals, control joints, and other plaster accessories.

G. Section 099000 - Painting and Coating: Surface preparation and repainting of exterior surfaces; crack repair materials for stucco crack repair.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Concrete Institute (ACI):

1. ACI 524R -- Guide to Portland Cement Plastering; 2008.

C. American Society for Testing and Materials (ASTM):

1. ASTM C91 -- Standard Specification for Masonry Cement; 2005.
2. ASTM C150 -- Standard Specification for Portland Cement; 2007.
3. ASTM C847 -- Standard Specification for Metal Lath; 2006.
4. ASTM C897 -- Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters; 2005.
5. ASTM C926 -- Standard Specification for Application of Portland Cement-Based Plaster; 2011a.
6. ASTM C932 -- Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering; 2006.
7. ASTM C1063 -- Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2006.
8. ASTM C1116/C1116M -- Standard Specification for Fiber-Reinforced Concrete; 2010a.
9. ASTM C1328 -- Specification for Plastic (Stucco) Cement; 2005.
10. ASTM D1784 -- Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds; 2011.
11. ASTM D4216 -- Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly(Vinyl Chloride) (CPVC) Building Products Compounds; 2013.

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

E. Portland Cement Association (PCA):

1. PCA EB049 -- Portland Cement Plaster/Stucco Manual; 2003.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.
2. Submittals for this section are to be coordinated with submittals required in Section 092400 - Portland Cement Plastering.

B. Product Data: Submit manufacturer's product data for each product to be used,

including but not limited to premixed cement plaster and patching stucco/cement plaster, integral bonding admixture, lath and plaster accessories.

1. Include manufacturer's written specifications, proportion mixes, and installation instructions for factory-prepared materials.
    a. Manufacturer's written specifications shall include physical and performance characteristics, and instructions for storage, handling, and use.
2. Provide documentation certifying that materials used together are mutually compatible (e.g., integral bonding admixture and premixed cement plaster).
3. If requested, provide Material Safety Data Sheets.

1.05 QUALITY ASSURANCE

A. Installer/Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

B. Contractor shall not change source or manufacturer of cement plaster materials during the course of the work.

C. Warranty: Contractor shall provide a written warranty against defects in material and installation for a period of not less than ten (10) years.

1.06 MOCK-UPS

A. General:
1. Contractor shall prepare mock-up installations illustrating each type of cement plaster repair work to be performed.
    a. Special tooling and texturing necessary to match existing finish is to be included.
    b. If cleaning tests are also to take place, test panels should be prepared on the same area as mock-up.
2. Where mock-up is deemed by Architect to be not in conformance with design intent, Contractor shall prepare additional mock-up(s) at no additional cost to Owner as necessary to achieve Architect's approval.
3. Locate mock-ups where directed or as approved by Architect.
    a. Mock-ups should not be undertaken on highly visible surfaces, except as authorized by Architect.
4. Accepted mock-up(s) shall become part of the Work, and shall serve as the quality standard for subsequent Work.

B. Mock-up No. 1 - Fine Fissure (hairline) Crack Repair: Construct mock-up of exterior fine fissure repair, 2 ft long, illustrating crack concealment and surface finish match to existing.

C. Mock-up No. 2 - Linear Static Crack Repair: Construct mock-up of exterior linear static crack repair, 2 ft long, illustrating crack concealment and surface finish match to

existing.

D. Mock-up No. 3 - Large Dynamic Crack Repair: Construct mock-up of exterior wall large dynamic crack repair, 2 ft long, illustrating crack concealment and surface finish match to existing.

E. Mock-up No. 4 - Delamination Repair: Construct mock-up of exterior wall delamination repair, 2 ft long by 2 feet wide, illustrating surface finish match to existing, and edge interface between new and existing cement plaster.

F. Mock-up No. 5 - Corner Bead Repair: Construct mock-up of exterior wall corner repair, 2 ft long, illustrating corner finishing, surface finish match to existing, and edge interface between new and existing cement plaster.

G. Mock-up No. 6 - Reveal Bead Repair: Construct mock-up of exterior wall reveal repair, 2 ft long, illustrating reveal finishing, surface finish(es) match to existing, and edge interface between new and existing cement plaster.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver all products to the site in original packaging, unopened, and undamaged with manufacturer's name and product identification visible thereon, and manufacturer's instructions and Material Safety Data Sheets.

B. Store products in a dry location and protect them from dampness following manufacturer's instructions.

C. Stockpile and handle aggregates in a manner to prevent contamination from foreign materials.

1.08 FIELD CONDITIONS

A. Do not apply cement plaster when substrate or ambient air temperature is under 50 degrees F or over 90 degrees F.

B. Hot Weather Conditions:

1. Use damp loose sand.

2. Use cool water for mixing.

3. Pre-dampen masonry walls prior to application of cement plaster scratch coat.

4. Prevent the cement plaster from drying out by covering with a plastic sheet, or moist cure at least twice daily for the first 2 to 3 days.

5. Do not allow fresh cement plaster to be subject to hot, dry winds.

C. Protect existing adjacent materials and surfaces during the execution of the work; provide all necessary protection and follow all necessary work procedures to avoid damage to existing material assemblies not a part of the work in the Section:

1. Minimize levels of dust during cement plaster removal and repair operations.

2. Protect open joints and other vulnerable areas from water penetration to prevent leakage during the course of the work. Open areas shall not be left exposed

overnight or when inclement weather is predicted.

3. Temporarily remove and store surface-mounted appurtenances (e.g., light fixtures, signs, etc.) during cement plaster and sealant repair work.
4. Protect windows during repair of cement plaster in close proximity to window openings.
5. Protect existing roof surface from damage during the course of the cement plaster rehabilitation work. Repair all damage to roofing, flashings, etc., to the satisfaction of, and at no additional cost to, the Owner.
6. Protect adjacent work from moisture deterioration and soiling due to cement plaster application operations. Provide temporary coverings as required to minimize spattering of cement plaster on other materials.

D. Provide visible barriers and/or warning tape around the perimeter of the work area for visitor protection and shall provide that nearby vehicles and adjacent structures and foliage are protected from damage during the course of the work.

E. Coordinate cement plaster work with the other trades involved in exterior rehabilitation work, including but not limited to cleaning, sealing, and painting.

PART 2 - PRODUCTS

2.01 GENERAL

A. Comply with applicable requirements of governing building code, including but not limited to the following:

1. Lathing and plastering materials shall conform to the standards listed in FBC-B TABLE 2507.2 and FBC-B CHAPTER 35 and, where required for fire protection, shall also conform to the provisions of FBC-B CHAPTER 7.
2. Cement plaster and lathing shall be done with the appropriate materials listed in FBC-B TABLE 2507.2 and FBC-B CHAPTER 35.

B. Manufacturers:

1. Cement Plaster Materials: Refer to Section 092400 - Portland Cement Plastering.
2. Bonding Agent: Refer to Section 092400 - Portland Cement Plastering.
3. Metal Lath: Refer to Section 092236 - Metal Lath.
4. Plaster Beads, Screeds, Reveals and Other Accessories: Refer to Section 092236 - Metal Lath.
5. Underlayment:
   a. Carlisle Coatings & Waterproofing Incorporated: www.carlisle-ccw.com.
   b. GAF.
   c. Owens-Corning.
   d. TAMKO.

2.02 PLASTER/STUCCO MATERIALS

A. Portland Cement Plaster: Refer to Section 092400 - Portland Cement Plastering.

B. Admixtures:

1. Integral Bonding Admixture: Refer to Section 092400 - Portland Cement Plastering.

2. Fiber Reinforcement: Refer to Section 092400 - Portland Cement Plastering

2.03 PLASTER PROPORTIONS & MIXING

A. Refer to Section 092400 - Portland Cement Plastering.

2.04 RELATED MATERIALS

A. Crack Repair Materials:

1. Patching Material Type 1 or 2, as appropriate for application; refer to Section 099000 - Painting and Coating, for additional information.

2. Patching Material Type 3: Joint Sealant Type S-5; refer to Section 079200 - Joint Sealants, for additional information.

B. Repair Mortar (Patching Material Type 4): Non-sag, lightweight, one-component, high-strength, polymer-modified, silica-fume-enhanced repair mortar with integral corrosion inhibitor for vertical and overhead applications.

1. Performance Characteristics:

a. Compressive Strength (ASTM C109): 6,750 psi (46.5 MPa) at 28 days.

b. Modulus of Elasticity (ASTM C215): 5.6×10^5 psi (3,861 MPa).

c. Splitting Tensile Strength (ASTM C496): 610 psi (4.2 MPa) at 28 days.

d. Flexural Strength (ASTM C348): 1,110 psi (7.7 MPa) at 28 days.

e. Bond Strength (ASTM C882, mortar scrubbed into substrate): 450 psi (16.9 MPa) at 28 days.

f. Water Absorption (ASTM C642): 4 percent.

g. Chloride Permeability (AASHTO T-277, according to ASTM C1202 Table 1): Very low range.

h. Length Change, wet cure (ASTM C157): +0.034 percent.

i. Length Change, dry cure (ASTM C157): -0.15 percent.

2. Product: “Gel Patch” (“MasterEmaco N 425”) by BASF.

C. Lath: Shall conform to applicable requirements of ASTM C1063 and the governing building code, including but not limited to FBC-B CHAPTER 25.

1. Metal Lath: Refer to Section 092236 - Metal Lath.

2. Strip Lath: Same as Metal Lath, except 6 inch (300 mm) wide strip.

3. Welded Wire Lath: ASTM C933; galvanized; with 2 inch (50 mm) square openings, paper or felt backing, of weight to suit application and as specified in FBC-B TABLE 2514.3.2 for framing spacing.

D. Corner Mesh: Formed sheet steel, minimum 0.018 inch (0.5 mm) thick, expanded flanges shaped to permit complete embedding in cement plaster, minimum 2 inch (50 mm) size; minimum G60 galvanized.

E. Beads, Screeds, Reveals, Control Joints, and Other Plaster Accessories: Refer to Section 092236 - Metal Lath.

F. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.

G. Fasteners: ASTM C1002 self-piercing tapping screws.

H. Tie Wire: Annealed galvanized steel.

I. Underlayment: Composite membrane consisting of fiberglass reinforced rubberized asphalt laminated to an impermeable polyethylene film layer, providing dual-barrier moisture protection.

1. Physical and Performance Requirements:

a. Thickness (ASTM D1970): 55 mils

b. Tensile Strength (ASTM D412): 25 lbf/in, min.

c. Moisture Vapor Permeability (ASTM E96): 0.03 perms.

d. Water Absorption (ASTM D1970): 0.1 percent, max.

2. Product: "CCW WIP 200" by Carlisle Coatings and Waterproofing, Inc., or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. General:

1. Prior to beginning operations, all exterior cement plaster surfaces shall be inspected to determine locations and extent of defects in cement plaster work, and to identify scope of patching and repair required.

2. Verify that substrates to receive cement plaster conform to the requirements of ASTM C926.

B. Existing Conditions Survey and Analysis:

1. Comprehensive evaluation of all exterior cement plaster areas shall be conducted by qualified persons experienced cement plaster analysis and repairs.

a. All cement plaster surfaces to be visually inspected for defects/damage, including but not limited to the following:

(1) Efflorescence: White crystalline deposits on wall surface; white streaks.

(2) Craze Cracking: Short, fine lines on the surface of cement plaster; typically about one-eighth (1/8) inch to about one-half (1/2) inch in length.

(3) Fine Fissures: Fine, tight fissures in the cement plaster.

(4) Linear Cracks: Fissures / fractures in cement plaster, such as dimensional cracks, angular cracks, corner cracks, and door and window cracks; indicate whether cracking is static or dynamic in nature.

(5) Delamination: Failure of the bond between cement plaster and substrate.

(6) Damage: Chipped or broken cement plaster and/or plaster accessory (e.g., corner bead).

b. Sounding: At locations where delamination of cement plaster is suspected (e.g., cracking, discoloration, unevenness in finished surface), conduct "soundings" to identify areas of delamination.

c. Bond Strength Tests: At locations where delamination of cement plaster has been identified by soundings, conduct bond strength testing to determine the extent of defective cement plaster and to identify sound cement plaster.

(1) Bond strength test procedure shall include a pull-out test conducted on existing cement plaster surfaces.

(2) Test machine shall be any type that is of sufficient capacity and capable of applying the load continuously and without shock at the rate of 0.05 in. (1.27 mm) per minute, with provision for adjustment of the rate of loading.

(3) Cement plaster areas where testing indicates that bond strength is less than the minimum acceptable values specified in ASTM C932 (i.e., 150 psi) shall be deemed to be defective.

d. The edges of each area where delamination has been identified by soundings and/or bond strength testing shall be marked for removal.

3.02 PREPARATION

A. General:

1. Pressure clean all existing cement plaster surfaces, using minimum 3000 psi, 3 gal per minute equipment.

a. Areas where mildew is present or suspected must be pre-treated with mildewcide prior to pressure cleaning.

2. Prior to application of cement plaster to masonry or concrete substrate surfaces:

a. Clean concrete and masonry substrate surfaces of foreign matter. Wash surfaces with clean water.

b. Wet cast-in-place concrete and unit masonry bases with fine water spray to produce a uniformly damp surface and to reduce excessive suction.

B. At each area where efflorescence is identified in the Existing Stucco Inspection and Evaluation Report: Remove efflorescence from cement plaster surface.

C. At each area where cracking is identified in the Existing Stucco Inspection and Evaluation Report:

1. Craze Cracking or Fine Fissure Cracking (hairline cracks caused by plastic or drying shrinkage): Remove loose materials and foreign matter that could impair adhesion of crack repair materials to be used for repair; coordinate with preparation requirements specified in Section 099000 - Painting and Coating.

2. Linear Static Cracking (1/32-inch to 1/4-inch wide): Remove loose materials and foreign matter that could impair adhesion of crack repair materials to be used for repair; coordinate with preparation requirements specified in Section 099000 - Painting and Coating.

3. Large Dynamic Cracking (1/4-inch wide or wider): Rout out the crack to form a continuous slot, 1/4 inch W x 1/4 inch D. Remove loose materials and foreign matter that could impair adhesion of crack repair materials to be used for repair.

a. The edges of the routed slot shall be undercut where possible; if undercut is not possible, then slot shall have square edges. Edges shall be suitable for installation of bond breaker and joint sealer.

b. Coordinate joint design (including edge slope) with joint sealant requirements specified in Section 079200 - Joint Sealants, and with preparation requirements specified in Section 099000 - Painting and Coating.

D. At each area where delaminated cement plaster is identified in the Existing Stucco Inspection and Evaluation Report:

1. Sound cement plaster to determine the extent of delaminated material.

2. Remove unsound cement plaster material; profile base substrate by mechanical means.

a. Where unsound cement plaster material is to be removed, sawcut an edge line over sound cement plaster at least 2 inches beyond extent of unsound cement plaster material; sawcuts shall be same depth as cement plaster thickness, and shall not extend into substrate. The angle of sawcuts shall be slightly greater than 90 degress, to provide optimal edge for mating of new cement plaster to existing; featheredging is not allowed.

3. Remove paint from sound cement plaster a minimum of 12 inches surrounding area to be repaired.

E. At each area where damage (e.g., rusted metal bead) is identified in the Existing Stucco Inspection and Evaluation Report:

1. Remove sections of metal plaster bead which are rusted plus minimum 6 inches of sound (free of rust) metal at each end of rusted portion.

2. Remove unsound cement plaster material and all cement plaster covering the legs

of bead sections being removed; profile base substrate by mechanical means.

a. Where unsound cement plaster material is to be removed, sawcut an edge line over sound cement plaster at least 2 inches beyond extent of unsound cement plaster material; sawcuts shall be same depth as cement plaster thickness, and shall not extend into substrate. The angle of sawcuts shall be slightly greater than 90 degress, to provide optimal edge for mating of new repair mortar or cement plaster to existing; featheredging is not allowed.

3. Remove paint from sound cement plaster a minimum of 12 inches surrounding area to be repaired.

F. At each area where cast-in-place concrete is exposed due to removal of delaminated or damaged cement plaster, the exposed concrete surface shall be prepared to receive new cement plaster by:

1. Sandblasting, wire brushing, or chipping, or a combination thereof; and

2. Application of a dash-bond coat of cement plaster, applied forcefully against the surface, left untroweled, undisturbed, and moist cured for at least 24 hours.

3.03 STUCCO REPAIRS

A. General:

1. Defective or damaged cement plaster and related plaster accessories shall be removed.

2. After application of finish coating system, patched and repaired cement plaster cracks, areas, beads and edges shall not be distinguishable in the finished cement plaster work.

B. Repair of Cracks in Cement Plaster:

1. General:

a. Prepare surfaces and install crack repair materials in accordance with manufacturer's application instructions.

b. Crack shall be free from dirt, grease, or other contaminants. Blow cracks clean with compressed air, not to exceed 150 psi.

c. If substrate appears chalky after cleaning or if other conditions warrant, apply primer in accordance with manufacturer's application instructions.

2. Craze Cracking and Fine Fissure (Hairline) Cracks: After surface preparation, fill crack with appropriate crack repair materials.

3. Linear Static Cracks: Fill crack with appropriate crack repair materials.

4. Large Dynamic Cracks: After surface preparation, install bond breaker at bottom of new routed slot and install joint sealant.

a. The edges of the crack shall be undercut where possible. Brush cracks clean of loose debris with a soft brush.

C. Repair of Delaminated or Damaged Stucco:

1. Cut, patch, repair, and point-up cement plaster as necessary to restore uniform cement plaster (stucco) finish, and to prepare such finish for coating application.

2. Repair cracks and intended surfaces by moistening cement plaster and filling with new cement plaster, troweled or tamped flush with adjoining surfaces.

3. Point-up finish surfaces around items which are built into or penetrate cement plaster surfaces.

D. Plaster Bead Repairs at Corners and Reveals:

1. At locations where existing metal bead is rusted through or damaged, cut and remove rusted or damages bead and adjacent cement plaster. Then patch and repair the cement plaster to match adjacent corner/reveal detail, using slip-form method without a bead.

2. At locations where existing metal bead has minor rust, solvent clean; then remove loose rust, loose mill scale, and other foreign substances using hand tools according to SSPC-SP 2 or power tools according to SSPC-SP 3. Then coat metal with rust-inhibitive primer recommended by top coat manufacturer (refer to Section 099000 - Painting and Coating), and patch and repair the cement plaster to match adjacent corner/reveal detail.

3.04 CEMENT PLASTER APPLICATION

A. General:

1. Apply premixed cement plaster in accordance with manufacturer's instructions.

2. Apply cement plaster in accordance with ASTM C926.

3. Moist cure base coats.

4. Apply second coat immediately following initial set of first coat.

5. After curing, dampen previous coat prior to applying finish coat.

6. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

7. Where cement plaster is applied to horizontal surfaces, provide slope to prevent water from accumulating or standing.

8. Where cement plaster abuts aluminum, protect metal from contact with such cement plaster.

9. Where dissimilar base materials abut and are to receive a continuous coat of cement plaster, the juncture shall be covered with a 6-inch wide strip lath extending 3 inches on either side of the juncture.

10. Do not use integral bonding admixture as a surface-applied external bonding agent or as a primer.

B. Apply cement plaster with complete embedment into bases and all accessories. Fill all corner beads with each coat.

C. At each cement plaster area to be patched, apply cement plaster with interruptions occurring only at junctures of cement plaster planes, openings, or control joints.

D. At locations where cement plaster repair work is over metal base (e.g., metal lath), install cement plaster in accordance with the requirements of ASTM C926 for the application of three-coat cement plaster on metal plaster bases.

1. Cement plaster thickness for patching and repairs shall match existing.

E. At locations where cement plaster repair work is over solid base (e.g., concrete, concrete masonry), install cement plaster in accordance with the requirements of ASTM C926 for the application of three-coat cement plaster on solid bases.

1. Cement plaster thickness for patching and repairs shall match existing.

2. Where total cement plaster thickness will exceed the total thickness specified in ASTM C926 TABLE 1 for three-coat work over unit masonry or cast-in-place concrete, self-furring metal lath shall be installed in accordance with ASTM C1063.

F. Delay application of brown coat until scratch coat has attained sufficient rigidity to resist cracking or other physical damage when the next coat is applied.

1. Use a long rod or slicker to densify each coat.

G. Curing and Interval:

1. First and second coats of cement plaster shall be applied and moist cured as set forth in ASTM C926 and FBC-B TABLE 2512.6.

a. The base coat shall be damp cured for a period of not less than 24 hours as set forth in FBC-B SECTION 2516.1.6.6.

2. Cement plaster finish coats shall be applied over base coats that have been in place for the time periods set forth in ASTM C926 and FBC-B SECTION 2516.1.6.8.

a. The third or finish coat shall be applied with sufficient material and pressure to bond and to cover the brown coat, and shall be of sufficient thickness to conceal the brown coat; additional coats shall be applied as necessary to meet the finished thickness specified or to flush with adjacent cement plaster surfaces.

3. Cement plaster shall be kept damp for a period of not less than 48 hours after application of the finish coat.

H. Finish Texture:

1. Finish texture of new cement plaster used for patching and repairs shall match finish of existing cement plaster on adjacent surfaces, to provide a uniform and consistent overall appearance; for reference, use the following finishes in the locations indicated:

a. Vertical Surfaces (e.g., walls; columns): Smooth or textured finish (as indicated on drawings and verified in the field), to match existing finish on adjacent cement plaster.

b. Horizontal Surfaces (e.g., ceilings; soffits): Smooth finish, to match existing finish on adjacent cement plaster.

2. Patched and repaired cement plaster work shall not be distinguishable in the finished cement plaster work.

I. Tolerance: Complete cement plaster work such that the deviation from true plane (exclusive of texture) is no greater than 1/4 in. (6 mm) as measured from line of a 10-ft (3.5-m) straightedge placed at any location on surface.

3.05 ADJUSTING, CLEANING AND PROTECTION

A. Refer to Section 092400 - Portland Cement Plastering.

END OF SECTION

SECTION 093000

TILING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tile for interior floor and wall applications.

B. Mortar, grout and membrane materials.

C. Joint sealant (for movement joints).

D. Non-ceramic trim.

E. Grout sealer.

F. Patching and leveling compound materials.

1.02 RELATED REQUIREMENTS

A. Section 033000 – Cast-In-Place Concrete.

B. Section 079200 - Joint Sealants.

C. Section 090561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

D. Section 092116 - Gypsum Board Assemblies: Cement Backer Board / Cement Backer Board Units (CBU) as tile substrates; backer plate for attachment of toilet accessories; anchor plate for attachment of grab bars.

E. Section 102800 - Toilet Accessories.

F. Division 22 - Plumbing: Fixtures; floor drains.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American National Standards Institute (ANSI):

1. ANSI A108 Series/A118 Series/A136.1 -- American National Standard Specifications for the Installation of Ceramic Tile (Compendium).

a. ANSI A108.1 -- American National Standard for Installation of Ceramic Tile.

(1) ANSI A108.1a -- American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 1999.

(2) ANSI A108.1b -- American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 1999.

(3) ANSI A108.1c -- Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement Mortar; 1999 (R2010).

b. ANSI A108.5 -- American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex--Portland Cement Mortar; 1999.

e. ANSI A108.10 -- American National Standard Specifications for Installation of Grout in Tilework; 1999.

d. ANSI A108.11 -- American National Standard for Interior Installation of Cementitious Backer Units; 2013.

e. ANSI A108.13 -- American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.

f. ANSI A118.1 -- American National Standard Specifications for Dry-Set Portland Cement Mortar; 1999.

g. ANSI A118.4 -- American National Standard Specifications for Latex-Portland Cement Mortar; 1999.

h. ANSI A118.6 -- American National Standard Specifications for Standard Cement Grouts for Tile Installation; 1999.

i. ANSI A118.7 -- American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation.

j. ANSI A118.9 -- American National Standard Specifications for Cementitious Backer Units; 2013.

k. ANSI A118.10 -- American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.

l. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.

m ANSI A118.12 -- American National Standard for Crack Isolation Membranes for Thin Set Ceramic Tile and Dimension Stone Installations; 2013.1.

2. ANSI A137.1 -- American National Standard Specifications for Ceramic Tile; 2012.

C. American Society for Testing and Materials (ASTM):

1. ASTM A653/A653M -- Standard Specification for Steel Sheet, Zinc-Coated

(Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.

2. ASTM C109/C109M -- Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
3. ASTM C373 -- Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products; 2014a.
4. ASTM C482 -- Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement; 2002 (2014).
6. 5. ASTM C627 -- Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester; 2010.
6. ASTM C648 -- Standard Test Method for Breaking Strength of Ceramic Tile; 2004 (2014).
7. ASTM C794 -- Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2001.
8. ASTM C920 -- Standard Specification for Elastomeric Joint Sealants; 2005.
9. ASTM E96/E96M -- Standard Test Methods for Water Vapor Transmission of Materials; 2005.

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.
2. FBC-A -- Florida Building Code, Accessibility.

E. International Organization for Standardization (ISO):

1. ISO 13007 -- Standards for Adhesives and Grouts

F. Tile Council of North America, Inc. (TCNA):

1. TCNA (HB) -- TCNA Handbook for Ceramic Tile Installation; current edition.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.
2. Submittals for this section are to be coordinated with submittals required in Section 092400 - Portland Cement Plastering.

B. Product Data: Provide manufacturers' product data sheets and installation instructions for each of the following:

1. Tile (Field Tile and Trim Pieces).
   a. Include physical and performance characteristics.

b. Mark to identify each type, size, and shape required.

2. Mortar and grout materials.

a. Include manufacturer’s instructions for mixing and installing.

b. Include ISO 13007 classification for each type grout and mortar to be used; coordinate with shop drawings to indicate which product will be used in each designated application.

3. Joint sealer and backer materials for use in movement joints.

4. Cement backer board materials.

5. Membranes and associated products.

C. Shop Drawings:

1. Shop drawings for this section are to be coordinated with stud-framing partition submittals required in Section 092116 - Gypsum Board Assemblies.

2. Indicate field-verified dimensions for all surfaces to receive tile; coordinate with tile layout.

3. For each type installation, indicate applicable TCNA tile installation method.

a. Indicate compliance with specified reference standards for materials and installation specifications.

b. Where installation method includes options or alternatives, indicate selected options and alternatives.

c. Indicate thickness of setting materials, and coordination with related components (e.g., door threshold, floor drain, etc.).

d. Indicate ISO 13007 classification for grout and mortar to be used in each designated application.

4. Indicate accessory materials, including but not limited to patching and leveling compound, waterproofing, cement backer units, joint sealer, grout, etc.

5. Indicate tile layout, patterns, color arrangement, perimeter conditions, junction with dissimilar materials, movement joints, and setting details.

a. Indicate alignment of floor, base and wall joints.

6. Indicate interface between materials specified in this section and materials specified elsewhere, including but not limited to sheet metal flashing, floor drains, and door thresholds.

D. Samples:

1. Selection Samples:

a. Tile: For each type of tile (except tile for which color and finish is specified), submit manufacturer's complete range of color samples (including samples of all Price Groups), for Architect's initial selection.

b. Grout: For each type of grout, submit manufacturer's complete set of color samples for Architect's initial selection.

2. Verification Samples: Mount selected tile and apply selected grout on plywood panels; each sample panel to be 24 x 24 inches (600 x 600 mm) in size, illustrating tile pattern, color variations, and grout joint size variations for each of the following conditions:

a. Panel A: Floor tile.

b. Panel B: Wall tile.

E. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.05 QUALITY ASSURANCE

A. Maintain one copy of TCNA (HB) and ANSI A108 Series/A118 Series/A136.1 on site.

B. Installer Qualifications: Company specializing in performing tile installation, with minimum of ten (10) years of documented experience.

C. Comply with applicable requirements of the governing building code, including but not limited to FBC-B SECTIONS 2103, 2121 and 2520.

1.06 WARRANTY

A. Manufacturer’s Warranty:

1. Ceramic Tile: Provide tile manufacturer's product warranty agreeing to repair or replace tile products that show manufacturing defects within one (1) year after Date of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be stored and protected from damage in accordance with manufacturer's delivery, storage and handling instructions.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient and substrate temperature of mortar materials in accordance with mortar manufacturer’s recommended instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Tile:

1. Floor Tile:

a. Basis of Design: American Olean: www.americanolean.com.

b. Other Manufacturers: Equivalent products manufactured by one of the following manufacturers may be submitted for consideration.

(1) Crossville, Inc.: www.crossvilleinc.com.

(2) DalTile: www.daltile.com.

2. Ceramic Wall Tile:

a. Basis of Design: American Olean: www.americanolean.com.

b. Other Manufacturers: Equivalent products manufactured by one of the following manufacturers may be submitted for consideration.

(1) Crossville, Inc.: www.crossvilleinc.com.

(2) DalTile: www.daltile.com.

C. Non-Ceramic Trim: Schlüter Systems, LP: 194 Pleasant Ridge Road; Pittsburgh, NY 12901-5841; Tel. 800-477-9783.

D. Waterproofing Membrane, Mortar and Grout Materials:

1. Basis of Design: Mapei Corporation: www.mapei.us.

2. Other Manufacturers: Equivalent products manufactured by one of the following may be submitted for consideration:

a. Laticrete International, Inc.: www.laticrete.com.

b. Southern Grouts & Mortars, Inc. (SGM): www.sgm.cc.

F. Joint Sealant:

1. Basis of Design: Mapei Corporation: www.mapei.us.

2. Other Manufacturers: Equivalent products manufactured by one of the following may be submitted for consideration:

a. BASF.

b. Laticrete International, Inc.: www.laticrete.com.

c. Tremco.

G. Patching and Leveling Compound Materials: Same as Waterproofing Membrane, Mortar and Grout Materials manufacturer.

2.02 TILE

A. General:

1. Tile products shall be by the same manufacturer.

2. Tile shall be as defined in, and shall conform to the requirements of, ANSI A137.1.

3. Tile flooring surfaces shall be stable, firm, and slip resistant; and shall comply with applicable requirements of the governing building code, including but not limited to FBC-B SECTION 1003 and FBC-A SECTION 302.

a. Interior tile flooring surfaces shall have a minimum DCOF AccuTest value (ANSI A137.1, Section 9.6) of not less than 0.42; and not less than 0.50 in wet areas.

B. Porcelain Mosaic Floor Tile:

1. Performance Requirements:

a. Moisture Absorption (ASTM C373): 0.5 percent, max.

b. Breaking Strength (ASTM C648): 300 lbf, min

c. Scratch Hardness (MOH's Scale): 7.0, min.

d. Slip Resistance, DCOF AcuTest Value (ANSI A137.1, Section 9.6): 0.42, min.

2. Dimensions: 1 x 1 in, hexagon; mesh-mounted on a 12 x 12 in sheet.

a. Thickness: 1/4 in.

3. Product: "Unglazed ColorBody™ Porcelain Mosaics" by American Olean.

a. Finish: Unglazed; slip-resistant.

b. Color: "Ice White" (A25).

C. Glazed Ceramic Wall Tile:

1. Performance Requirements:

a. Water Absorption (ASTM C373): 20 percent, max.

b. Breaking Strength (ASTM C648): 120 lbf, min.

c. Scratch Hardness (MOH's Scale): 4.0, min.

2. Dimensions: 3 x 6 in. (7.5 x 15.2 cm).

a. Thickness: 5/16 in.; 3/8 in. (bevel).

3. Trim Units: Flat top cove base.

4. Product: "Bright & Matte Profiles - Bevel Wall Tile", as manufactured by American Olean.

a. Surface Finish: "Bright".

b. Color(s): "Ice White" (0025).

2.03 MORTAR & SETTING MATERIALS

A. General:

1. Shall contain anti-microbial protection to inhibit the growth of stain-causing mold and mildew in the substrate.

2. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.

3. Mortar materials shall conform to specified warranty requirements.

B. Cementitious Mortars:

1. Mortar Type 1 - Thick Bed Mortar: Latex-portland mortar complying with ANSI

A108.1A, and as follows:

a. General:

(1) Shall be compatible with mortar bond coat materials.

(2) Suitable for bonded or unbounded, screeded or sloped, and interior or exterior applications.

(3) Consistency of Mix: Screed mortar.

b. Performance Requirements (28 days):

(1) Compressive Strength (ANSI A118.4 and ASTM C109/C109M): Minimum 4,000 PSI.

(2) Flexural Strength (ASTM C348): Minimum 1,100 PSI.

(3) Pull-out: Minimum 300 PSI.

c. Acceptable Product: MAPEI 4-to-1 Mortar Mix gauged with MAPEI Planicrete AC, or equal.

2. Mortar Type 2 - Thin-Set / Bond Coat Mortar:

a. Mortar Type 2A - Thin-Set / Bond Coat Mortar (Extended Open Time): Latex-portland mortar complying with ANSI A118.4, and as the following:

(1) ISO 13007 Classification: C2ES2P2.

(2) Acceptable Product: MAPEI Keralastic System, or equal.

b. Mortar Type 2B - Thin-Set / Bond Coat Mortar (Fast Setting): Latex-portland mortar complying with ANSI A118.4, and as the following:

(1) ISO 13007 Classification: C2FS2P2.

(2) Acceptable Product: Mapei Granirapid System, or equal.

2.04 GROUT MATERIALS

A. General:

1. Shall contain anti-microbial protection to inhibit the growth of stain-causing mold and mildew or mildew.

2. Grout materials shall conform to specified warranty requirements.

3. Color(s): Up to three colors, to be selected by Architect.

B. Cementitious Grouts:

1. Grout Type 1: Premium-grade, pre-blended, fast-setting, polymer-modified, color consistent, non-shrinking, efflorescence-free, Portland-cement tile grout complying with ANSI A118.6, ANSI A118.7, and Classification CG2WAF per ISO 13007.

a. Recommended by manufacturer for joint widths from 1/16 to 1 inch (1.5 to 2.5 cm).

b. Acceptable Product: MAPEI Ultracolor Plus, or equal.

2. Pre-Blended Grouts:

a. Grout Type 2A - Pre-Blended Sanded Grout: Premium-grade, pre-blended, polymer-modified sanded Portland-cement tile grout complying with ANSI A118.6 and Classification CG2WA per ISO 13007.

(1) Recommended by manufacturer for joint widths from 1/8 to 5/8 inch (3 to 16 cm).

(2) Acceptable Product: MAPEI Keracolor S, or equal.

b. Grout Type 2B - Pre-Blended Unsanded Grout: Premium-grade, pre-blended, polymer-modified unsanded Portland-cement tile grout complying with ANSI A118.6 and Classification CG2WA per ISO 13007.

(1) Recommended by manufacturer for joint widths from 1/16 to 1/8 inch (1.5 to 3 cm).

(2) Acceptable Product: MAPEI Keracolor U, or equal.

2.05 MARBLE THRESHOLDS

A. N/A.

2.06 MEMBRANE MATERIALS

A. General:

1. Membrane materials shall conform to specified warranty requirements, and shall be compatible with other materials used in the assembly.

B. Cleavage Membrane: Chlorinated polyethylene (CPU) sheeting, polyvinyl chloride (PVC) membrane, or high-solids, cold-liquid-applied membrane, conforming to ANSI A108.02-3.8 and TCNA (HB) Product Selection Guides.

C. Waterproof Membrane: Thin, flexible, seamless load-bearing waterproofing/ crack isolation membrane formed from a single component, self-curing, liquid rubber polymer; shall not require the use of fabric in the field, coves or corners.

1. Physical and Performance Requirements:

a. Hydrostatic Test, 7-day (ANSI A118.10): Pass.

b. Tensile Strength, 7-day (ANSI A118.10): 265 to 300 PSI (1.8 to 2.0 MPa).

c. Water Immersion, 7-day (ANSI A118.10): 95 to 120 PSI (0.7 to 0.83 MPa).

d. Shear Bond, 7-day (ANSI A118.10): 200 to 275 PSI (1.4 to 1.9 MPa).

e. Shear Strength, 28-day (ANSI A118.10): 214 to 343 PSI (1.5 to 2.3 MPa)

f. System Crack Resistance Test (ANSI A118.12.5.4): Pass (High).

g. Water Vapor Transmission (ASTM E96/E96M, Procedure B): 0.515 grams/h-ft^2.

h. Water Vapor Performance (ASTM E96/E96M, Procedure B): 1.247 perms.

i. Service Rating (TCNA; ASTM C627): Extra Heavy/cycles 1-14.

2. Acceptable Product: MAPEI AquaDefense, or equal.

D. Crack Suppression Membrane: Thin, cold-applied, two-part system consisting of a liquid rubber and reinforcing fabric; for interior or exterior use on floors and walls whenever hairline cracking or spider-webbing occurs in the substrate, and over shrinkage and other non-structural cracks up to 1/8 inch in width. Materials shall be non-toxic, non-flammable, and non-hazardous during storage, mixing, application, and when cured.

1. Physical and Performance Requirements:

a. System Crack Resistance (ANSI A118.12 5.4): Pass at 1/8 inch (3 mm).

b. Elongation (ASTM D751; 17.1): 20 to 30 percent.

c. Breaking Strength, Cut Strip Method (ASTM D751; 16.1): 1700 to 1900 psi (11.72 to 13.10 MPa).

d. Nominal Dry Thickness (LIL 1013): 0.020 inch (0.51 mm)

e. 28 day Quarry/Concrete Shear Strength (ANSI A118.12 5.1.5): 125 psi (0.86 MPa), minimum.

f. Point Load (ANSI A118.12 5.2): 3200 lbf (14 kN), minimum.

g. Service Temperature Range (LIL 1016): -20 to 280 degrees F (-28 to 137 degrees C).

h. Service Rating (TCNA; ASTM C627): Extra Heavy/cycles 1-14.

i. Total VOC Content: Less than 0.05 mg/m$^{3.}$

2. Acceptable Product: MAPEI AquaDefense, or equal

E. Vapor Retarder Membrane at Walls: Minimum 6-mil polyethylene film is required behind cement backer board.

1. The vapor retarder membrane must be tied into the floor waterproofing membrane.

2. Tile installer to coordinate

2.07 MOVEMENT JOINT MATERIALS

A. General:

1. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

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

B. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

C. Backup Strip: A flexible and compressible type of closed cell foam polyethylene, butyl rubber, or open cell and closed cell polyurethane, rounded to contact sealant, as shown in TCNA (HB) Method EJ171 details, and as recommended by sealant manufacturer.

1. Backup strip must fit neatly into the joint without compacting and to such a height to allow a sealant depth of 1/2 the width of the joint.

2. Sealant must not bond to the backup material.

D. Joint Sealant : High-performance, one-component, neutral-cure, 100-percent silicone sealant designed for ceramic tile applications, conforming to ASTM C920, Type S, Grade NS, Class 25, Uses NT, I, M, and G.

1. Adhesion: Shall conform to ASTM C794.

2. Shall be equipped with fungicides to resist mold and mildew growth.

3. Shall be resistant to pool chemicals.

4. Colors: To be selected by Architect from manufacturer’s complete range.

5. Product: MAPEI Mapesil, or equal.

2.08 ACCESSORY MATERIALS

A. Non-Ceramic Trim: Metal, style and dimensions to suit application, for setting using tile mortar.

1. Movement and Control Joint Profiles:

a. Product: Schluter Dilex-EDP Stainless Steel Movement Joint.

B. Tile Setting Accessories:

1. Joint Spacers: Plastic; size specified in manufacturer's printed installation instructions for tile thicknesses and joint widths indicated.

2. Tile Edge: Stainless steel angle, leg length equal to depth of tile or panel and setting bed.

3. Miscellaneous Accessories: Supply additional components specified in ANSI and TCNA specifications for indicated installations.

C. Patching and Leveling Compound: Latex-portland mortar complying with ANSI A118.4 and designed for screeds, patching and leveling beds, and scratch/plaster coats; suitable for repairing subfloors in commercial and institutional applications.

1. General:

a. Products containing gypsum are not acceptable.

2. Patching and Leveling Compound: Engineered, polymer-modified, fiber-reinforced, cement-based, skimcoating and patching compound.

a. Thickness: Featheredge to 1/2-inch.

b. Performance Requirements (28 days):

(1) Compressive Strength (ASTM C109/C109M): Minimum 3,500 PSI.

c. Acceptable Products: MAPEI Mapecem Quickpatch, or equal.

D. Grout Sealer: Water-based grout sealer designed to resist water, oil and acid-based contaminants, and to simplify maintenance.

1. General:

a. Shall not change the appearance of the grout.

b. Shall allow moisture vapor transmission.

c. Suitable for cementitious sanded or unsanded grout joints, interior and exterior applications, and walls or floors.

d. Expected Wear Duration: 5 years, minimum.

2. Product: As recommended by grout manufacturer.

E. Cement Backer Board / Cement Backer Board Units (CBU): Refer to Section 092116 - Gypsum Board Assemblies.

F. Fasteners (for attaching Cement Backer Board panels to stud framing): Non-corrosive and non-oxidizing, hot-dipped galvanized fasteners conforming to ASTM A653/A653M.

1. Refer to Section 092116 - Gypsum Board Assemblies for additional requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Subsurface/Substrate Tolerances: Contractor shall provide tile substrates complying with TCNA (HB) guidelines for “Subsurface Tolerance” and the following criteria, whichever is the most stringent:

1. Concrete Sub-floor (Substrate for Floor Tile):

a. Finish slab free from small hollows or bumps and graded to the elevations called for, with depressions in floors between high spots not greater than 1/8 inch below a 10-foot straightedge in accordance with ACI 302 Surface Finish Tolerance, and not more than 1/4 inch between opposite exterior walls, unless otherwise called for on the Drawings.

b. Subsurface shall not vary by more than 1/16 inch over 1 foot, nor more than 1/32 inch between adjoining edges.

2. Cement Backer Board (Substrate for Wall Tile / Wall Base Tile):

a. Variation from required plane of the backer board surface shall not exceed 1/8 inch in 10 feet.

b. Subsurface shall not vary by more than 1/16 inch over 1 foot, nor more than 1/32 inch between adjoining edges.

B. Sub-floor Surfaces:

1. Verify that sub-floor surfaces are:
    a. Smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
    b. Dust-free and free of substances which would impair bonding of setting materials to sub-floor surfaces.
2. Verify that required floor-mounted utilities are in correct location.

C. Wall Substrate Surfaces: Verify that support metal and framing systems are installed to meet the tolerances specified in Section 092116 - Gypsum Board Assemblies as well as in this section, whichever are the most stringent; and ready for installation of cement backer board.
1. Metal studs shall be well braced; minimum 20 gage; minimum 3-5/8 inch depth; maximum stud spacing 16 inches on center.

3.02 PREPARATION

A. General:
1. Protect surrounding work from damage.
2. Vacuum clean surfaces and damp clean.
3. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
4. Full waterproofing membrane under all bathroom and janitor closet room floor prior to tile system installation.

B. Cement Backer Board Substrate:
1. Prior to installation of Cement Backer Board, install Vapor Retarder Membrane at Walls (ANSI A.2.1.8) over entire wall area where Cement Backer Board Unit is to be installed.
    a. Install in accordance with manufacturer’s installation instructions.
2. Install Cement Backer Board Units in accordance with ANSI A108.11, Cement Backer Board manufacturer's instructions, and applicable requirements of the Florida Building Code.
3. Install Cement Backer Board Units horizontally or vertically to minimize joints, with end joints over framing members.
    a. Cement Backer Board Units with rounded edges: Face rounded edge away from studs, to form a V-joint for joint treatment.
4. Secure Cement Backer Board Units to each framing member with screws spaced not more than 8 inches (200 mm) on center and not closer than 1/2 inch (13 mm) from the edge of the Cement Backer Board Units, or as recommended by Cement Backer Board manufacturer. Install screws so that the screw heads are flush with the surface of the backer unit.

5. Where Cement Backer Board Unit joins waterproofing, lap backer unit over turned up waterproof system. Install fasteners only through top one-inch of turned up waterproof systems.

6. Remove polyethylene wrapping from Cement Backer Board Units and separate to allow for air circulation.

    a. Allow moisture content of backer units to dry down to a maximum of 35 percent before applying joint treatment and tile.

7. Joint Treatment:

    a. Horizontal Joints: 1/8-inch spacing, filled solid with latex-portland cement mortar and taped with 2-inch alkali-resistant glass fiber mesh tape.

    b. Vertical Joints: Filled solid with latex-portland cement mortar and taped with 2-inch alkali-resistant glass fiber mesh tape.

    c. Corners: Leave space between backer board units. Tape joints with skim coat of latex-portland cement mortar, but don't fill.

C. Concrete Floor Slab Substrate:

1. Bondability:

    a. Where tile is to be installed, concrete slabs should not have air entrainment or other additives in the mix, nor sealers or curing compounds applied without specific approval of mortar and grout manufacturer.

    b. Slabs should have steel trowel and fine broom finish and be free of laitance.

    c. In case of any question on condition of slab, it should be tested for bondability with a Dillon Dynamometer, and show a tensile bond of not less than 300 psi.

2. Levelness:

    a. Before tile is applied, test structural floor for levelness or uniformity of slope by water. Fill, level, and retest areas as required to meet tolerances specified in Section A-3 of ANSI A108.1 and retest.

    b. When specified levelness or uniformity of slope is obtained, prepare floors for setting bed in accordance with ANSI A108.1.

3. Where sealer, curing compound, bond breaker, densifier/hardener, adhesive or other surface coating has been applied to concrete substrate, it must be removed.

4. Refer to Section 090561 - Common Work Results for Flooring Preparation for additional requirements.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated; if not indicated, request tile pattern. Do not interrupt tile

pattern through openings.

C. Sound tile after setting. Replace hollow sounding units.

D. Workmanship:

1. Lay-out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.

    a. Joint Pattern at Wall and Base Tile: Horizontal running bond pattern, with each successive course staggered by half the length of tile above and below; joints in each alternate course are aligned.

    b. Joint Pattern at Floor Tile: Uniform hexagonal pattern, normal to long axis.

2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.

3. Form intersections and returns accurately.

4. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly.

5. Cut and drill tile neatly without marring surface.

6. Cut edges of tile abutting work of other trades, including but not limited to floor/wall penetrations, rough openings for recessed toilet accessories, and other built-in items.

    a. Fit tile closely around electrical outlets, piping, fixture mountings and fittings, and openings for recessed toilet accessories, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.

    b. The following joints shall be sealed watertight.

        (1) Movement joints (e.g., interior wall-to-wall corner joints, floor-to-base joints).

        (2) Penetration joints (e.g., penetrations for piping, fixture mountings).

        (3) Joints between tile and fixtures, and between tile and wall-mounted toilet accessories.

    c. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.

    d. Remove and reset tiles that are out of plane or misaligned.

    e. Floors:

        (1) In areas where floor drains occur, slope to drains where shown.

    f. Walls:

        (1) Install tile on walls and partitions, including pilasters, furred areas, and freestanding columns, from floor to ceiling.

        (2) Finish reveals of openings with tile, except where other finish materials

are shown or specified.

(3) Install tile on wall surfaces behind and at sides of fixtures, toilet accessories, mirrors, and equipment, except those units mounted in wall recesses, using same tile as scheduled for wall surfaces.

E. Tile Joints:

1. Keep all joints in line, straight, level, perpendicular and of even width, unless shown otherwise.

2. Joint Width:

a. Floor Tile Joints: 1/16 inch (2 mm), unless otherwise noted.

b. Wall Tile and Cove Base Tile Joints: 1/16 inch (2 mm), unless otherwise noted.

c. Movement Joints: 1/4 inch (6 mm), unless otherwise noted.

3. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

4. Grouting

a. Preparation:

(1) Cure set tile 72 hours before grouting when temperature is low or humidity is high; 48 hours before grouting when hot, dry conditions exist.

(2) Check mortar bond strength of installed tile before grouting.

(3) Clean sanding water, dust, and foreign substances from joints to be grouted.

(4) Clean and dry tile surfaces.

b. Grout joints in accordance with manufacturer's instructions and ANSI A108.10.

c. Remove grout from tile surfaces while still plastic, as grouting progresses.

d. After grouting, promptly remove all grout residue.

5. Keep movement joints (e.g., interior wall-to-wall corner joints, floor-to-base joints) free of mortar, grout and other materials prior to application of joint sealant and backer materials.

3.04 INSTALLATION - TILE

A. Install in accordance with designated TCNA (HB) installation method, as follows:

1. Floor Tile:

a. Tile Installation on Mortar Bed over Concrete Slab-On-Grade: Install in accordance with TCNA (HB) Method F111.

(1) Unbonded Membrane: Crack Suppression Membrane.

(2) Mortar Bed: Mortar Type 1 - Thick Bed Mortar.

(a) Adjust mortar bed thickness to ensure that finish floor elevation of tile flooring at the door threshold is flush with finish floor elevation of wood flooring on other side of the door threshold.

(3) Reinforcing: Wire Reinforcing Mesh.

(4) Bonded Membrane (Waterproofing): Waterproofing Membrane.

(5) Mortar Bond Coat: Mortar Type 2A or 2B (Installer's option).

(6) Tile: Porcelain Mosaic Floor Tile.

(7) Grout: Grout Type 1 or Grout Type 2B (Installer's option), with Grout Sealer.

b. Tile Installation on Concrete Slab-On-Grade (without Mortar Bed): N/A.

2. Wall Tile and Cove Base Tile:

a. Concrete / CMU Wall: N/A.

b. Stud Framed/Furred Wall: Install in accordance with TCNA (HB) Method W244C.

(1) Metal Stud Framing/Furring: Minimum 20 gage metal studs/furring at maximum 16 inches on center; for additional information, refer to Section 092116 - Gypsum Board Assemblies.

(2) Membrane: Vapor Retarder Membrane, installed between Cement Backer Board and stud framing.

(3) Cement Backer Board: One layer; for additional information, refer to Section 092116 - Gypsum Board Assemblies.

(4) Mortar Bond Coat: Mortar Type 2A or 2B (Installer's option).

(5) Tile:

(a) Wall Tile: Glazed Ceramic Wall Tile.

(b) Cove Base Tile: Flat Top Cove Base Trim for Glazed Ceramic Wall Tile.

(6) Grout: Grout Type 1 or Grout Type 2B (Installer's option), with Grout Sealer.

3.05 INSTALLATION - MARBLE THRESHOLDS

A. N/A.

3.06 INSTALLATION - MOVEMENT JOINTS

A. Provide continuous movement joints in accordance with TCNA (HB) Method EJ171 at each of the following locations:

1. Where tile work abuts restraining surfaces (e.g., interior wall-to-wall corner joints, floor-to-base joints, dissimilar floors, curbs, columns, pipes, ceilings), and where changes occur in backing materials.

2. Where joints occur at changes in plane of tile work, including but not limited to the following:
    a. Joints at junctions between adjacent walls (e.g., inside corner where wall tile meets wall tile).
    b. Joints between walls and floors (e.g., where bottom of cove base tile meets floor tile).
    c. Joints between columns, walls and floors.
    d. Expansion and control joints.
3. All expansion, control, construction, and cold joints in the construction shall continue through the tile work, including such joints at vertical surfaces.
    a. Joints through tile work directly over structural joints must not be narrower than the structural joint.

B. Installation:
1. Movement joints shall be located over all cold joints and saw-cut control joints.
2. To insure that location of joints in tile work align with existing joints in substrate, joints in tile work should be constructed during installation of mortar beds and/or tile, rather than saw-cutting joints after installation.
3. Keep movement joint cavities open and free of dirt, debris, grout, mortar, and setting materials.
4. Set compressible back-up strip when mortar is placed or utilize removable wood strip to provide space for backup after mortar has cured.
5. Install sealant after tile work and grout are dry. Follow sealant manufacturer’s recommendations.

3.07 CLEANING AND PROTECTION OF FINISHED WORK

A. Clean tile and grout surfaces.

B. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective work.

C. When recommended by tile manufacturer, apply protective coat of neutral protective cleaner to completed tile walls and floors.

D. Protect installed tile in accordance with ANSI specifications and manufacturer's instructions; use Kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
1. Do not permit traffic over finished floor surface for four (4) days after installation.

E. Remove protective coverings and rinse neutral cleaner from tile surfaces not more than 24 hours before final inspection.

END OF SECTION

SECTION 095100

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal grid ceiling suspension system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 115223 - Audio-Visual Equipment Supports: Suspended ceiling tile replacement kit for support of ceiling-hung projector mount.

B. Division 23 - Heating, Ventilating and Air Conditioning: Ceiling-grid-mounted air diffusers.

C. Division 26 - Electrical: Ceiling-grid-mounted luminaires.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C635/C635M -- Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2007.

2. ASTM C636/C636M -- Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.

3. ASTM E84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.

4. ASTM E1264 -- Standard Classification for Acoustical Ceiling Products; 2014.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

1. Include details and locations of ceiling access identification marks; indicate type of equipment.

C. Product Data: Provide data on suspension system components, acoustical units, and perimeter trim system.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Acoustical Units: Quantity equal to 2 percent of total installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. USG Corporation: www.usg.com.

B. Armstrong World Industries, Inc: www.armstrong.com.

2.02 ACOUSTICAL UNITS

A. General:

1. Acoustical units shall be by same manufacturer as suspension system and perimeter trim system.

B. Acoustical Panel:

1. Classification (ASTM E1264): Type IV, Form 2, Pattern E.

2. Physical Requirements:

a. Material: Mineral fiber.

b. Texture: Fine texture.

c. Surface Finish: Factory-applied latex paint on acoustically transparent membrane.

(1) Color: White.

d. Panel Dimensions:

(1) Size: 24 x 24 inches.

(2) Thickness: 3/4 inch.

e. Panel Edge Detail: 15/16-inch beveled tegular (i.e., a rebated or beveled edge to the tile which allows it to sink just below the grid level once installed).

3. Performance Requirements:

a. Acoustical Performance:

(1) NRC (NRC): 0.60, min.

(2) Ceiling Attenuation Class (CAC): 40, min.

(3) Product to have UL acoustical compliance.

b. Surface Burning Characteristics (ASTM E84): Class A.

(1) Flame Spread: 25, max.

(2) Smoke Developed: 50, max.

c. Light Reflectance: 0.90, min.

4. Product (Basis of Design): "Ultima Tegular, Fine Texture" (1951) by Armstrong.

2.03 SUSPENSION SYSTEM(S)

A. General:

1. Manufacturer: Acoustical Panels shall be by same manufacturer as suspension system and perimeter trim system.

B. Exposed Suspension System: ASTM C635/C635M; commercial quality, cold-rolled galvanized steel ceiling suspension system, including die-cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

1. Suspension System Components:

a. Main Tees: UL Classified Heavy Duty Classification; double-web design; 1-1/2 inches high; rectangular top bulb; 15/16-inch exposed flange with roll-formed steel cap; cross tee holes and hanger wire holes at 6 inches o.c.; convenience holes at approximately 2 inches o.c.; integral reversible splices.

b. Cross Tees: 1-1/2 inches high; roll-formed into double-web design with rectangular bulb; 15/16-inch exposed flange with pre-painted steel cap; high-tensile steel end clips clenched to web.

(1) Main tees and cross tees shall be positively locked, yet shall be removable without the use of tools.

c. Finish: Manufacturer's standard corrosion-resistant enamel paint finish; color: Flat White.

2. Suspension System Attachment Devices:

a. Hanger Wire: Galvanized carbon steel; soft temper; pre-stretched; yield stress load at least three times the design load but not less than 12-gauge

3. Wall Moldings:

a. General:

(1) Edges: Hemmed.

(2) Finish: Exposed surface pre-finished to match suspension system components.

b. Angle Molding: Angle shape.

(1) Dimensions:

(a) Flange: 7/8 inch.

(b) Height: 7/8 inch.

c. Shadow Molding: Angle shape with reveal.

(1) Dimensions:

(a) Flange: 3/4 inch.

(b) Height: 15/16 inch.

(c) Reveal: 3/4 inch.

4. Product (Basis of Design): "Prelude ML" by Armstrong.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

B. Ceiling Access Identification Marks: Provide printed labels for ceiling access identification marks to identify controls, valves, and other equipment located within in ceiling plenum areas.

C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of

each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Use longest practical lengths.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:

1. Cut to fit irregular grid and perimeter edge trim.

2. Make field cut edges of same profile as factory edges.

3. Double cut and field paint exposed reveal edges.

3.04 INSTALLATION – SUSPENDED CEILING TILE REPLACEMENT KIT

A. Coordinate installation of Suspended Ceiling Tile Replacement Kit within suspended grid opening at locations shown on drawings.

1. For additional requirements, refer to Section 115223 - Audio-Visual Equipment Supports.

3.05 IDENTIFICATION OF EQUIPMENT LOCATED ABOVE CEILING

A. Provide ceiling access identification marks to identify controls, valves, and other equipment located within in ceiling plenum areas. Equipment that requires ceiling access identification marks includes, but is not limited to the following:

1. Isolation valves.

2. Flow valves.

3. VAV controls.

4. Damper controls.

5. Remote electrical lighting ballasts.

6. Control dampers.

7. Fire control dampers.

8. HVAC equipment.

9. Remote transformers.

B. Coordinate location and design of ceiling access identification marks with Owner's representative.

3.06 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 096429

WOOD STRIP & PLANK FLOORING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Engineered wood strip and plank flooring.

B. Secondary subflooring.

C. Sleepers on cushion blocks.

D. Sheet vapor retarder.

E. Surface finishing.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete subfloor surface.

B. Section 061000 - Rough Carpentry: Secondary subfloor, including preservative-treated dimensional lumber and plywood sheathing panels.

C. Section 062000 - Finish Carpentry: Architectural wood trim.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM D3498 -- Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems; 2003 (2011).

C. National Wood Flooring Association (NWFA):

1. NWFA (IGM) - Installation Guidelines Manual; current edition.

2. NWFA (IG) -- Installation Guidelines; current edition.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide data for flooring, floor finish materials, and related materials.

C. Shop Drawings: Indicate wood plank flooring layout and joint pattern, and termination

details at walls and other vertical surfaces.

1. Include details for secondary subflooring, including layout of sleepers and plywood sheathing panel layout and joint details.
2. Include expansion/contraction range calculations for perimeter conditions.

D. Samples: Submit two samples 3-1/4 x 12 in. (83 x 300 mm) in size illustrating floor construction, finish grain, color, and sheen.

E. Installation Instructions: Indicate standard and special installation procedures.

F. Maintenance Data: Include maintenance procedures.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with NWFA (IG).

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.

C. Installer Qualifications: Company specializing in performing work of this section with minimum ten years experience.

1. Installer shall be a NWFA “Certified Professional Installer”.

1.06 FIELD CONDITIONS

A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40-percent.

B. Provide heat, light, and ventilation prior to installation.

C. Store materials in area of installation for minimum period of 24 hours prior to installation.

D. Maintain minimum room temperature of 65 degF (18 degC) for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

1.07 DELIVERY, STORAGE AND HANDLING

A. Do not deliver material in inclement weather.

B. Always store material in a dry place.

C. Do not store materials directly on concrete.

1. Elevate material at least 4 in. above concrete.

D. Solid wood flooring should be stored in the same environment in which it is expected to perform.

E. Acclimate the product for a minimum of 72 hours or as long as needed in order to meet the proper installation requirements.

1. Opening of the cartons will help to better acclimate material.

2. Material is acclimated once it has reached moisture equilibrium consistent with the temperature and relative humidity of the job site and normal living conditions.

1.08 WARRANTY

A. Manufacturer's Warranties:

1. Structural Integrity Limited Warranty: Manufacturer shall warrant that its products will be free from manufacturing defects in milling, dimension, and grade for the lifetime of the floor.

a. Engineered products shall be warranted against de-lamination of the plies due to bond line failure.

b. Warranty Period: Lifetime.

2. Finish Wear Layer Limited Warranty: Manufacturer shall warrant that the factory finish will not wear through or separate from the wood.

a. Finish Wear-Through is defined as 100-percent finish removal over at least 3-percent of the area of a total floor installation for the project.

b. Warranty Period: 5 years, commencing on date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Engineered Wood Plank Flooring:

1. Basis of Design:

a. Somerset Hardwood Flooring: www.somersetfloors.com.

2. Equivalent products by one of the following may be submitted for consideration:

a. Anderson Hardwood Floors: www.andersonfloors.com.

2.02 MATERIALS

A. Engineered Wood Plank Flooring:

1. Species: Red Oak.

2. Janka Hardness Rating: 1290 psi.

3. Grade: Clear.

4. Surface: Smooth.

5. Cut: Edge grain.

6. Construction: 8-ply cross-grain engineered construction; 7-ply birch core.

7. Dimensions:

a. Thickness:

(1) Overall: 1/2 in.

(2) Solid Dry Sawn Wear Layer: 3 mm.

b. Width: 3-1/4 in.

c. Length: Random from 10 in. up to 6-1/2 ft.

8. Edge: Tongue and groove, eased edge.

9. End: End matched, eased end.

10. Formaldehyde Emissions (ASTM D6007): BQL (below quantification limit), 0.008 ppm; CARB Phase 2 Compliant.

11. Critical Radiant Flux (ASTM E648): 0.33.

12. Product (Basis of Design): "Classic Collection" SolidPlus Engineered Hardwood Flooring by Somerset.

a. Finish: Ultimate™ Urethane Finish - UV Cured Aluminum Oxide, Abrasion Resistant Finish.

(1) Gloss Level: Low gloss.

(2) Color: "Gunstock" (EP314CLGUE).

B. Flooring Nails: Type recommended by flooring manufacturer.

C. Adhesive: Waterproof, air cure adhesive meeting the performance standards and test requirements of ASTM D3498; cartridge dispensed.

1. Product: "Titebond GREENchoice Weatherproof Subfloor Adhesive" by Franklin International, Inc. (www.titebond.com/sle), or equal.

D. Sleepers and Shims: Softwood lumber, pressure treated for moisture protection, 2 by 4 inch (50 by 100 mm) size.

1. For additional requirements, refer to Section 061000 - Rough Carpentry.

E. Secondary Subflooring: 3/4 inch (19 mm) thick plywood, APA Rated Sheathing, Span Rating of 24, with square edges; Exposure 1, preservative treated.

F. Vapor Retarder Sheet: ASTM D4397 polyethylene film.

1. Thickness: 8 mil (0.2 mm), minimum.

2. Water Vapor Permeance: As required by referenced standard for thickness specified.

G. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches (50 mm) wide, compatible with vapor retarder sheet material.

2.03 SHOP FINISHING

A. Floor Finish: Polyurethane, to achieve satin sheen surface; type recommended by flooring manufacturer.

1. Floor Stain: Penetrating type recommended by flooring manufacturer.

2.04 ACCESSORIES

A. Wood Base: Same species as flooring, unless lumber salvaged from original wood trusses is used; profile as indicated.

1. For additional information, refer to Section 062000 - Finish Carpentry.

2.05 SOURCE QUALITY CONTROL

A. Inspect and stamp species and grade on underside of each piece of wood flooring at factory.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/4 inch in 10 feet (6 mm in 3 m).

C. Verify that required floor-mounted utilities are in correct location.

D. The sub floor must be flat, meeting a minimum of 3/16 in. within 10 ft. or 1/8 in. in 6 ft.

1. All “wet” work (e.g., paint, drywall, concrete, masonry, plumbing) must be complete and dry well in advance of delivery of hardwood flooring

2. Permanent HVAC should be on and operational a minimum of 7 days and maintained between 65 to 75 degF and a relative humidity of 35- to 55-percent prior to delivery, during, and after installation of the flooring.

3.02 PREPARATION

A. Install Secondary Subflooring in accordance with wood flooring manufacturer's instructions, NWFA (IGM) and NWFA (IG), and as follows:

1. Place vapor retarder membrane over subfloor surface, lapping edges and ends minimum 6 inches (150 mm) and tape seal.

a. Patch punctures and cuts, and seal repairs with tape.

2. Place sleepers on vapor retarder membrane, parallel to short dimension of room and space at 16 in. (400 mm) nominally, to suit sheathing dimensions.

a. Stagger sleepers and lap ends 6 in. (150 mm) minimum.

b. Shim sleepers as required to prevent rocking and to provide solid contact with structural substrate, and to provide level base for support of plywood subfloor sheathing installation.

c. Maintain minimum 3/4 in. (19 mm) expansion gap between sleepers and at fixed walls and other interruptions, except where 1/2 in. (13 mm) is allowed per manufacturer’s installation instructions.

3. Install plywood subflooring over wood sleepers.

a. Lay plywood sheathing with face grain at right angle to sleepers, and with end joints over sleepers.

b. Maintain 1/8 in. (3 mm) gap between plywood sheathing panels, and 3/4 in. (19 mm) expansion gap between edge of plywood sheathing installation and fixed walls and other interruptions.

c. Attach plywood sheathing to sleepers with adhesive, and nail at 12 inches (300 mm) on center.

(1) Apply adhesive in accordance with manufacturer's instructions.

B. Prepare Secondary Subflooring substrate to receive wood flooring in accordance with manufacturer's instructions, and NWFA (IG).

C. Broom clean substrate.

3.03 INSTALLATION

A. Sheathing Paper: Place over wood subfloor; lap edges and ends 2 inches (50 mm), staple in place.

B. Engineered Wood Plank Flooring:

1. Install in accordance with manufacturer's instructions, and NWFA (IGM) and NWFA (IG).

a. Pre-drill and blind nail to secondary subflooring.

2. Lay flooring parallel to length of room areas. Verify alignment as work progresses.

3. Arrange flooring with end matched grain set flush and tight.

4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated.

5. Install edge strips at unprotected or exposed edges, and where flooring terminates.

6. Provide 3/4 in. (19 mm) expansion gap between edge of wood flooring installation and fixed walls and other interruptions**,** except where 1/2 in. (13 mm) is allowed per manufacturer’s installation instructions.

C. Install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions.

1. Miter inside and outside corners.

3.04 FINISHING

A. Finishing shall conform to manufacturer’s instructions, and as follows

1. Mask off adjacent surfaces before beginning sanding.

2. Sand flooring to smooth even finish with no evidence of sander marks.

a. Take precautions to contain dust.

b. Remove dust by vacuum.

3. Apply finish in accordance with floor finish manufacturer's instructions.

a. Lightly buff between coats with steel wool to remove irregularities; then vacuum clean and wipe with damp cloth before applying succeeding coat.

4. Apply last coat of finish.

3.05 CLEANING

A. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.

3.06 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Place protective coverings over finished floors; do not remove coverings until Substantial Completion.

END OF SECTION

SECTION 099000

PAINTING AND COATING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish designated surfaces exposed to view, unless fully factory-finished or otherwise indicated.

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.

2. Items indicated to receive other finishes.

3. Items indicated to remain unfinished.

4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.

5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.

6. Floors, unless specifically indicated.

7. Ceramic and other types of tiles.

8. Glass.

9. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 016302 - Use of Substitute Materials on Historic Building Exteriors.

B. Section 090561 - Common Work Results for Flooring Preparation.

C. Division 22 - Plumbing: Painted identification.

D. Division 23 - Heating, Ventilating and Air Conditioning: Painted identification.

E. Division 26 - Electrical: Painted identification.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM D4442 -- Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

C. Master Painters and Decorators Association (MPI):

1. MPI (APL) -- Master Painters Institute Approved Products List; current edition.

2. MPI (APSM) -- Master Painters Institute Architectural Painting Specification Manual; current edition.

D. U.S. Code of Federal Regulations (CFR):

1. 40 CFR -- U.S. Environmental Protection Agency.

a. 40 CFR 59, Subpart D -- National Volatile Organic Compound Emission Standards for Architectural Coatings; current edition.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").

2. MPI product number (e.g. MPI #47).

3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

4. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

C. Samples:

1. Selection Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of at least three shades of each proposed color for each finishing product specified.

a. Where sheen is specified, submit samples in only that sheen.

b. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.

2. Verification Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded.

a. Submit on aluminum sheet, 8-1/2 by 11 inches (216 by 279 mm) in size.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.

2. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years documented experience and approved by manufacturer.

1.06 MOCK-UP

A. General:

1. Locate where directed by Architect.

2. Mock-up may remain as part of the work.

B. Mock-Up No.1 - Exterior Stucco Wall: Provide panel, approx 8 feet (2.5 m) long by 8 feet (2.5 m) wide, illustrating paint color, texture, and finish of paint on stucco wall surface.

C. Mock-Up No.2 - Exterior Roof Overhang: Provide roof overhang area approx 1 ft (300 mm) long by 3 ft (1 m) wide and including at least three (3) restored wood rafter tails and underside of wood roof sheathing between rafter tails, illustrating paint color, texture, and finish on wood.

1.07 WARRANTY

A. Manufacturer’s Warranty: Provide paint manufacturer's product warranty agreeing to repair or replace, at manufacturer’s option, paint products that blister or peel from properly prepared and primed surfaces or wear down or weather to expose previously painted surface within six (6) years after Date of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the

temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.

2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.

B. Paints:

1. Benjamin Moore & Co: www.benjaminmoore.com.

2. Glidden Professional, a product of PPG Architectural Coatings: www.gliddenprofessional.com.

3. PPG Paints: www.ppgpaints.com.

4. Sherwin-Williams Company: www.sherwin-williams.com.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.

2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.

5. Supply each paint material in quantity required to complete entire project's work from a single production run.

6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:

1. Provide paints and finishes that comply with the most stringent requirements specified in the following:

a. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.

b. Architectural coatings VOC limits of State of Florida.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated in Color Schedule.

1. Selection to be made by Architect after award of contract.

2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.

3. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint PI-OP-3L - Plaster (cured), Opaque, Latex, 3-Coat:

1. Flat Finish (MPI Gloss Level 2):

a. 1st Coat (Primer): MPI # 50; # 149.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Latex Primer (372), or equal.

b. 2nd Coat: MPI # 53.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Flat (373), or equal.

c. 3rd Coat: MPI # 53.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Flat (373), or equal.

B. Paint GI-OP-3L - Gypsum Board, Opaque, Latex, 3-Coat:

1. Flat Finish (MPI Gloss Level 2):

a. 1st Coat (Primer): MPI # 50; # 149.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Latex Primer (372), or equal.

b. 2nd Coat: MPI # 53.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Flat (373), or equal.

c. 3rd Coat: MPI # 53.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Flat (373), or equal.

C. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3-Coat:

1. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat (Primer): MPI # 107; # 134.

(1) Product: Benjamin Moore® ULTRA SPEC HP® Acrylic Metal Primer (H04).

b. 2nd Coat: MPI # 54.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

c. 3rd Coat: MPI # 54.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

D. Paint MI-OP-2L – Metals (ferrous or galvanized), Shop-Primed, Latex, 2-Coat:

1. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat (Primer): MPI # 54.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

b. 2nd Coat: MPI # 54.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

E. Paint MgI-OP-3L - Galvanized Metals, Latex, 3-Coat:

1. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat (Primer): MPI # 107; # 134.

(1) Product: Benjamin Moore® ULTRA SPEC HP® Acrylic Metal Primer (H04).

b. 2nd Coat: MPI # 54.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

c. 3rd Coat: MPI # 54.

(1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

F. Paint WI-OP-3L - Wood, Opaque, Latex, 3-Coat:

1. Flat Finish (MPI Gloss Level 2):
    a. 1st Coat (Primer): MPI # 45.
        (1) Product: Benjamin Moore® FRESH START® Alkyd Enamel Underbody (217), or equal.
    b. 2nd Coat: MPI # 53.
        (1) Product: Benjamin Moore® ECO SPEC® WB Interior Flat (373), or equal.
    c. 3rd Coat: MPI # 53.
        (1) Product: Benjamin Moore® ECO SPEC® WB Interior Flat (373), or equal.
2. Eggshell Finish (MPI Gloss Level 3):
    a. 1st Coat (Primer): MPI # 45.
        (1) Product: Benjamin Moore® FRESH START® Alkyd Enamel Underbody (217), or equal.
    b. 2nd Coat: MPI # 52.
        (1) Product: Benjamin Moore® ECO SPEC® WB Interior Eggshell (374), or equal.
    c. 3rd Coat: MPI # 52.
        (1) Product: Benjamin Moore® ECO SPEC® WB Interior Eggshell (374), or equal.
3. Semi-Gloss Finish (Gloss Level 5):
    a. 1st Coat (Primer):
        (1) Product: Benjamin Moore® FRESH START® Alkyd Enamel Underbody (217), or equal.
    b. 2nd Coat: MPI # 54.
        (1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.
    c. 3rd Coat: MPI # 54.
        (1) Product: Benjamin Moore® ECO SPEC® WB Interior Semi-Gloss (376), or equal.

G. Paint WI-TR-VS - Wood (except Wood Floors), Transparent; Varnish, Stain:
1. Eggshell Finish (MPI Gloss Level 3):
    a. 1st Coat: Stain.
        (1) Product: Benjamin Moore® Benwood® Interior Wood Finishes Waterborne Wood Stain (205), or equal.
    b. 2nd Coat: MPI #57.

(1) Product: Benjamin Moore® Benwood® Polyurethane Low Lustre (N435), or equal.

c. 3rd Coat: MPI #57 (Varnish, Interior, Polyurethane, Oil Modified, Satin):

(1) Product: Benjamin Moore® Benwood® Polyurethane Low Lustre (N435), or equal.

H. Paint I-FL - Concrete Floors Indicated to be Painted; Epoxy, Slip-Resistant.

1. Gloss Finish (Gloss Level 6):

1. 1st Coat(Primer):

a. Product: Benjamin Moore® Corotech® 100% Solids Epoxy Pre-Primer (V155).

2. 2nd Coat: MPI # 98.

a. Product: Benjamin Moore® Corotech® Polyamide Epoxy Gloss (V400), or equal.

3. 3rd Coat: MPI # 82.

a. Product: Benjamin Moore® Corotech® Polyamide Epoxy Gloss with non-slip additive (V400+NSA), or equal.

2.04 PAINT SYSTEMS - EXTERIOR

A. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3-Coat:

1. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat (Primer): Manufacturer's recommended metal primer, per product data sheet.

(1) Product: Benjamin Moore® Corotech Acrylic Metal Primer (V110), or equal.

b. 2nd Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel (HP29), or equal.

c. 3rd Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel (HP29), or equal.

2. Gloss Finish (MPI Gloss Level 6):

a. 1st Coat (Primer): Manufacturer's recommended metal primer, per product data sheet.

(1) Product: Benjamin Moore® Corotech Acrylic Metal Primer (V110), or equal.

b. 2nd Coat: MPI # 11.

(1) Product: Benjamin Moore® Ultra Spec EXT Gloss Finish (N449), or equal.

c. 3rd Coat: MPI # 11.

(1) Product: Benjamin Moore® Ultra Spec EXT Gloss Finish (N449), or equal.

B. Paint ME-OP-2L - Metals, Shop-Primed, Latex, 2-Coat:

1. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel (HP29), or equal.

b. 2nd Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel (HP29), or equal.

2. Gloss Finish (MPI Gloss Level 6):

a. 1st Coat: MPI # 11.

(1) Product: Benjamin Moore Ultra Spec EXT Gloss Finish (N449), or equal.

b. 2nd Coat: MPI # 11.

(1) Product: Benjamin Moore® Ultra Spec EXT Gloss Finish (N449), or equal.

C. Paint MgE-OP-3L - Galvanized Metals, Latex, 3-Coat:

1. Flat Finish (MPI Gloss Level 2):

a. 1st Coat: MPI # 10.

(1) Product: Benjamin Moore® Ultra Spec Exterior Flat Finish (N447), or equal.

b. 2nd Coat: MPI # 10.

(1) Product: Benjamin Moore® Ultra Spec Exterior Flat Finish (N447), or equal.

2. Satin Finish (MPI Gloss Level 4):

a. 1st Coat: MPI # 15.

(1) Product: Benjamin Moore® Ultra Spec EXT Satin (N448), or equal.

b. 2nd Coat: MPI # 15.

(1) Product: Benjamin Moore® Ultra Spec EXT Satin (N448), or equal.

3. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP Acrylic DTM Semi-Gloss Enamel (HP29), or equal.

b. 2nd Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP Acrylic DTM Semi-Gloss Enamel (HP29), or equal.

4. Gloss Finish (MPI Gloss Level 6):

a. 1st Coat: MPI # 11.

(1) Product: Benjamin Moore® Ultra Spec EXT Gloss Finish (N449), or equal.

b. 2nd Coat: MPI # 11.

(1) Product: Benjamin Moore® Ultra Spec EXT Gloss Finish (N449), or equal.

D. Paint WE-OP-3L - Wood, Opaque, Latex, 3-Coat:

1. Flat Finish (MPI Gloss Level 2):

a. 1st Coat (Primer): MPI # 6, 17, X-Green 17, 39, 50, X-Green 50, 137, X-Green 137.

(1) Product: Benjamin Moore® Fresh Start High-Hiding All Purpose Primer (046), or equal.

b. 2nd Coat: MPI # 10.

(1) Product: Benjamin Moore® Ultra Spec Exterior Flat Finish (N447).

c. 3rd Coat: MPI # 10.

(1) Product: Benjamin Moore® Ultra Spec Exterior Flat Finish (N447).

2. Satin Finish (MPI Gloss Level 4):

a. 1st Coat (Primer): MPI # 6, 17, X-Green 17, 39, 50, X-Green 50, 137, X-Green 137.

(1) Product: Benjamin Moore® Fresh Start High-Hiding All Purpose Primer (046), or equal.

b. 2nd Coat: MPI # 15.

(1) Product: Benjamin Moore® Ultra Spec EXT Satin (N448), or equal.

c. 3rd Coat: MPI # 15.

(1) Product: Benjamin Moore® Ultra Spec EXT Satin (N448), or equal.

3. Semi-Gloss Finish (MPI Gloss Level 5):

a. 1st Coat (Primer): MPI # 6, 17, X-Green 17, 39, 50, X-Green 50, 137, X-Green 137.

(1) Product: Benjamin Moore® Fresh Start High-Hiding All Purpose Primer (046), or equal.

b. 2nd Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel (HP29), or equal.

c. 3rd Coat: MPI # 141, X-Green 141, 153, X-Green 153.

(1) Product: Benjamin Moore® Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel (HP29), or equal.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Stucco: 12 percent.

2. Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. General:

1. Clean surfaces thoroughly and correct defects prior to coating application.

2. Prepare surfaces using the methods recommended by the coating manufacturer for achieving the best result for the substrate under the project conditions.

3. Remove or repair existing coatings that exhibit surface defects.

4. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

5. Seal surfaces that might cause bleed through or staining of topcoat.

6. Remove mildew from impervious surfaces by scrubbing with solution of tetra-

sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

7. Concrete Surfaces to be Painted:
    a. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter.
    b. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry.
    c. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
8. Cement Plaster (Stucco) Surfaces to be Painted:
    a. Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces.
    b. Wash and neutralize high alkali surfaces.
9. Galvanized Surfaces to be Painted:
    a. Remove all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from steel surfaces in accordance with SSPC-SP 1.
    b. Apply coat of etching primer.
10. Corroded Steel and Iron Surfaces to be Painted:
    a. Remove all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter in accordance with SSPC-SP 3. Then remove all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from steel surfaces in accordance with SSPC-SP 1.
11. Uncorroded Uncoated Steel or Iron Surfaces to be Painted:
    a. Remove all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter in accordance with SSPC-SP 2.
    b. Remove all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from steel surfaces in accordance with SSPC-SP 1.
    c. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned.
    d. Prime paint entire surface; spot prime after repairs.
12. Shop-Primed Steel Surfaces to be Finish Painted:
    a. Remove all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter in accordance with SSPC-SP 2.
        (1) Feather edges to make touch-up patches inconspicuous.
    b. Remove all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from steel surfaces in accordance with SSPC-SP 1.
    c. Prime bare steel surfaces.

d. Re-prime entire shop-primed item.

13. Asphalt, Creosote, or Bituminous Surfaces to be Painted: N/A.

14. Insulated Coverings to be Painted: N/A.

15. Concrete Floors to be Painted: N/A.

B. Additional Requirements for Surfaces with Existing Coatings:

1. Before application of new coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

a. Sand existing glossy surfaces to be painted to reduce gloss.

(1) Brush, and wipe clean with a damp cloth to remove dust.

b. Previously painted surfaces specified to be repainted or damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.

c. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.

d. Chalk shall be removed so that when tested in accordance with ASTM D4214, the chalk resistance rating is no less than 8.

e. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.

f. Edges of chipped paint shall be feather edged and sanded smooth.

g. Rusty metal surfaces shall be cleaned in accordance with SSPC requirements.

(1) Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.

(2) Comply with coating manufacturer's surface preparation instructions.

h. New, proposed coatings shall be compatible with existing coatings.

2. Existing Coated Surfaces with Minor Defects:

a. Sand, spackle, and treat surfaces with minor defects (i.e., scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, or irregularities due to partial peeling of previous coating) as necessary to render such surfaces to a uniform smooth finish.

b. Remove chalking by sanding or blasting so that when tested in accordance with ASTM D4214, the chalk rating is not less than 8.

3. Removal of Existing Coatings: Remove existing coatings from the following:

a. Surfaces containing large areas of minor defects.

b. Surfaces containing more than 20 percent peeling area.

c. Surfaces where rust is visible/apparent through existing coating.

4. Cement Plaster (Stucco) Substrate Repairs:

a. Repair cracks, holes, spalled/delaminated areas, and other defects in existing cement plaster/stucco surfaces using appropriate repair materials; verify compatibility of repair materials with coating system prior to use.

b. Remove any protruding concrete accessories and patch to smooth out any irregularities.

5. Other Substrate Repairs:

a. Repair substrate surface damaged during coating removal.

b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal.

c. Clean and prime the substrate as specified.

C. Additional Requirements for New (Previously Uncoated) Surfaces:

1. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

2. Surfaces:

a. Correct defects and clean surfaces that affect work of this section.

b. Remove or repair existing coatings that exhibit surface defects.

c. Mask surfaces that are not to be finished, or that are to be finished at a later time.

3. Marks: Seal with shellac that which may bleed through surface finishes.

4. Impervious Surfaces:

a. Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach.

b. Rinse with clean water and allow surface to dry.

5. New Cement Plaster (Stucco) Surfaces to be Painted:

a. Fill hairline cracks, small holes, and imperfections with same patching materials used for similar repairs to existing plaster.

b. Make smooth and flush with adjacent surfaces.

c. Wash and neutralize high alkali surfaces.

6. Galvanized Surfaces to be Painted:

a. Remove surface contamination and oils and wash with solvent.

b. Apply coat of etching primer.

3.03 APPLICATION

A. General:

1. Apply products in accordance with manufacturer's written instructions and recommendations in MPI (APSM).

2. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

3. Apply each coat to uniform appearance.

4. Apply each coat in conformance with recommended film thickness criteria (wet and dry) specified in the manufacturer’s product data sheet for the applicable paint product.

    a. For dry film testing requirements, refer to FIELD QUALITY CONTROL.

5. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

6. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

B. Plumbing, HVAC, Electrical and Communication Work to Receive Opaque Finish:

1. Paint the following work where exposed to view:

    a. Electrical and communication equipment, including but not limited to conduit and panelboards.

    b. Uninsulated piping, pipe hangers and supports.

    c. Duct, equipment, and pipe insulation having paintable jacket material (e.g., cotton or canvas insulation covering).

    d. Other items as directed by Architect.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.07 SCHEDULE - PAINT SYSTEMS

A. Interior:

1. Plaster: N/A.
2. Gypsum Board:
    a. Gypsum Board Walls:
        (1) Paint System: GI-OP-3L, Flat Finish (Gloss Level 2).
    b. Gypsum Board Ceilings:
        (1) Paint System: GI-OP-3L, Flat Finish (Gloss Level 2).
3. Metals, Shop-Primed:
    a. Metal Doors and Frames: Finish surfaces exposed to view.
        (1) Paint System: MI-OP-2L, Semi-Gloss Finish (Gloss Level 5).
4. Galvanized Metals:
    a. Hollow Metal Doors and Frames: Finish surfaces exposed to view.
        (1) Paint System: MgI-OP-3L, Semi-Gloss Finish (Gloss Level 5).
5. Wood:
    a. Wood Wall Paneling: Finish surfaces exposed to view.
        (1) Paint System: WI-TR-VS, Eggshell Finish (MPI Gloss Level 3).:
    b. Finish Carpentry: Finish surfaces exposed to view.
        (1) Paint System: WI-OP-3L, Eggshell Finish (MPI Gloss Level 3).
        (2) Paint System: WI-OP-3L, Semi-Gloss Finish (Gloss Level 5).
6. Concrete:
    a. Concrete Floor: Finish surfaces exposed to view.
        (1) Paint System: I-FL, Gloss Finish (Gloss Level 6) with non-slip additive.

B. Exterior:

1. Ferrous Metals:
    a. Steel Fabrications: Finish surfaces exposed to view.
        (1) Paint System: ME-OP-3L, Semi-Gloss Finish (MPI Gloss Level 5).
2. Metals, Shop-Primed:
    a. Metal Doors and Frames: Finish surfaces exposed to view.
        (1) Paint System: ME-OP-2L, Semi-Gloss Finish (Gloss Level 5).
3. Galvanized Metals:

a. Metal Doors and Frames: Finish surfaces exposed to view.

(1) Paint System: MgE-OP-3L, Satin Finish (MPI Gloss Level 3).

(2) Paint System: MgE-OP-3L, Semi-Gloss Finish (Gloss Level 5).

4. Wood:

a. Rough and Finish Carpentry (e.g., underside of roof sheathing, roof rafter tails): Finish surfaces exposed to view.

(1) Paint System: WE-OP-3L, Satin Finish (MPI Gloss Level 3).

(2) Paint System: WE-OP-3L, Semi-Gloss Finish (Gloss Level 5).

END OF SECTION

SECTION 101400

SIGNAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

B. Aluminum flat face exterior signs.

C. Dimensional letter signage.

1.02 RELATED REQUIREMENTS

A. Section 092116 - Gypsum Board Assemblies: Concealed metal backing plates for attachment and support of room signs to stud-framed or furred walls/partitions.

A. Division 22 - Plumbing: Identification for plumbing piping and equipment.

B. Division 26 - Electrical: Identification for electrical systems; exit signs required by code.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Institute of Graphic Arts (AIGA).

C. American Society for Testing and Materials (ASTM):

1. ASTM B26/B26M -- Standard Specification for Aluminum-Alloy Sand Castings; 2014e1.

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room name, other text to be applied, sign and letter sizes, fonts, and colors.

D. Samples:

1. Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

2. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

3. Verification Samples: Submit samples showing colors specified.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Room and Door Signs:

1. Basis of Design: 2/90 Sign Systems; Grand Rapids, MI 49512; Tel 800-777-4310; www.290signs.com.

B. Dimensional Letter Signage:

1. Basis of Design: Gemini USA; Cannon Falls, MN; Tel 800-538-8377; www.geminisignproducts.com.

2.02 GENERAL

A. Accessibility Compliance: Signs shall comply with applicable requirements of the governing building code, including but not limited to FBC-A.

1. In the event of conflicting requirements, comply with the most comprehensive and specific requirements.

2.03 ROOM AND DOOR SIGNS

A. General:

1. All signs of this type shall be by same manufacturer.

2. All signs shall comply with applicable requirements of the governing building code, including but not limited to the following:

a. Raised Characters: Raised characters shall comply with FBC-A SECTION

703.2 and shall be duplicated in Braille complying with FBC-A SECTION 703.3. Raised characters shall be installed in accordance with FBC-A SECTION 703.4.

b. Braille: Braille shall be contracted (Grade 2) and shall comply with FBC-A SECTIONS 703.3 and 703.4.

c. Installation Height and Location: Signs with tactile characters shall comply with FBC-A SECTION 703.4.

(1) Height above Finish Floor or Ground: Tactile characters on signs shall be located 48 inches (1220 mm) minimum above the finish floor or ground surface, measured from the baseline of the lowest tactile character and 60 inches (1525 mm) maximum above the finish floor or ground surface, measured from the baseline of the highest tactile character.

(2) Location: Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located on the inactive leaf. Where a tactile sign is provided at double doors with two active leafs, the sign shall be located to the right of the right hand door. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall. Signs containing tactile characters shall be located so that a clear floor space of 18 inches (455 mm) minimum by 18 inches (455 mm) minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.

d. Visual Characters: Visual characters shall comply with FBC-A SECTION 703.5.

e. Pictograms: Pictograms shall comply with FBC-A SECTION 703.6.

f. Symbols of Accessibility: Symbols of accessibility shall comply with FBC-A SECTION 703.7.

(1) International Symbol of Accessibility: The International Symbol of Accessibility shall comply with FBC-A FIGURE 703.7.2.1.

B. Toilet Room Signs:

1. Size:

a. Overall (H x W): 10 x 8-1/2 inches.

b. Top Insert (H x W): 8 x 8-1/2 inches.

c. Bottom Insert (H x W): 2 x 8-1/2 inches.

2. Edge Cap Style: Slim, satin natural aluminum finish.

3. Insert:

a. Top Insert: Graphic symbols (pictograms); direct print.

b. Bottom Insert: Text (raised characters and braille); photopolymer.

4. Copy:

a. Top Insert - Graphic Symbol(s):

(1) Style:

(a) Sign 1A: International symbol for Toilet-Women, and International symbol of accessibility.

(b) Sign 1B: International symbol for Toilet-Men, and International symbol of accessibility.

(2) Size: 4-1/2 inch.

(3) Position: Center.

(4) Colors (Symbol / Background): To be selected.

b. Bottom Insert - Text:

(1) Style: Arial.

(2) Size: 5/8 inch.

(3) Position: Center.

(4) Colors (Text / Background): To be selected.

(5) Message: As indicated on drawings.

(a) Sign 1A: "WOMEN".

(b) Sign 1B: "MEN".

5. Mounting: Screw-on mounting for drywall, for permanent installation.

6. Product: "Plaques Plus Essentials Model M.10" by 2/90 Sign Systems, or equal.

7. Quantity: Two (one each per Toilet Room).

C. Utility Room Signs:

1. Size: 3 x 6 inches.

2. Edge Cap Style: Slim, satin natural aluminum finish.

3. Insert: Text; direct print.

4. Copy:

a. Text:

(1) Style: Arial.

(2) Size: 1/2 inch.

(3) Position: Center.

(4) Colors (Text / Background): To be selected.

b. Message: As indicated on drawings.

(1) Sign 3: “JANITOR ROOM”.

(2) Sign 4: “MECHANICAL ROOM”.

(3) Sign 5: “STORAGE ROOM”.

5. Mounting: Screw-on mounting for drywall, for permanent installation.

6. Product: “Modular Essentials Model M.2” by 2/90 Sign Systems, or equal.

7. Quantity: Three (one each per Janitor Room, Mechanical Room, and Storage Room).

D. Primary Function Room Sign:

1. Size: 8 x 8 inches.

2. Edge Cap Style: Slim, satin natural aluminum finish.

3. Insert: Text; direct print.

4. Copy:

a. Text:

(1) Style: Arial.

(2) Size: 5/8 inch.

(3) Position: Center.

(4) Colors (Text / Background): To be selected.

b. Message: As indicated on drawings.

(1) Sign 2: “READING ROOM”.

5. Mounting: Screw-on mounting for drywall, for permanent installation.

6. Product: “Modular Essentials Model M.2” by 2/90 Sign Systems, or equal.

7. Quantity: One.

2.05 DIMENSIONAL LETTER SIGNAGE

A. General:

1. All signs of this type shall be by same manufacturer.

B. Materials and Components:

1. Metal: Cast bronze.

A. Finish: Traditional patina, clear-coated, and baked.

2. Mounting Hardware: Threaded stainless steel stud bosses, of number and size as recommended by manufacturer; concealed anchorage, for permanent installation.

a. Letters to project from the building line, with stud spacer sleeves for stand-off

mounting.

b. Templates for mounting shall be supplied.

C. Fabrication:

1. Typeface (Font): Times New Roman.

2. Dimensions:

a. Letter/Number Height:

(1) Sign 5A: 5 in.

(2) Sign 5B: 8 in.

(3) Sign 5C: 5 in.

3. Message:

a. Sign 5A: “CITY OF MIAMI”.

b. Sign 5B: “DORSEY MEMORIAL LIBRARY”.

c. Sign 5C: “100”.

2.07 ACCESSORIES

A. Fasteners and Anchors:

1. Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal, per manufacturer’s standard.

2. Threaded Boss Studs: Stainless steel, brass, or aluminum, per manufacturer’s standard.

B. Epoxy Adhesive (for blind anchoring of threaded stud boss to building structure): Type recommended by sign manufacturer for each specific application.

PART 3 - EXECUTION

3.01EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs where indicated:

1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches (1525 mm) above finished floor.

2. If no location is indicated obtain Owner's instructions.

D. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION

SECTION 102813

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Toilet room accessories and janitor closet accessories.

B. Grab bars.

C. ADA piping protection systems.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants.

B. Section 092116 - Gypsum Board Assemblies: Concealed backing materials for attachment and support of toilet accessories and grab bars to stud-framed or furred walls/partitions.

C. Section 093000 - Tiling.

D. Division 22 - Plumbing: Plumbing fixtures.

E. Division 26 - Electrical: Electrical service for electric hand dryers.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM A123/A123M -- Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

2. ASTM A269 -- Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

3. ASTM A653/A653M -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

4. ASTM A666 -- Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

5. ASTM B456 -- Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

6. ASTM F446 -- Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

7. ASTM G21 -- Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

8. ASTM G22 -- Standard Practice for Determining Resistance of Plastics to Bacteria.

C. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

D. Glass Association of North America (GANA).

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

1. Mirror Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

2. ADA Piping Protection Systems: Provide data describing product specifications, materials, colors, accessories, extensions, and code compliances.

C. Shop Drawings: Provide complete shop drawings for toilet accessories and grab bars attached to walls, partitions, or toilet compartment panels.

1. Plans: Locate each specified unit in project.

2. Elevations: Indicate mounting height of each specified unit in project.

3. Details: Indicate anchoring and fastening details, required locations and types of anchors and reinforcement, and materials required for correct installation of specified products not supplied by manufacturer of products of this section.

4 Coordinate with applicable substrate and framing conditions. Include load calculations confirming adequacy of wall/partition framing, internal wall reinforcement, concealed supports, and backing plate details, based on specified design loads.

D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.05 QUALITY ASSURANCE

A. Accessibility Requirements:

1. Conform to applicable regulatory requirements for accessibility, including FBC-A.

2. Operating Force: Soap dispensers shall operate with a maximum five-pound operating force.

3. Wall Mounted Grab Bars, and related fasteners and mounting devices:

    a. Grab Bars shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTIONS 604 and 609.

    b. Grab bars shall comply with the length and positioning requirements shown in FBC-A FIGURES 604.5.1, 604.5.2, and 609.3.

        (1) Grab bars shall have a gripping surface at the locations shown and do not obstruct the required clear floor area.

    c. The diameter or width of the gripping surfaces of grab bars shall be 1-1/4 in. to 1-1/2 in. (32 mm to 38 mm). Where grab bars are mounted adjacent to a wall, the space between the wall and the grab bar shall be 1-1/2 in. (38 mm).

    d. The structural strength of Grab Bars, and related fasteners and mounting devices shall meet the specifications of FBC-A SECTION 609.8, and as follows:

        (1) Bending stress induced by the maximum bending moment from the application of 250 lbf (1112N) shall be less than the allowable stress for the material of the assembly.

        (2) Shear stress induced by the application of 250 lbf (1112N) shall be less than the allowable shear stress for the assembly. If the connection between the assembly and its mounting bracket or other support is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stress, which shall not exceed the allowable shear stress for the material.

        (3) Bending stress induced by the maximum bending moment from the application of 250 lbf (1112N) shall be less than the allowable stress for the material of the assembly.

        (4) Shear force induced in a fastener or mounting device from the application of 250 lbf (1112N) shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.

        (5) Tensile force induced in a fastener by a direct tension force of 250 lbf (1112N) plus the maximum moment from the application of 250 lbf (1112N) shall be less than the allowable withdrawal load between the fastener and the supporting structure.

        (6) Grab bars shall not rotate within their fittings.

4. Toilet Paper Dispensers:

    a. All toilet paper dispensers shall meet the requirement to be free spinning. Dispensers that control delivery, or that do not permit continuous paper flow, shall not be used.

    b. All dual roll toilet paper dispensers shall be fully automatic and shall not

require the end user to perform any function to obtain the second roll.

5. Mirrors: Mirrors shall be mounted with the bottom edge of the reflecting surface no higher than 40 inches (1015 mm) above the finish floor.

1.06 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1. Provide concealed mounting plates, backplates, anchor plates, or other approved reinforcement for support of accessories to be anchored to stud wall, furred wall, or other hollow wall assembly.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Toilet Room Accessories, Grab Bars, Baby Changing Stations, Electric Hand Dryers, and Utility Room / Janitor Closet Accessories: Bobrick Washroom Equipment; www.bobrick.com.

B. ADA Protection Systems: TrueBro, Inc.; www.truebro.com.

C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

1. Grind welded joints smooth.

2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide three keys for each accessory to Owner; master key all lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269, Type 304 or 316.

E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653, with G90/Z275 coating.

F. Adhesive: Two-component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.

H. Manufacturer's identification logo must be permanently stamped into each accessory to provide positive identification to end user for replacement or matching equipment in the future. Such stamping shall be no larger than 1 x 1 inch, and shall be unobtrusively located on accessory. Lavatory mounted soap dispensers shall have the manufacturer's name permanently molded into the container. Adhesive slickers shall not be acceptable.

2.03 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.

C. Baked Enamel: Pre-treat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

D. Galvanizing for Items Other than Sheet: Comply with ASTM A123; galvanize ferrous metal and fastening devices.

E. Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.

F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 TOILET ROOM ACCESSORIES

A. Paper Towel Dispenser & Waste Receptacle:

1. Type: Recessed paper towel dispenser and waste receptacle.

2. Materials:

a. Cabinet: 18-8, type-304, 22-gauge (0.8mm) stainless steel; all-welded construction.

(1) Finish: Exposed surfaces have satin finish.

b. Flange: 18-8, type-304, 22-gauge (0.8mm) stainless steel; drawn and beveled, one-piece, seamless construction.

(1) Finish: Exposed surfaces have satin finish.

c. Door: 18-8, type-304, 22-gauge (0.8mm) stainless steel; secured to cabinet with a full-length stainless steel piano-hinge.

(1) Finish: Exposed surfaces have satin finish.

(2) Equipped with a knob latch.

d. Paper Towel Dispenser: 18-8, type-304, 22-gauge (0.8mm) stainless steel.

(1) Finish: Exposed surfaces have satin finish.

(2) Capacity: 350 C-fold or 475 multifold paper towels.

e. Waste Receptacle: 18-8, type-304, heavy-gauge stainless steel; top edges are hemmed for safe handling; retaining hook.

(1) Finish: Exposed surfaces have satin finish.

(2) Capacity: 2-gal. (7.6-L).

3. Operation:

a. Paper towel dispenser shall dispense C-fold or multifold paper towels without adjustment.

b. Rounded towel tray shall have hemmed opening to dispense paper towels without tearing.

c. Waste receptacle to be retained in cabinet by a retaining hook feature; removable for servicing.

4. Installation:

a. Provide framed rough wall opening per manufacturer's instructions.

(1) Allow clearance for construction features that may protrude into rough wall opening from opposite wall.

(2) Coordinate to avoid pipes, vents, and conduits.

b. Mount unit in wall opening with shims between framing/blocking and cabinet at all points designated by manufacturer, then secure unit with sheet-metal screws furnished by manufacturer.

c. Mounting Height: Shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTIONS 307, 308, 309 and 609.

5. Product: Bobrick B-369.

B. Toilet Tissue Dispenser:

1. Type: Surface-mounted multi-roll toilet tissue dispenser.

2. Materials:

a. Cabinet: 18-8, type-304, 22-gauge (0.8mm) stainless steel; all-welded construction.

(1) Finish: Exposed surfaces have satin finish.

b. Door: 18-8, type-304, 22-gauge (0.8mm) stainless steel with 18-gauge (1.2mm) stainless steel door frame; secured to cabinet with two rivets.

(1) Finish: Exposed surfaces have satin finish.

(2) Front of Door: Drawn, one-piece, seamless construction.

(3) Lock: Tumbler lock, keyed like other washroom accessories.

c. Dispensing Mechanism, Inner Housing and Cam: 18-8, type-304, 18-gauge (1.2mm) stainless steel.

d. Spindles: Heavy-duty, one-piece, molded ABS; theft-resistant; retained in dispensing mechanism when door is locked.

(1) Quantity: Two.

3. Operation: Unit shall hold two standard-core toilet tissue rolls up to 5-1/4 in. (133mm) diameter (1800 sheets).

a. Tissue rolls to be loaded and locked into dispensing mechanism.

b. Extra roll shall automatically drop in place when bottom roll is depleted.

c. Depleted rolls can only be removed after unlocking door.

3. Installation Method (attachment to stud-framed or furred partition): Provide concealed metal backing plate per Section 092116 - Gypsum Board Assemblies, then secure Toilet Tissue Dispenser to wall with #10 x 2 inch (M4.8 x 50mm) Phillips oval-head, stainless steel, sheet-metal screws, at points designated by manufacturer; screws shall extend through wall finish and concealed backing plate.

   a. Mounting Height: Shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTIONS 307, 308, 309 and 609.

4. Product: Bobrick B-2888.

C. Soap Dispenser:

1. Type: Surface-mounted soap dispenser.

   a. Concealed, vandal-resistant mounting.

2. Materials:

   a. Container: 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin-finish.

      (1) Body: Drawn, one-piece, seamless construction.

      (2) Back Plate: Attached mounting bracket.

      (3) Soap Reservoir: Equipped with a clear acrylic soap refill-indicator window and a locked, hinged stainless steel lid for top filling.

         (a) Capacity: 40-fl oz (1.2-L).

   b. Valve: Black molded plastic push button and spout; soap head-holding mushroom valve; stainless steel spring; U-packing seal and duckbill; antibacterial-soap-resistant plastic cylinder.

3. Operation: Corrosion-resistant valve shall dispense commercially marketed all-purpose hand soaps.

   a. Valve to be operable with one hand, without tight grasping, pinching, or twisting of the wrist, and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines (including FBC-A).

   b. Window shall indicate when refill is required.

   c. Locked, hinged lid shall open for top filling only with special key provided.

4. Installation Method (attachment to stud-framed or furred partition): Provide concealed metal backing plate per Section 092116 - Gypsum Board Assemblies, then secure Soap Dispenser to wall with stainless steel, sheet-metal screws, at points designated by manufacturer; screws shall extend through wall finish and concealed backing plate.

a. Mounting Height: Shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTIONS 307, 308, 309 and 609.

5. Product: Bobrick B-2112.

D. Mirrors:

1. Type: Glass mirror with stainless steel channel frame.

a. Size (W x H): 18 inches x 30 inches.

2. Materials and Components:

a. Frame: Type 430 stainless steel, 1/2 in. x 1/2 in. x 3/8 in. channel with 1/4 in. (6mm) return at rear for Snap Locking Design; 1/2 in. x 1/2 in. x 1/2 in. (13 x 13 x 13mm) channel for Lock Tab Design; with bright polished finish.

(1) Include galvanized steel back with integral horizontal hanging brackets near the top for hanging the mirror and near the bottom to prevent the bottom of the mirror from pulling away from the wall.

(2) Include locking devices secure mirror to concealed wall hanger.

b. Mirror: No. 1 quality, 1/4 inch (6mm) select float glass (standard glass): selected for silvering, electrolytically copper-plated by the galvanic process; guaranteed against silver spoilage for 15 years.

(1) Edges to be protected by plastic filler strips.

(2) Back to be protected by full-size, shock-absorbing, water-resistant, nonabrasive, 3/16 inch (5mm) thick polyethylene padding.

c. Concealed Wall Hanger: Galvanized steel construction; shall incorporate upper and lower support members, which engage backplate louvers to secure mirror against wall.

3. Installation Method (attachment to stud-framed or furred partition): Provide concealed metal backing plate per Section 092116 - Gypsum Board Assemblies, then secure Concealed Wall Hanger to wall with #10 x 2 inch (M4.8 x 50mm) Phillips oval-head, stainless steel, sheet-metal screws, at points designated by manufacturer; screws shall extend through wall finish and concealed backing plate.

a. Hang mirror on Concealed Wall Hanger with all four backplate louvers engaged behind horizontal wall hanger members.

b. Mounting Height: Shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTION 603.3.

4. Product: Bobrick B-165_1836.

E. Sanitary Napkin Disposal:

1. Type: Recessed sanitary napkin disposal.

2. Materials:

a. Cabinet: 118-8, type-304, heavy-gauge stainless steel; all-welded construction; exposed surfaces have satin finish.

b. Flange: 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish; drawn and beveled, one-piece, seamless construction.

c. Door: 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish; secured to cabinet with a full-length stainless steel piano-hinge.

(1) Lock: Tumbler lock, keyed like other washroom accessories.

d. Disposal Panel: 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish; bottom edge hemmed for safety; secured to door with a spring-loaded, full-length stainless steel piano-hinge.

(1) Equipped with an international graphic symbol identifying sanitary napkin disposal.

e. Waste Receptacle: Leak-proof, rigid molded polyethylene.

(1) Removable for servicing.

(2) Capacity: 1.2-gal. (4.6-L).

3. Operation: Unit to be equipped with a self-closing panel covering disposal opening. Napkin disposal is emptied by opening door with furnished key and removing waste receptacle.

4. Installation Method:

a. Provide framed rough wall opening per manufacturer's instructions.

(1) Allow clearance for construction features that may protrude into rough wall opening from opposite wall.

(2) Coordinate to avoid pipes, vents, and conduits.

b. Mount unit in wall opening with shims between framing/blocking and cabinet at all points designated by manufacturer, then secure unit with sheet-metal screws furnished by manufacturer.

c. Mounting Height: Shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTIONS 307, 308, 309 and 609.

5. Product: Bobrick B-353.

2.05 GRAB BARS

A. Grab Bars:

1. Sizes:

a. "L-Shaped" Two Wall Grab Bar: 40 inches x 58 inches

2. Materials and Components:

a. Grab Bars: Type 304, 18-8 S alloy, 18-gage, stainless steel with satin finish; 1-1/4 inches (32 mm) outside diameter; minimum 0.05 inch (1.3 mm) wall thickness; non-slip grasping surface finish; concealed flange mounting.

(1) Ends to be heliarc welded to exposed mounting flanges.

3. Products:

a. "L-Shaped" Two Wall Grab Bar: Bobrick B-5837 with Concealed Backing Plates as applicable.

B. Concealed Backing Materials: Each grab bar attached to stud-framed or furred wall/partition shall be provided with concealed backing and fastening system, as recommended by manufacturer for each applicable condition and as required to meet design load requirements.

1. For additional information, refer to Section 092116 - Gypsum Board Assemblies.

2.06 ADA PIPING PROTECTION SYSTEMS

A. Undersink Piping Protective Covers:

1. General: Comply with requirements of FBC-A, and as follows:

a. Lavatory P-traps and angle valve assemblies shall be covered with undersink protective pipe cover assemblies.

(1) Cover assemblies shall include P-trap cover, two angle valve covers, offset grid drain cover, tailpiece cover, and extensions as necessary to cover all undersink piping and valves.

b. Covers shall be secured with snap-clip flush reusable fasteners, and angle stop shall have locking access cover. Cable ties or baggie tie fasteners are not acceptable.

c. Covers shall be installable and removable without requiring disassembly of P-trap or angle stop.

d. Covers shall allow for emergency and maintenance access to the plumbing P-trap clean-out and angle stop valve without removing piping covers.

2. Specifications:

a. Material: Molded closed cell vinyl.

b. Nominal Wall Thickness: 1/8 inch.

c. Durometer: 60 - 70 Shore A.

d. Finish: Smooth, high gloss.

e. UV Protection: Will not fade or discolor.

f. Durability: Virtually indestructible.

g. Fasteners: Reusable snap clips.

h. Color: White.

i. Compatibility: Shall fit all 1.25 to 1.50 inch cast brass or tubular P-trap assemblies and 3/8 to 1/2 inch angle stop assemblies. Coordinate with specified plumbing fixtures.

j. Flame Characteristics (ASTM D635): ATB, 0 sec.; AEB, 0 mm.

k. Thermal Conductivity: K value of 1.17 plus dead air space.

l. Bacteria/Fungus Resistance (ASTM G21 and G22): Anti-microbial vinyl formula; Result 0.

3. Product: TrueBro Lav-Guard Undersink Protective Pipe Covers, or equal.

2.07 BABY CHANGING STATION

A. Type: Horizontal wall-mounted stainless steel finish baby changing station.

B. Materials: 18-gauge, type 304 satin stainless steel exterior finish with molded grey color polyethylene interior.

1. Size (W x H): 35-1/4 in. x 20 in. (800 x 510mm).

2. Depth:

a. Closed: 4 inch (100mm).

b. Open (Extension): 15-3/16 inches (385mm).

C. Installation Method: Install in accordance with manufacturer's recommended installation method.

1. Mounting Height: Shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTIONS 307, 308 and 309.

D. Product: Bobrick KB-110-SSWM.

2.08 JANITOR CLOSET ACCESSORIES

A. Combination Utility Shelf/Mop, Broom Holder and Hooks: 0.05 inch thick stainless steel, Type 304 stainless steel, with 1/2 inch returned edges, 0.06 inch steel wall brackets. Mount securely to back wall, and extend the shelf around the other two sides of the closet with heavy-duty supports.

1. Drying rod: Stainless steel, 1/4-inch diameter.

2. Hooks: Two 0.06-inch stainless steel rag hooks at shelf front.

3. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.

4. Length: 30 inches; manufacturer's standard length for number of holders/hooks.

5. Product: Bobrick B-239x34, or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

C. Coordinate placement and installation of blocking, reinforcement plates, and concealed anchors required for installation of accessories, with construction of related work specified in other sections.

3.03 INSTALLATION

A. Install accessories, grab bars, and ADA piping protection systems in accordance with manufacturers' instructions and as indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights and Locations: As required by accessibility regulations, as indicated on drawings, and as follows:

1. Toilet Tissue Dispensers: Except as otherwise indicated, top of dispenser to be mounted at 31.0 inches above finish floor.

a. Mount toilet tissue dispenser so that top of dispenser is at 3.0 inches below top of grab bar; clearance between bottom of grab bar and tissue dispenser to be not less than 1.5 inches.

D. Mirrors:

1. Install mirrors in accordance with GANA recommendations and manufacturers' instructions.

2. Set mirrors plumb and level, free of optical distortion.

3. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

3.04 ADJUSTMENT AND CLEANING

A. After installation, remove all traces of protective coating paper, and clean accessories in manner not to damage finish.

B. Adjust accessories for proper operation. Test mechanisms, hinges, locks, and latches and where necessary adjust and lubricate.

END OF SECTION

SECTION 104400

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fire extinguisher cabinets.

B. Fire extinguishers.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 092116 - Gypsum Board Assemblies: Roughed-in wall openings; concealed backer plates for attachment of wall-mounted extinguisher brackets to stud-framed or furred walls/partitions.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM E814 -- Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2008b.

C. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

D. Florida Fire Prevention Code, 5th edition - 2014 (FFPC).

E. National Fire Protection Association (NFPA):

1. NFPA 10 -- Standard for Portable Fire Extinguishers; 2010.

F. Underwriters Laboratories Inc. (UL):

1. UL (FPED) -- Fire Protection Equipment Directory.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.

C. Product Data: Provide fire extinguisher operational features, color and finish, and anchorage details.

D. Samples: Provide samples of manufacturer's complete range of colors for Architect's selection.

E. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguisher Cabinets and Accessories:

1. JL Industries (a division of Activar Construction Products Group, Inc.): www.activarcpg.com/jl-industries.

2. Larsen's Manufacturing Co.: www.larsensmfg.com.

3. Potter-Roemer: www.potterroemer.com.

B. Fire Extinguishers:

1. JL Industries (a division of Activar Construction Products Group, Inc.): www.activarcpg.com/jl-industries.

2. Ansul, Inc: www.ansul.com.

3. Pyro-Chem: www.pyrochem.com.

2.02 FIRE EXTINGUISHER CABINETS (FEC)

A. Materials:

1. Tub: Cold-rolled steel.

2. Door and Trim: Aluminum; fully-glazed.

B. Cabinet Configuration:

1. Recessed.

2. Sized to accommodate Multi-Purpose Fire Extinguisher and accessories.

3. Door: Flush, fully-glazed cabinet door with handle and lock, attached to cabinet by a continuous hinge.

a. Handle: Chrome-plated pull.

b. Lock: Theft-deterrent feature with keyed cylinder lock and replaceable plastic cam.

(1) The lock mechanism shall be designed such that a sharp pull on the handle will break the replaceable plastic cam, thus allowing the door to be

opened.

(2) Lock shall be classified as an “approved locking arrangement” in accordance with requirements of FBC-B SECTION 905.7.2.

4. Trim: Square; returned to wall surface.

a. Face Width: 1-3/4 inch (44 mm).

b. Depth: 2-1/4 inch.

C. Door Glazing: Clear, fully-tempered glass; 1/8 inch (3 mm) thick; set in resilient channel gasket glazing.

D. Cabinet Mounting Hardware: Appropriate to cabinet, application and conditions of use, per manufacturer’s recommendations. Pre-drill for anchors.

E. Weld, fill, and grind components smooth.

F. Finishes:

1. Tub Interior: White powder coat.

2. Door and Trim Exterior: Clear anodized.

G. Product: "Academy" Model 1720G17 by J.L. Industries, or equal.

2.03 FIRE EXTINGUISHERS

A. General:

1. Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

2. Provide fire extinguishers labeled by UL for the purpose specified and indicated.

3. Coordinate fire extinguisher with fire extinguisher cabinet, to ensure proper fit.

B. Fire Extinguisher:

1. General:

a. Stored Pressure Operated: Deep drawn.

b. Class: A:B:C.

c. Finish: Baked polyester powder coat, red color.

d. Temperature range: -65 degrees F (-54 degrees C) to 120 degrees F (49 degrees C).

2. Multi-Purpose Fire Extinguisher: Dry chemical type; carbon steel tank, with pressure gage.

a. UL Rating: 3-A:40-B:C.

a. Size: 5 pound (2.27 kg).

3. Product: “Cosmic 5E” Model MB818C by J.L. Industries, or equal.

2.04 ACCESSORIES

A. Wall-Mounted Fire Extinguisher Brackets: Formed steel hook with integral latching strap, chrome-plated; designed for surface attachment to wall assembly.

1. Sized to accommodate Multi-Purpose Fire Extinguisher.

2. Bracket shall be provided with appropriate fasteners suitable for attaching bracket to wall assembly.

3. Product: Model MB818C by J.L. Industries, or equal.

B. Concealed Backer Plate: Refer to Section 092116 - Gypsum Board Assemblies.

C. Cabinet Equipment Identification: Cabinets shall be identified in an approved manner by a permanently attached sign with letters not less than 2 inches (51 mm) high in a color that contrasts with the background color, indicating the equipment contained in the cabinet.

1. Exceptions: As allowed per FBC-B SECTION 905.7.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. General:

1. Install in accordance with manufacturer's instructions.

B. Fire Extinguisher Cabinets: Install cabinets plumb and level at 47 inches (1200 mm) from finished floor to cabinet door pull or fire extinguisher handle, whichever is the highest.

1. Comply with applicable requirements of governing building code, including but not limited to FBC-A SECTIONS 309.3 and 404.2.7.

2. Secure rigidly in place in accordance with manufacturer's instructions.

3. Position cabinet signage as indicated on drawings; if not indicated, as directed by Architect.

4. Maintain fire ratings where cabinets are recessed into fire-rated wall systems.

C. Wall-Mounted Fire Extinguisher Brackets: Install wall mounted brackets plumb and level at 47 inches (1200 mm) from finished floor to extinguisher handle.

1. In each location where the drawings indicate a fire extinguisher without a fire extinguisher cabinet install in the wall/partition a concealed backer plate of sufficient size and strength to provide secure attachment and support for fire extinguisher, regardless of whether or not such backer plate are indicated on the Drawings.

a. For additional requirements, refer to Section 092116 - Gypsum Board Assemblies.

2. Attach bracket to wall and secure rigidly in place using sheet metal screws extending through the gypsum board and the concealed backer plate.

D. Fire Extinguishers:

1. In each location where the drawings indicate a fire extinguisher cabinet, place one Multi-Purpose Fire Extinguisher in the fire extinguisher cabinet.

2. In each location where the drawings indicate a fire extinguisher without a fire extinguisher cabinet, place one Multi-Purpose Fire Extinguisher on wall-mounted bracket.

E. Position cabinet signage as indicated on drawings; if not indicated, as directed by Architect.

END OF SECTION

SECTION 107113

EXTERIOR SUN CONTROL DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Exterior Bahama shutters, to provide sun control at window openings.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Mounting substrates.

B. Section 042000 - Unit Masonry: Mounting substrates.

C. Section 079200 - Joint Sealants: Joint sealant at joint between shutter hinge and stucco wall finish.

D. Section 085200 - Wood Windows.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Architectural Manufacturers Association (AAMA):

1. AAMA 2603 -- Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 2015.

2. AAMA 2604 -- Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

3. AAMA 2605 -- Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. American Society for Testing and Materials (ASTM):

1. ASTM B209 -- Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

2. ASTM B209M -- Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

3. ASTM B221 -- Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

4. ASTM B221M -- Standard Specification for Aluminum and Aluminum-Alloy

Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-EB -- Florida Building Code, Existing Building.

a. FBC-EB Appendix B -- Standard for Rehabilitation, The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

3. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

a. FBC-TP TAS-202 -- Criteria for Testing Impact and Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure.

1.04 DESIGN & PERFORMANCE REQUIREMENTS

A. General: Design, materials, construction and quality of Bahama shutters shall comply with design criteria specified in the Contract Documents and applicable requirements of the governing building code, including but not limited to FBC-B CHAPTERS 15 and 16 (including HVHZ provisions), FBC-B SECTION 2413, and ASCE 7.

1. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of window wall.

2. Bahama shutters shall be designed and constructed to insure a minimum of 1-inch (25 mm) separation at maximum deflection with components and frames of components they are to protect unless the components and frame are specifically designed to receive the load of storm shutters, and shall be designed to resist the wind pressures as set forth in FBC-B CHAPTER 16 (HVHZ) by methods admitting of rational analysis based on established principles of design.

a. Deflection shall not exceed the limits set forth in FBC-B CHAPTER 16 (HVHZ).

B. Design Loads: Bahama Shutter components and assemblies shall comply with requirements of governing building code, criteria indicated on the Structural Drawings, and as follows:

1. Bahama Shutter assemblies shall be designed and constructed to be of sufficient strength to support the estimated or actual imposed dead, live, wind, and any other loads, both during construction and after completion of the structure, without exceeding the allowable materials stresses specified by the governing building code.

2. Wind Load Design Criteria:

a. Building Risk Category (FBC-B TABLE 1604.5 and ASCE 7 Table 1-1): II.

b. Basic Wind Speed (Ultimate Design Wind Speed, 3-second gust (V*ult*): 175 mph.

c. Wind Exposure Category (FBC-B SECTION 1620.3): C.

d. Enclosure Classification: Enclosed Building.

3. Maximum Design Pressure (MDP) Rating (per Product Approval): Provide Bahama Shutter components and assemblies that are identical to systems that have been successfully tested and approved for use in HVHZ, with MDP rating equal to or greater than pressures indicated on the drawings.

C. Testing - Product Approval: Comply with applicable requirements of the FBC, including but not limited to the following:

1. Bahama Shutter assemblies shall be tested in accordance with:

a. Quality control test methods intended to confirm compliance with the wind load requirements of FBC-B CHAPTERS 15 and 16, including FBC-B SECTION 1625, and FBC-TP TAS-202.

b. Requirements of FBC-TP TAS-202.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.

1. Engineering Drawings and Calculations: Submit Bahama shutter design calculations and detailed drawings, including attachment to the main structure, prepared by and bearing the seal of qualified delegated engineer.

D. Samples:

1. Selection Samples: Submit color and finish charts showing complete range for initial selection.

2. Verification Samples: Submit two samples, 12 inch (300 mm) long illustrating louver and frame materials, and finish or color.

1.05 QUALITY ASSURANCE

A. Delegated Engineer Qualifications: Florida-registered engineer, proficient in structural design.

B. Bahama shutters shall be approved by the certification agency and shall bear the name of the company engraved in every section of the system.

C. Manufacturer/Installer Qualifications: Company specializing in manufacturing and installing products specified in this section, with no less than 20 years of documented experience.

1.06 MOCK-UP

A. Mock-Up: Provide full size mock-up of sun control device assembly at project site.

1. Obtain Architect's approval before proceeding with installation of remaining work.

2. Full-sized mock-up may become part of the final installation.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site ready for erection.

B. Package using methods that prevent damage during shipping and storage on site.

C. Store materials under cover and elevated above grade.

1.08 WARRANTY

A. Manufacturer’s Finish Warranty: Provide manufacturer's five year warranty on factory finish against cracking, peeling, and blistering.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Bahama Shutters:

1. Basis of Design: Willard Shutter Company, Inc.; 4420 NW 35 Court; Miami, FL 33142; Tel 305-633-0162 or 800-826-4530; www.willardshutterco.com.

B. Source Limitations: Furnish sun control devices and associated controls produced by a single manufacturer and obtained from a single supplier.

2.02 PERFORMANCE REQUIREMENTS

A. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of window wall.

B. Design Pressure (DP): As indicated on Drawings.

2.03 BAHAMA SHUTTERS

A. Description: Louvered, exterior Bahama-style shutters; hinged at top edge; designed to provide shade for window when open.

1. Material/Fabrication: Aluminum; box beam frame with roll-formed louvers interlocking into frame.

2. Size and Configuration: As indicated on drawings.

3. Construct to withstand applicable positive and negative design wind pressures without damage or failure of anchors; provide intermediate louver supports and frame reinforcing as required.

a. Design Wind Pressures: As indicated on drawings.

4. Frame: 0.025 inch (0.6 mm) thick aluminum; 2-1/2 inches (63.5 mm) wide by 1-5/8 inches (41 mm); voids filled with expanded polystyrene after installation of louvers.
5. Louvers: 0.025 inch (0.6 mm) thick aluminum; 1-3/4 inches (44 mm) wide, with converse rolled edges, spaced at 1-1/4 inches (32 mm).
6. Mounting Components: Continuous reversible extruded aluminum hinge header at top with anchors; mounting as indicated on drawings.
    a. Arms attached to brackets on back of shutter and camelbacks on sill.
    b. Telescoping arms, for projection up to 44 degrees.
    c. Fixed length arms, for projection of 30 degrees.
    d. Arms removable and latches for securing shutter in closed position.
    e. Screw tie-down brackets and wall anchors as required for wind resistance.
7. Fasteners: Self-tapping stainless steel machine screws or aluminum blind rivets.
8. Frame and Louver Finish: AAMA 2603, multiple-coat, thermally-cured polyvinylidene fluoride organic coating system.
    a. Color: Custom color finish, as selected from manufacturer's standard line.

B. Product (Basis of Design): "Islander® Bahama Louver" conforming to Miami-Dade Product Approval NOA No. 15-0706.05, as manufactured by Willard Shutter Co.

2.04 MATERIALS

A. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063-T5.

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

2.05 ANCHORS

A. General:
    1. Anchors shall be suitable for concrete and CMU (block) substrates, in accordance with requirements of Product Approval.

B. Material: Stainless steel.

C. Type and Size: Per Product Approval.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and site area for conditions that might prevent satisfactory installation.

B. Do not install until after adjacent painting, roofing and window installation work has been completed.

C. Do not proceed with installation until related conditions are satisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's installation instructions, approved shop drawings, and product approval requirements.

B. Set units level, plumb, with uniform joints, and aligned with building elements.

C. Separate dissimilar metals using concealed bituminous paint or non-absorbent gasket.

D. Anchor units to structure as indicated on the drawings.

3.03 TOLERANCES

A. Maximum Variation from Level: Plus/minus 1/8 inch (3.175 mm).

3.04 CLEANING

A. Clean exterior surfaces units of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.05 PROTECTION

A. Protect units after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION

SECTION 107116

HURRICANE PROTECTION PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Flexible hurricane protection panels.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Mounting substrates.

B. Section 042200 - Concrete Unit Masonry: Mounting substrates.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C158 -- Standard Test Methods for Strength of Glass by Flexure (Determination of Modulus of Rupture**);** 2002 (2012).

2. ASTM D635 -- Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.

2. ASTM D638 -- Standard Test Method for Tensile Properties of Plastics; 2014.

3. ASTM D1929 -- Standard Test Method for Determining Ignition Temperature of Plastics; 2016.

4. ASTM D3786 /D3786M -- Standard Test Method for Bursting Strength **of** Textile Fabrics—Diaphragm Bursting Strength Tester Method; 2016.

5. ASTM D4533 -- Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015.

6. ASTM D4595 -- Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method; 2011.

7. ASTM D4632/D4632M -- Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.

8. ASTM D4833/D4833M -- Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products; 2007 (2013)e1.

9. ASTM D5199 -- Standard Test Method for Measuring the Nominal Thickness of Geosynthetics; 2012.

C. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-TP -- Florida Building Code, Test Protocols for HVHZ.

a. FBC-TP TAS-201 -- Impact Test Procedures.

a. FBC-TP TAS-202 -- Criteria for Testing Impact & Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure.

a. FBC-TP TAS-203 -- Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

1.04 DESIGN & PERFORMANCE REQUIREMENTS

A. General: Design, materials, construction and quality of hurricane protection panels shall comply with design criteria specified in the Contract Documents and applicable requirements of the governing building code, including but not limited to FBC-B CHAPTERS 15 and 16 (including HVHZ provisions), FBC-B SECTION 2413, and ASCE 7.

1. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of window wall.

2. Hurricane protection panels shall be designed and constructed to insure a minimum of 1-inch (25 mm) separation at maximum deflection with components and frames of components they are to protect unless the components and frame are specifically designed to receive the load of storm shutters, and shall be designed to resist the wind pressures as set forth in FBC-B CHAPTER 16 (HVHZ) by methods admitting of rational analysis based on established principles of design.

a. Hurricane protection panels shall also be designed to comply with the impact load requirements included within FBC-B CHAPTER 16 (HVHZ).

3. Deflection shall not exceed the limits set forth in FBC-B CHAPTER 16 (HVHZ).

4. Hurricane protection panels must completely cover an opening in all directions.

a. Hurricane protection panel overlap shall comply with requirements of product approval.

b. End closures shall be designed to resist wind loads specified in FBC-B CHAPTER 16 (HVHZ), based on rational analysis.

B. Design Loads: Hurricane protection panels shall comply with requirements of governing building code, criteria indicated on the Structural Drawings, and as follows:

1. Hurricane protection panels shall be designed and constructed to be of sufficient strength to support the estimated or actual imposed dead, live, wind, and any other loads, both during construction and after completion of the structure, without exceeding the allowable materials stresses specified by the governing building code.

2. Wind Load Design Criteria:

    a. Building Risk Category (FBC-B TABLE 1604.5 and ASCE 7 Table 1-1): II.

    b. Basic Wind Speed (Ultimate Design Wind Speed, 3-second gust (V*ult*): 175 mph.

    c. Wind Exposure Category (FBC-B SECTION 1620.3): C.

    d. Enclosure Classification: Enclosed Building.

3. Maximum Design Pressure (MDP) Rating (per Product Approval): Provide hurricane protection panels that are identical to systems that have been successfully tested and approved for use in HVHZ, with MDP rating equal to or greater than pressures indicated on the drawings.

C. Testing - Product Approval: Comply with applicable requirements of the FBC..

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.

1. Engineering Drawings and Calculations: Submit design calculations and detailed drawings, including attachment to the main structure, prepared by and bearing the seal of qualified delegated engineer.

1.05 QUALITY ASSURANCE

A. Delegated Engineer Qualifications: Florida-registered engineer, proficient in structural design.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site ready for erection.

B. Package using methods that prevent damage during shipping and storage on site.

C. Store materials under cover and elevated above grade.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Hurricane Protection Panels:

1. Basis of Design: Armor Screen Corp.; 1881 Old Okeechobee Road; West Palm Beach, FL 33409; www.armorscreen.com.

2.02 PERFORMANCE REQUIREMENTS

A. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall and fenestration opening.

B. Design Pressure (DP): As indicated on Drawings.

2.03 HURRICANE PROTECTION PANELS

A. Description: Flexible, lightweight hurricane protection panel system, designed to provide wind pressure and missile impact protection for fenestration opening; size and configuration as indicated on drawings.

B. Materials:

1. Fabric: Hurricane protection panels shall be fabricated from a polypropylene, woven geotextile fabric with filaments woven such that they retain dimensional stability relative to each other. The woven fabric shall have the following minimum average roll values:

a. Grab Textile Strength (ASTM D4632/D4632M): 425 x 325 lbs.

b. Puncture Strength (ASTM D4833/D4833M): 130 lbs.

c. Mullen Burst (ASTM D3786/D3786M): 675 psi.

d. Trapezoidal Tear (ASTM D4533): 150 x 125 lbs.

e. Wide Width Tensile Strength (ASTM D4595): 225 x 205 lbs.

f. Thickness (ASTM D5199): 20 mil.

g. Wide Width Elongation (ASTM D4595): 22 x 21 percent.

h. Apparent Opening Size: 30 US STD sieve.

i. Percentage of Open Area: 5 percent.

2. Anchors: Anchors shall be suitable for concrete and CMU (block) substrates, in accordance with requirement of Product Approval.

C. Product (Basis of Design): "Armor Screen Series 63 Flexible Wind Abatement System" conforming to Miami Dade Product Approval NOA No. 15-0518.03, as manufactured by Armor Screen Corp.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and site area for conditions that might prevent satisfactory installation.

B. Do not install until after adjacent painting, roofing and window installation work has been completed.

C. Do not proceed with installation until related conditions are satisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's installation instructions and product approval specifications.

B. Set hurricane protection panel level and plumb, and aligned with building elements, to provide complete coverage over opening.

C. Install anchors in accordance with product approval and approved shop drawings.

3.03 CLEANING

A. Clean hurricane protection panels and exterior wall surfaces of dust and debris; follow manufacturer's cleaning instructions.

3.04 PROTECTION

A. Store panels in accordance with manufacturer’s instructions, in location to be designated by Owner. Protect panels to prevent theft or damage due to other work until Date of Substantial Completion.

END OF SECTION

SECTION 115223

AUDIO-VISUAL EQUIPMENT SUPPORTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Suspended ceiling tile replacement kit for support of ceiling-hung projector mount.

1.02 RELATED REQUIREMENTS

A. Section 095100 - Suspended Acoustical Ceilings: Suspended panel ceilings for recessed screens.

B. Division 26 - Electrical: Electrical supply, conduit, and wiring for audio-visual equipment.

1.03 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Experienced in manufacturing products specified in this section.

B. Installer Qualifications: Experienced in installation of the work of this section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery.

B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F (10 degrees C). Stack according to manufacturer's recommendations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Suspended Ceiling Tile Replacement Kit:

1. Basis of Design: Chief Professional AV Solutions; 6436 City West Parkway; Eden Prairie, MN 55344; Tel 800-582-6480; www.chiefmfg.com.

2.02 SUSPENDED CEILING TILE REPLACEMENT KIT

A. Certification(s): UL Listed.

B. Overall Dimensions (H x W x D): 1.1 in. x 23.6 in. x 23.6 in. (29 x 600 x 600 mm).

1. Shall fit within suspended acoustical ceiling grid.

C. Weight Capacity: 50 lbs (22.7 kg).

D. Color: White.

E. Output: 15A, 1875 W continuous.

F. Features:

1. Shall include a high-performance, dual gang housing, isolated ground, dual receptacle outlet featuring the SurgeX® non-sacrificial multi-stage filtration and surge protection system.

a. Shall protect equipment from disruptive high frequency noise and damage caused by power disturbances.

2. Shall include Cable Suspension System, for quick and easy tie-off.

3. Shall include Ceiling Tile Cutter, for piercing a circular hole in tile for extension column.

4. Shall provide infinite column placement within ceiling tile.

5. Shall include single and dual electrical outlet cutouts.

6. Shall include Security System designed to provide locking hardware at column connection point.

7. Shall include (4) 25 ft flexible cables, (4) wood eyebolts, (4) concrete anchors and a chrome trim ring.

8. Shall be 1.5 in. NPT-compatible.

9. Shall include Surge and Filter Module with the following features:

a. Non-volatile spike protection with LED power indicator.

b. Non-sacrificial multi-stage technology.

c. Non-current limiting design passes full power on a regular circuit; redundant protection circuits.

d. Improves the reliability and functionality of connected equipment by safeguarding equipment from high energy transients, lightning strikes and electronic noise events that can cause gear degradation and downtime.

e. Line filter reduces common and differential mode noise by up to 40 dB.

f. Rated for 125V~, 60Hz, 15 A.

g. Ferrite toroid based EMI Filter.

h. Withstand rating of 240 VAC continuous without damage or loss of protection.

G. Product (Basis of Design): "SpeedConnect Suspended Ceiling Tile Replacement Kit with 2-Gang Filter & Surge" (CMS445P2), manufactured by Chief Professional AV Solutions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate is finished and ready to accept Suspended Ceiling Tile Replacement Kit installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that openings for Suspended Ceiling Tile Replacement Kit are correctly sized.

D. Do not install Suspended Ceiling Tile Replacement Kit until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

A. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, and registers and grilles.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.

B. Install Suspended Ceiling Tile Replacement Kit in mountings as specified and as indicated on drawings.

C. Install plumb and level.

D. Adjust Suspended Ceiling Tile Replacement Kit and related hardware in accordance with manufacturer's instructions for proper placement and operation.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 122400

WINDOW SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Roller type window shades and accessories.

B. Manual controls.

1.02 RELATED REQUIREMENTS

A. Section 092116 - Gypsum Board Assemblies: Substrate for window shade systems.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM D4674 -- Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2002a (R2010).

2. ASTM G21 -- Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

C. National Fire Protection Association (NFPA):

1. NFPA 70 -- National Electric Code; 2011 edition; adopted per FAC Rule 69A-60.005.

2. NFPA 701 -- Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2010.

D. Window Covering Manufacturers Association (WCMA):

1. WCMA A100.1 -- Safety of Corded Window Covering Products; current edition, including all revisions. (ANSI/WCMA A101.1)

1.04 SYSTEM DESCRIPTION

A. Roller Shade System: Manually operated roller shades.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:

1. Do not fabricate shades until field dimensions for each opening have been taken.

2. Do not install shades until final surface finishes and painting are complete.

1.06 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings:

1. Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.

D. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.

E. Samples:

1. Selection Samples: Include fabric samples in full range of available colors and patterns.

2. Verification Samples: Minimum size 6 inches (150 mm) square, representing actual materials, color and pattern.

F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual locations of control systems and show interconnecting wiring.

H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

1. Assign responsibility for design, engineering, installation, and performance of window shade system to single manufacturer and their qualified dealers and installers.

2. Furnish shading system and electrical control equipment for complete installation and single source responsibility of shading and lighting control.

3. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of documented experience.

1. Qualified to install and commission specified products by prior factory training, experience, demonstrated performance, and acceptance of any requirement of the manufacturer, subsidiary of the manufacturer, or licensed agent.

1.08 MOCK-UP

A. Mock-Up: Provide full size mockup of window shade complete with selected shade fabric including sample of seam when applicable.

1. Full-sized mock-up may become part of the final installation.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.10 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.11 WARRANTY

A. Provide manufacturer’s eight (8) year warranty providing for repair or replacement of defective equipment.

1.12 MAINTENANCE

A. Make ordering of new equipment for expansions, replacements, and spare parts available to qualified dealer or installer.

B. Make replacement parts available for minimum of ten years after date of manufacture.

C. Provide on-site service support within 24 hours.

D. Offer renewable service contract on yearly basis to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system startup completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Window Shades, Motors and Motor Controls:

1. Basis of Design: Lutron Electronics Co., Inc.: www.lutron.com.

2. Other Manufacturers: Equivalent products by the following manufacturers:

a. Skyco Shading Systems, Inc.: www.skycoshade.com.

b. Nysan Solar Control, Inc., division of Hunter Douglas: www.nysan.com.

B. Source Limitations: Furnish products produced by a single manufacturer and obtained

from a single supplier.

2.02 WINDOW SHADE APPLICATIONS

A. Type WT-1 Window Shade: Manually-operated single roller shade.
   1. Type: Roller shades.
   2. Fabric:
      a. Composition: 35 percent fiberglass, 65 percent vinyl on fiberglass.
      b. Fire Rating: NFPA 701, M1.
      c. Openness Factor: 10 percent.
      d. Usable Roll Width: 96 in., min.
      e. Color: Charcoal/Gray.
      f. Product: "Classico - BasketWeave 90" (SV22-90-10) by Lutron, or equal.
   3. Mounting: Ceiling pocket mount, except as otherwise indicated.
   4. Operation: Manual, in locations indicated.
   5. Product: Manually-operated single roller shades by Lutron, or equal.

B. Type WT-2 Window Shade: Manually operated dual roller shades blackout and shear shades.
   1. Type: Roller shades.
   2. Fabric:
      a. Sheer Fabric (Roller 1):
         a. Composition: 35 percent fiberglass, 65 percent vinyl on fiberglass.
         b. Fire Rating: NFPA 701, M1.
         c. Openness Factor: 10 percent.
         d. Usable Roll Width: 96 in., min.
         e. Color: Charcoal/Gray.
         f. Product: "Classico Sheer BasketWeave 90" (SV22-90-10) by Lutron, or equal.
      b. Blackout Fabric (Roller 2):
         a. Composition: 100 percent polyester with acrylic foamed backing.
         b. Fire Rating: NFPA 701, M1.
         c. Openness Factor: 0 percent.
         d. Usable Roll Width: 108 in., min.
         e. Color: Khaki.

f. Product: "Classico Blackout Dual-Sided Avila" (BA-0015-0) by Lutron, or equal.

3. Mounting: Ceiling pocket mount, except as otherwise indicated.

4. Operation: Manual, in locations indicated.

5. Product: Manually-operated double roller shades by Lutron, or equal.

2.03 ROLLER SHADES

A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories; fully factory-assembled.

1. Drop: Regular roll.

2. Size: As indicated on drawings.

B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.

1. Sheer Shades: Shall reduce glare yet still reveal considerable details to the outside; no privacy.

a. Openness Factor greater than 1 percent.

2. Blackout Shades: Shall block virtually all the light.

a. Openness Factor equal to zero (0).

3. Flammability: Pass NFPA 701 large and small tests.

4. Fungal Resistance: No growth when tested according to ASTM G21.

C. Roller Tube: As required for type of operation, extruded aluminum with end caps.

1. Dimensions: Manufacturer's standard, selected for suitability for installation conditions, span, and weight of shades.

2. Fabric Attachment: Utilize double sided adhesive tape with minimum of one turn of fabric on roller before working section of fabric starts.

3. Finish: Clear anodized.

D. Hembars and Hembar Pockets: Wall thickness designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.

1. Style: Thermally sealed fabric pocket covering rectangular aluminum hembar.

E. Manual Operation: Clutch operated continuous loop; beaded ball chain meeting WCMA A100.1.

1. System must be capable of smoothly raising and lowering the shade to any desired height and maintaining that position without slippage.

2. The shade shall not be operable by any other means other than the chain. Pulling on the hem bar shall not disengage the clutch.

3. The system shall provide a maximum fabric gap of 0.75 inch per side.

2.04 ACCESSORIES

A. Fascias: Size as required to conceal shade mounting.

1. Style: As selected by Architect from shade manufacturer's full selection.

2. Material and Color: To match shade.

B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.

C. Number Plates: Number each opening and shade. Provide aluminum number plates for each shade unit and each opening. Fasten shade plate to the back of roller. Fasten opening plate on unexposed surface of the opening.

D. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.06 FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Fabricate shades to fit openings within specified tolerances.

1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch (13 mm) space between bottom bar and window sill, except as otherwise indicated.

2. Horizontal Dimensions:

a. Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 0.75 inches (19.05 mm) total.

b. Outside Mounting: Extend blind 2 inches (50 mm) beyond jambs on each side.

C. Dimensional Tolerances: As recommended in writing by manufacturer.

D. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that ratings and configurations of system components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive system components.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Installation Tolerances:

1. Inside Mounting: Maximum space between shade and jamb when closed of 1/16 inch (1.5 mm).

2. Maximum Offset From Level: 1/16 inch (1.5 mm).

C. Replace blinds that exceed specified dimensional tolerances at no extra cost to Owner.

D. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure shades for smooth operation.

3.04 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

3.05 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 123600

COUNTERTOPS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quartz surfacing countertop for reception desk.

1.02 RELATED REQUIREMENTS

A. Section 064100 - Architectural Wood Casework.

B. Section 079200 - Joint Sealants.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM C97 -- Absorption and Bulk Specific Gravity of Dimension Stone.

2. ASTM C99 -- Modulus of Rupture of Dimension Stone.

3. ASTM C170 -- Compressive Strength of Dimension Stone.

4. ASTM C370 -- Moisture Expansion.

5. ASTM C501 -- Relative Resistance to Wear of Unglazed Tile to Taber Abraser.

6. ASTM C482 -- Bond Strength of Ceramic Tile to Portland Cement.

7. ASTM C484 -- Thermal Shock Resistance of Glazed Ceramic Tile.

8. ASTM C531 -- Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concrete.

9. ASTM C648 -- Breaking Strength of Ceramic Tile.

10. ASTM C1026 -- Resistance of Ceramic Tile to Freeze Thaw Cycling.

11. ASTM E84 -- Standard Test Method for Surface Burning Characteristics of Building Materials.

12. ASTM E662 -- Smoke Density.

C. International Solid Surface Fabricators Association (ISSFA):

1. ISSFA-2 -- Classification and Standards for Solid Surfacing Material.

D. Marble Institute of America, Inc. (MIA):

1. MIA (DSDM) -- Dimensional Stone Design Manual.

E. National Electrical Manufacturers Association (NEMA):

1. NEMA LD 3 -- High-Pressure Decorative Laminates.

F. U.S. Product Standards (PS):

1. PS 1 -- Structural Plywood

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

C. Shop Drawings: Provide complete detailed shop drawings showing installation of quartz surfacing fabrications.

1. General:

a. Indicate dimensions, thicknesses, required clearances, tolerances, materials, colors, finishes, fabrication details, field jointing, adjacent construction, design load parameters, methods of support, integration of plumbing components, and anchorages.

b. Indicate materials, component profiles, fastening methods, jointing details, hardware and accessories.

2. Countertops: Coordinate and submit shop drawings required in this section with shop drawings of cabinets and casework specified in Section 064100 - Architectural Wood Casework.

D. Samples:

1. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns; and samples of actual product representing manufacturer's full range of available surface finish options.

2. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, pattern and surface finish.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

F. Installation Instructions: Manufacturer's installation instructions and recommendations.

G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Company specializing in fabrication and installation of the products and assemblies specified in this section, with minimum five years of documented experience and certified in writing by the countertop manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Quality Standard: Same as custom built-in cabinets and casework; see Section 064100 - Architectural Wood Casework.

B. Quartz Surfacing: Sheet or slab of natural quartz and plastic resin self-supporting over structural members.

1. Flat Sheet Thickness: 3/8 inch (1 cm), 3/4 inch (2 cm) or 1-1/4 inches (3 cm), as indicated on drawings; if not indicated, provide 3/4 inch (2 cm).

2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Shall comply with ISSFA-2 and NEMA LD 3; high-performance polyester resin, unfilled, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.

a. NSF approved for food contact.

3. Performance Requirements:

a. Surface Burning Characteristics (ASTM E84): Flame spread 25, maximum; smoke developed 450, maximum.

b. Moisture Absorption (ASTM C97): 0.02 percent.

c. Modulus of Rupture (ASTM C99): 6,800 psi.

d. Compressive Strength (ASTM C170): 24,750 psi.

e. Moisture Expansion (ASTM C370): Less than 0.01.

f. Abrasion Resistance (ASTM C501): 223.

g. Bond Strength (ASTM C482): 205 psi.

h. Thermal Shock (ASTM C484): Passes at 5 cycles.

i. Coefficient of Thermal Expansion (ASTM C531): 0.000012 inch/degree F.

j. Breaking Strength (ASTM C648): 3,661 lbf.

k. Resistance to Freeze Thaw Cycling (ASTM C1026): Unaffected at 15 cycles.

l. Stain Resistance (ANSI Z124.6): Unaffected.

4. Manufacturers:

a. Basis of Design:

(1) Cambria USA; 11000 West 78 Street, Suite 220; Eden Prairie, MN 55344; Tel. 866-226-2742; www.cambriausa.com.

(a) Florida Sales Rep.: Georgia Farmer; Tel. 952-944-1676; Cell. 612-751-6962; email Georgia.Farmer@CambriaUSA.com).

b. Other Manufacturers:

(1) Caesarstone Corporation: www.caesarstoneus.com

(2) Seieffe Corporation: www.okite.us.

C. Accessory Materials:

1. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.

a. For additional information, refer to Section 061000 - Rough Carpentry.

2. Adhesives:

a. Mounting Adhesive: Chemical-resistant waterproof structural grade "50-year" silicone or epoxy adhesive of a type recommended by manufacturer for materials being joined, application and conditions of use.

(1) Product: "Two-Part Acrylic Adhesive" by Cambria, or equal by one of the following:

(a) Akemi North America.

(b) Bonstone Material Corporation.

(c) Tenax USA.

b. Quartz Surfacing Adhesive: Chemical-resistant waterproof epoxy or polyester adhesive of a type recommended by manufacturer for materials being joined, application and conditions of use.

(1) Adhesive which will be visible in finished Work shall be tinted to match quartz surface.

(2) Product: "Two-Part Acrylic Adhesive" by Cambria, or equal by one of the following:

(a) Akemi North America.

(b) Bonstone Material Corporation.

(c) Tenax USA.

3. Joint Sealant: Mildew-resistant silicone sealant, clear.
4. Solvent: Denatured alcohol for cleaning quartz surfacing, to assure adhesion of adhesives and sealants.
5. Cleaning Agents: Mild soap and water.

2.03 FABRICATION

A. General:

1. Inspect materials for defects prior to fabrication.
2. Layout quartz surfacing fabrications to minimize joints and avoid L-shaped pieces of quartz surfacing, and fabricate with hairline joints.
3. Shop-fabricate quartz surfacing components to the greatest extent practical; comply with the MIA (DSDM).
4. Fabricate quartz surfacing components in the largest sections practicable, with exposed surface of joints flush.
5. Join lengths of quartz surfacing materials using best method recommended by manufacturer.
6. Cut and polish with water-cooled power tools.
7. Cutouts shall have a minimum of 3/8 inch (1 cm) radius.
8. Polish exposed edges (including edges of cutouts) that will be exposed in finished Work.
9. Laminate layers of quartz surfacing as required to create built-up edges, following procedures recommended by the manufacturer.

B. Countertops:

1. Material: Quartz surfacing.
   a. Thickness: As indicated on drawings; if not indicated, provide 3/4 inch (2 cm) except at exposed edges (see Exposed Edge Detail).
   b. Color and Pattern: To be selected by Architect from manufacturer's full line of colors and patterns.
2. Fabricate countertops to overhang 1 inch (25 mm) beyond fronts and ends of cabinet or wall beneath, except at edges abutting adjacent cabinet or wall finish.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
4. Exposed Edge Detail: Exposed edges to be built up to 1-1/2 inch (4 cm) thick, and

finished with edge profile as indicated on drawings.

5. Exposed Surface Finish: To be selected by Architect from manufacturer's full line of surface finish options.

6. Secure countertop to base cabinet or wall beneath, as applicable, with concealed fasteners and with contact surfaces set in waterproof glue, per approved shop drawings.

C. Backsplashes and Endsplashes:

1. Material: Quartz surfacing.

a. Thickness: As indicated on drawings; if not indicated, provide 3/4 inch (2 cm) x 6 inch (15.24 cm)

b. Color and Pattern: To be selected by Architect from manufacturer's full line of colors and patterns.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

D. Site Verification:

1. Verify dimensions by field measurements prior to installation.

2. Verify that substrates supporting quartz surfaces are plumb, level and flat to within 1/8 inch in 10 ft, and that all necessary supports and blocking are in place.

3. Base cabinets shall be secured to adjoining units and back wall.

E. Inspect quartz surface materials for defects prior to installation.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's instructions and approved shop drawings

B. Preliminary Installation:

1. Position materials to verify the correct size.

2. If size adjustments, or additional fabrication is necessary, use water-cooled tools. Protect jobsite and surface from dust and water. Perform work away from installation site if possible.

3. Allow gaps for expansion of not less than 1/8 inch (1.5 mm) per 10 ft when installed between walls or other fixed structure.

C. Permanent Installation:

1. After verification of fit and finish, clean substrate; remove loose and foreign matter which may interfere with adhesion. Clean quartz surface backside and joints using denatured alcohol.

2. Horizontal Surface: Apply continuous bead of mounting adhesive around perimeter of structural substrate and supports.

3. Vertical Surface: Apply continuous bead of mounting adhesive around perimeter. In addition, apply 1/4 inch mounting adhesive bead every 8 inches on vertical center.

4. Install quartz surfacing plumb, level, square and flat, to within 1/8 inch in 10 feet, non-cumulative.

5. Align adjacent pieces in same plane.

6. Securely attach quartz surfacing fabrications to cabinets or wall, as applicable, using concealed fasteners. Make flat surfaces level; shim where required.

D. Joints:

1. Joints between Adjacent Pieces of Quartz Surfacing:

a. Joints shall be flush, tight fitting, level and neat.

b. Securely join adjacent pieces using specified Quartz Surfacing Adhesive; fill joints level to polished surface.

c. Secure adjacent quartz surfaces with vacuum clamps until adhesive hardens.

2. Joints between Quartz Surfacing and Other Materials or Finishes: Seal joint between quartz surfacing fabrications and adjacent construction, using specified Joint Sealant.

3.04 TOLERANCES

A. Variation from Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.

B. Offset from Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.

C. Joint Width between Adjacent Pieces of Quartz Surfacing: Hairline.

D. Surface Lippage at Joints between Adjacent Pieces of Quartz Surfacing: Exposed surfaces shall be flush, with no lippage.

E. Field Joints (except Joints between Adjacent Pieces of Quartz Surfacing): 1/8 inch (3

mm) wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 129313

BICYCLE RACKS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Bicycle racks.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Mounting surface for bicycle racks.

B. Section 321313 - Concrete Paving: Mounting surface for bicycle racks.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM A53/A53M -- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Outdoor Bicycle Racks:

1. Basis of Design: Huntco Supply, LLC: www.huntco.com.
2. Other Manufacturers:
    a. Columbia Cascade Company: www.timberform.com.
    b. Creative Pipe, Inc.: www.creativepipe.com.
    c. Highland Products Group, LLC: www.indoorbikeracks.net.

2.02 BICYCLE RACKS

A. Outdoor Bicycle Racks: Device allows user provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.

1. Style: Serpentine rack formed from a continuous round pipe.
2. Capacity: 7 bicycles.
3. Mounting, Ground: In-ground anchor.
4. Finish: Powder coat, maintenance-free and weather-resistant.
    a. Color: Custom color as selected by Architect, to match metal fence color.
5. Accessories: In-ground grout cover.

B. Materials:

1. Pipe: Carbon steel, ASTM A53/A53M, Schedule 40.

C. Product: “The Rambler” by Huntco, or equal by one of the other listed manufacturers.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive bicycle racks.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Do not begin installation until unsatisfactory substrates have been properly repaired.

3.02 PREPARATION

A. Ensure surfaces to receive bicycle racks are clean, flat, and level.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install bicycle racks level, plumb, square, and correctly located as indicated on the drawings.

C. In-Ground Anchor Installation:

1. Prepare holes in size according to manufacturer's instructions.
2. Place anchoring bolts through the holes in the pipe.
3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch (38 mm) from the ground.
4. Pour concrete and level rack.
5. Support until dry.

D. Freestanding installation: Place in location shown on drawings.

3.04 CLEANING

A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 144216

VERTICAL WHEELCHAIR LIFT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Enclosed, self-contained vertical platform wheelchair lift.

1.02 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete: Concrete shaftway and anchor placement.

B. Section 042200 - Concrete Unit Masonry: Masonry shaftway and anchor placement.

C. Section 042900 - Reinforced Unit Masonry: Masonry shaftway and anchor placement.

D. Division 26 - Electrical: Electrical power service and wiring connections.

E. Section 270000 - Telecommunication Systems: Telephone line for ADA-compliant autodialer telephone.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American National Standards Institute (ANSI).

C. American Society of Mechanical Engineers (ASME):

1. ASME A17.1 -- Safety Code for Elevators and Escalators; 2007.

2. ASME A17.5 -- Elevator and Escalator Electrical Equipment.

3. ASME A18.1 -- Safety Standard for Platform Lifts and Stairway Chairlifts; 2008.

D. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.

2. FBC-A -- Florida Building Code, Accessibility.

E. International Code Council (ICC):

1. ICC/ANSI A117.1 -- Accessible and Usable Buildings and Facilities.

F. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electric Code; 2011.

1.04 SUBMITTALS

A. General:

1. ___

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Submit manufacturer’s installation instructions, including preparation, storage and handling requirements.

2. Include complete description of performance and operating characteristics.

3. Show maximum and average power demands.

C. Shop Drawings:

1. Show typical details of assembly, erection and anchorage.

2. Include wiring diagrams for power, control, and signal systems.

3. Show complete layout and location of equipment, including required clearances and coordination with shaftway.

D. Samples:

1. Selection Samples: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.

2. Verification Samples: For each finished product specified, two samples, minimum size 1-3/4 x 2-1/4 inches, representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm with minimum 10 years experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.

B. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.

1.06 REGULATORY REQUIREMENTS

A. Provide platform lifts in compliance with:

1. ASME A18.1.

2. ASME A17.1.

3. ASME A17.5.

4. NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

1.08 PROJECT CONDITIONS

A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.09 WARRANTY

A. Warranty: Manufacturer shall warrant the wheelchair lift materials and workmanship for two years following completion of installation.

B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and workmanship for the following additional extended period beyond the initial two year warranty. Preventive Maintenance agreement required.

1. Five additional years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Garaventa Lift; P.O. Box 1769; Blaine, WA 98231-1769; Tel. 800-663-6556 or 604-594-0422; www.garaventalift.com.

1. Product: Garaventa Model GVL-EN-42.

2.02 ENCLOSED VERTICAL WHEELCHAIR LIFT

A. Capacity: 750 lbs (340 kg) rated capacity.

B. Mast Height: 45 inches (1143 mm) maximum lifting height.

C. Nominal Clear Platform Dimensions:

1. Standard: 37-1/4 inches (947 mm) by 54 inches (1370 mm).

D. Platform Configuration:

1. Straight Through Entry/Exit: Front and rear openings.

E. Landing Openings:

1. Lower Landing: Door.

2. Upper Landing: Gate.

F. Doors and Gates: Doors and gates shall be self closing type.

1. Door Height: Flush mount, 80 inches (2032 mm).

2. Gate Height: Flush mount, 42-1/8 inches (1070 mm).

3. Door Construction: Aluminum frame with:

a. Panels: 16 gauge (1.5 mm) painted galvanized steel.

b. D-Handle Pull: 12 inch (305 mm) offset D-Handle.

G. Lift Components:

1. Machine Tower: Custom aluminum extrusion.
2. Base Frame: Structural steel.
3. Platform Side Wall Panels: 42-1/8 (1070 mm) inches high. 16 gauge (1.5 mm) galvanized steel sheet. Custom aluminum extrusion tubing frame.
4. Enclosure Panels: 16 gauge (1.5 mm) painted galvanized steel sheet.

H. Enclosure Height above Upper Landing: Enclosure shall extend 42-1/8 inches (1070 mm) above the upper landing level.

I. Infill Panel Kit: Provide 16 gauge (1.5 mm) galvanized panels and mounting hardware to cover void between side of enclosure, drive mast and adjacent wall at the following locations:

1. Lower landing.

J. Base Mounting and Access to Lift at Lower Landing:

1. Floor Mount: Base of lift shall be mounted on the floor surface of the lower landing.
    a. For access onto the platform provide a ramp of 16 gauge (1.5 mm) galvanized steel sheet with a slip resistant surface.

K. Options:

1. Outdoor Protection: Lift shall include modifications recommended by manufacturer for reliable performance in outdoor climate of project site.

L. Hydraulic Drive:

1. Drive Type: Chain hydraulic.
2. Emergency Operation: Manual device to lower platform and use auxiliary battery power to raise or lower platform.
3. Safety Devices:
    a. Slack chain safety device.
    b. Shoring device.
4. Travel Speed: 17 fpm (5.2 m/minute).
5. Motor: 3.0 hp (2.2 kW); 24 volts DC.
6. Power Supply: 120 VAC single phase; 60 Hz on a dedicated 15 amp circuit

M. Platform Controls: 24 VDC control circuit with the following features.

1. Direction Control: Illuminated tactile and constant pressure push buttons with dual platform courtesy lights and safety light.
2. Keyless operation.
3. Emergency Telephone: Platform shall be equipped with ADA-compliant autodialer telephone with a stainless steel faceplate. Telephone shall operate in the event of

power failure.

a. A telephone line shall be supplied to the lift site as specified under Section 270000 - Telecommunication Systems.

4. Arrival Gong and Digital Floor Display.

N. Call Station Controls: 24 VDC control circuit with the following features.

1. Direction Control: Illuminated tactile and constant pressure push buttons with illuminated "In Use" indicator.

2. Keyless operation.

3. Call Station Mounting:

a. Lower: Frame mounted.

b. Upper: Frame mounted

O. Safety Devices and Features:

1. Grounded electrical system with upper, lower, and final limit switches.

2. Tamper resistant interlock to electrically monitor that the door is in the closed position and the lock is engaged before lift can move from landing.

3. Electrical disconnect shall shut off power to the lift.

P. Finishes:

1. Aluminum Extrusions: Champagne anodized finish.

2. Lift Finish: Baked powder coat finish, color as selected by the Architect from manufacturer’s optional RAL color chart.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify shaft and machine space are of correct size and within tolerances.

C. Verify required landings and openings are of correct size and within tolerances.

D. Verify electrical rough-in is at correct location.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install platform lifts in accordance with applicable regulatory requirements including ASME A17.1, ASME A 18.1 and the manufacturer's instructions.

B. Install system components and connect to building utilities.

C. Accommodate equipment in space indicated.

D. Startup equipment in accordance with manufacturer’s instructions.

E. Adjust for smooth operation.

3.04 FIELD QUALITY CONTROL

A. Perform tests in compliance with ASME A17.1 or A18.1 and as required by authorities having jurisdiction.

B. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 22 11 00

WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Requirements of the following Division 23 Sections apply to this section:

1. "Basic Mechanical Requirements".
2. "Basic Mechanical Materials and Methods".
3. "Basic Piping Materials and Methods".
4. "Supports and Anchors".
5. "Mechanical Identification".

1.02 SUMMARY

A. This Section includes potable cold water, piping, fittings, and specialties within the building to a point of connection to the existing service pipe; see drawings.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract.

B. Product data for each piping specialty and valve specified.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the provisions of the following codes:

1. ASME B31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
2. Florida Building Code – Plumbing, 2014 Ed.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store pipe in a manner to prevent sagging and bending.

1.06 EXTRA MATERIALS

A. Maintenance Stock: Furnish one valve key for each key-operated hose bibb, fixture supply, or faucet installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products by one of the following:

1. Hose Bibbs:
   a. Jones Manufacturing
   b. Nibco, Inc.
   c. Watts Regulator Co.

2. Water Hammer Arresters:
   a. Jones Manufacturing
   b. Josam Co.
   c. Wade Div., Tyler Pipe

3. Mechanical Couplings and Fittings For Grooved-End Steel Pipe:
   a. Grinnell Corp.
   b. Stockham Valves & Fittings, Inc.
   c. Victaulic Co. of America

4. Mechanical Couplings and Fittings For Grooved-End Copper Tube:
   a. Victaulic Co. of America

5. Vacuum Breakers For Hose Connections:
   a. Cash (A.W.) Valve Mfg. Corp.
   b. Conbraco Industries, Inc.
   c. Watts Regulator Co.

2.02 PIPE AND TUBE MATERIALS, GENERAL

A. Pipe and Tube: Refer to Part 3, Article "Application, General," for identification of systems where the below materials are used.

B. Copper Tube: ASTM B 88, Type L Water Tube, drawn temper.

2.03 FITTINGS

A. Wrought Copper Solder-Joint Fittings: ANSI B16.22, streamlined pattern.

B. Wrought Copper and Bronze Grooved-End Fittings: ASTM B 75 Tube and ASTM B 584 Bronze Castings.

C. Galvanized Cast-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ASME B1.20.1.

D. Grooved-End Mechanical Fittings: ASTM A 47, ASTM A 106, or A 536, galvanized fittings with grooves or shoulders designed to accept grooved-end couplings.

E. Mechanical Couplings For Grooved-End Piping: Ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design, with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe or tube and fittings. Couplings for use with AWWA Dimension piping shall conform to AWWA C606.

F. Unions: ASME B16.39, malleable iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces, female threaded ends. Threads shall conform to ASME B1.20.1.

G. Dielectric Unions: Threaded, solder, or grooved-end connections as required to suit application; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

2.04 JOINING MATERIALS

A. Solder Filler Metal: Lead-free silver alloy.

B. Gasket Material: Thickness, material, and type suitable for fluid to be handled at design temperatures and pressures.

2.05 GENERAL-DUTY VALVES

A. General-duty valves (i.e., gate, globe, check, ball, and butterfly valves) are specified in Division 23 Section “Valves”. Special duty valves are specified below by their generic name; refer to Part 3 Article “Valve Application” for specific uses and applications for each valve specified.

2.06 PIPING SPECIALTIES

A. Water Hammer Arresters: Bellows type, with stainless steel casing and bellows, pressure rated for 250 psi, sized, tested and certified in accordance with PDI Standard WH-201.

B. Hose Connections: Hose connections shall have garden hose thread outlets conforming to ASME B1.20.7.

C. Hose Bibbs: In recessed stainless steel box with locking cover, bronze body, 3/4-inch solder inlet, hose outlet, stainless steel cover. Vacuum breaker, backflow preventer, and key handle.

D. Vacuum Breakers: Hose connection vacuum breakers with finish to match hose connection.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine rough-in requirements for plumbing fixtures and other equipment with water connections to verify actual locations of piping connections prior to installation.

3.02 PIPE APPLICATIONS

A. Install Type L, drawn copper tube with wrought copper fittings and solder joints for pipe sizes 4 inches and smaller, above ground, within building.

B. Water piping in sizes 2-1/2 to 6 inches may be Type L drawn copper tube with roll-grooved ends and mechanical couplings, above ground, within building.

3.03 PIPING INSTALLATION

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.

D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

G. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

H. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4-inch ball valve, and short 3/4-inch threaded nipple and cap.

I. Fire Barrier Penetrations: Where pipes pass though fire-rated walls, partitions, ceilings, and floors, maintain the fire-rated integrity. Refer to Division 7 for special sealers and materials.

J. Install piping with 1/32-inch-per-foot (1/4 percent) downward slope towards drain point.

3.04 HANGERS AND SUPPORTS

A. General: Hanger, support, and anchor devices conforming to MSS SP-69 are specified in Division 23 Section “Supports and Anchors”. Conform to the table below for maximum spacing of supports.

B. Pipe Attachments: Install the following:

1. Adjustable steel clevis hangers, MSS Type 1, for individual horizontal runs less than 20 feet in length.
2. Adjustable roller hangers, MSS Type 43, and spring hangers, MSS Type 41 with Type 49, for individual horizontal runs 20 feet and longer.
3. Pipe roll, complete MSS Type 44 for multiple horizontal runs, 20 feet or longer, support on a trapeze.
4. Spring hangers to support vertical runs.

C. Install hangers for horizontal piping with the following maximum spacing and minimum rod sizes:

Nom. Pipe Size - In.	Copper Tube Max. Span - Ft.	Min. Rod Dia. - In.
Up to 3/4	5	3/8
1	6	3/8
1-1/4	7	3/8
1-1/2	8	3/8
2	8	3/8
2-1/2	9	1/2
3	10	1/2

D. Support vertical copper tube at each floor.

3.05 PIPE AND TUBE JOINT CONSTRUCTION

A. Soldered Joints: Comply with the procedures contained in the AWS "Soldering Manual".

B. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual".

1. CAUTION: Remove stems, seats, and packing of valves and accessible internal parts of piping specialties before soldering and brazing.
2. Fill the tubing and fittings during soldering and brazing with an inert gas (nitrogen or carbon dioxide) to prevent formation of scale.
3. Heat joints to proper and uniform temperature.

C. Threaded Joints: Conform to ASME B1.20.1, tapered pipe threads for field-cut threads. Join pipe fittings and valves as follows:

1. Note the 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.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
4. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.
   a. Damaged Threads: Do not use pipe with corroded or damaged threads. If a weld opens during cutting or threading operations, that portion of pipe shall

not be used.

D. Flanged Joints: Align flange surfaces parallel. 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 with a torque wrench.

E. Grooved-End Joints: Prepare pipe and tubing and install in accordance with manufacturer's installation instructions.

3.06 VALVE APPLICATIONS

A. General-Duty Valve Applications: The Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shut-off duty: Use gate, ball, and butterfly valves.
2. Throttling duty: Use globe, ball, and butterfly valves.

3.07 INSTALLATION OF VALVES

A. Sectional Valves: Install sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more plumbing fixtures or equipment connections, and elsewhere as indicated. For sectional valves 2 inches and smaller, use gate or ball valves; for sectional valves 2-1/2 inches and larger, use gate or butterfly valves.

B. Shutoff Valves: Install shutoff valves on inlet of each plumbing equipment item, on each supply to each plumbing fixture, and elsewhere as indicated. For shutoff valves 2 inches and smaller, use gate or ball valves; for shutoff valves 2-1/2 inches and larger, use gate or butterfly valves.

C. Drain Valves: Install drain valves on each plumbing equipment item, located to drain equipment completely for service or repair. Install drain valves at the base of each riser, at low points of horizontal runs, and elsewhere as required to drain distribution piping system completely. For drain valves 2 inches and smaller, use gate or ball valves; for drain valves 2-1/2 inches and larger, use gate or butterfly valves.

D. Hose Bibbs: Install on piping where indicated with vacuum breaker.

3.08 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by plumbing code.

3.09 FIELD QUALITY CONTROL

A. Inspections: Inspect water distribution piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved.
2. During the progress of the installation, notify the Architect/Engineer at least 48 hours prior to the time such inspection must be made. Perform tests specified below in the

presence of the plumbing official.

a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.
b. Final Inspection: Arrange for a final inspection to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.

3. Re-inspections: Whenever the piping system will not pass the test or inspection, make the required corrections and arrange for re-inspection.

B. Test water distribution piping as follows:

1. Test for leaks and defects all new water distribution piping systems and parts of existing systems that have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed all new, altered, extended, or replaced water distribution piping until it has been tested and approved. Expose all such work for testing that has been covered or concealed before it has been tested and approved.
3. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair all leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
5. Prepare reports for all tests and required corrective action.

3.10 ADJUSTING AND CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired prior to use.
2. Use the purging and disinfecting procedure proscribed by the authority having jurisdiction or, in case a method is not prescribed by that authority, the procedure described in either AWWA C651, or AWWA C652, or as described below:

a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
b. Fill the system or part thereof with a water/ chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.
c. Drain the system or part thereof of the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.

d. Following the allowed standing time, flush the system with clean, potable water until chlorine does not remain in the water coming from the system.

1. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

B. Prepare reports for all purging and disinfecting activities.

3.11 COMMISSIONING

A. Fill the system.

B. Before operating the system, perform these steps:

1. Close drain valve and hose bibbs.
2. Open valves to full open position.
3. Remove and clean strainers.

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END OF SECTION

SECTION 22 13 00

DRAINAGE AND VENT SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Requirements of the following Division 23 Sections apply to this section:

1. Basic Mechanical Requirements.
2. Basic Mechanical Materials and Methods.

1.02 SUMMARY

A. This Section includes building sanitary and storm drainage and vent piping systems, including drains and drainage specialties within the building and to a point not more than 20 feet outside the building.

1.03 SUBMITTALS

A. Product data for the following products:

1. Drainage piping specialties.
2. Floor drains.
3. Not used.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the provisions of the following:

1. Florida Building Code – Building, 2014 Ed.
2. Florida Building Code – Plumbing, 2014 Ed.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide drainage and vent systems from one of the following:

1. Drainage Piping Specialties, including drains, trap primers, and vandal-proof vent caps:

    a. Josam Mfg. Co.
    b. Smith (Jay R) Mfg. Co.
    c. Tyler Pipe; Subs. of Tyler Corp.
    d. Zurn Industries Inc; Hydromechanics Div.
    e. Neenah Foundry Company

2.02 ABOVE GROUND DRAINAGE AND VENT PIPE AND FITTINGS

A. Hubless Cast-Iron Soil Pipe: CISPI Standard 301, Service weight, cast-iron soil pipe and fittings, with heavy duty 304 stainless steel couplings and neoprene seals conforming to CISPI Standard 310. Acceptable manufacturer: Clampall or Husky.

B. Copper Tube: Type L.

2.03 UNDERGROUND DRAINAGE PIPE AND FITTINGS

A. Cast-Iron Soil Pipe: ASTM A74, service weight, hub-and-spigot soil pipe and fittings.

1. Neoprene Compression Gaskets: ASTM C564.

2.04 DRAINAGE PIPING SPECIALTIES

A. Not used.

B. Trap Primers: Bronze body valve with automatic vacuum breaker, with 1/2 inch connections matching piping system.

C. Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.

D. Floor Cleanouts: Cast-iron body and frame, heavy duty for outside installation, with cleanout plug and adjustable round top as follows:

1. Nickel-Bronze Top: Manufacturer's standard cast unit with the following patterns:

    a. Exposed rim type, with recess to receive 1/8 inch thick resilient floor finish.
    b. Exposed flush type, standard non-slip scored or abrasive finish.

E. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.

F. Flashing Flanges: Cast-iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.

G. Vent Flashing Sleeves: Cast-iron caulking type roof coupling for cast-iron stacks, cast-iron threaded type roof coupling for steel stacks, and cast-bronze stack flashing sleeve for copper tubing.

2.05 FLOOR DRAINS

A. Floor drain type designations and sizes are indicated on Drawings.

B. Floor Drain Type "B": Toilet rooms cast-iron body and flashing collar with closure plug, nickel bronze adjustable strainer head with secured square hole grate, with the following features:

1. Sediment bucket.
2. Hinged grate.
3. Heel-proof grate.
4. Trap primer connection.
5. Vandal-proof grate.
6. Not used.
7. Round strainer head.
8. Bottom outlet, inside caulk.

Acceptable Manufacturers: Smith 2010; Zurn ZN-415; Josam 3000-6T.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.

B. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.

C. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PIPE APPLICATIONS - ABOVE GROUND, WITHIN BUILDING

A. Install hubless, service weight, cast-iron soil pipe and fittings for storm and sanitary drainage and vent pipe.

B. Install Type L copper tubing for air conditioning condensate drainage.

3.03 PIPE APPLICATIONS - BELOW GROUND, WITHIN BUILDING

A. Install hub-and-spigot, service weight, cast-iron soil pipe and fittings with compression gasket joints for drainage pipe.

3.04 INSTALLATION

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate

the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.

G. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, and floors, maintain the fire rated integrity. Refer to Division 7 for special sealers and materials.

H. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, half-wyes, or long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn tees where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

I. Install building drain pitched down at minimum slope of 1/8 inch per foot.

J. Torque 2" and 3" joints to 4 ft.-lbs., larger pipe to 5 ft.-lbs. Re-check torque immediately prior to concealing piping.

3.05 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors devices are specified in Division 15 Section "Basic Mechanical Materials and Methods." Conform to the table below for maximum spacing of supports.

B. Support hubless pipe in accordance with Cast Iron Soil Pipe Institute Designation: 310-90, a copy of which can be obtained from 1499 Chain Bridge Road, Suite 203, McLean, VA 22101, Phone (703) 827-9177. Each horizontal length of pipe shall be restrained from lateral movement every 20 feet. Riser clamps shall be installed at each floor and all pipe joints 6" and larger shall have restraining clamps and rods as per 310-90. Fittings placed end to end in a line-up shall have each fitting supported or a 16-gauge continuous sleeve shall be placed under fittings and supported at each end.

C. Install hangers at the following intervals:

PIPE MATERIAL	MAX HORIZONTAL SPACING IN FEET	MAX VERTICAL SPACING IN FEET
Cast-Iron Pipe	5	15
Copper Tubing Up to 1 1/4"	6	10
Copper Tubing 1 1/2" and Larger	10	10

3.06 INSTALLATION OF PIPING SPECIALTIES

A. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and:

1. as required by plumbing code;
2. at each change in direction of piping greater than 45 degrees;
3. at minimum intervals of 75' for building drains and horizontal branches;
4. at base of each vertical soil or waste stack.
5. in Toilet Rooms provide wall cleanouts on stacks serving water closets, urinals and lavatories.

    a. Cleanouts shall be provided on the vent line above the fixture connection to the sanitary line located between the lavatories by using a 2" sanitary "T" with 2" cleanout body and brass plug. In cases where there is only one lavatory, the sanitary line shall be locate to the side of the fixture centerline so as to accommodate the installation of the cleanout on the vent line above the fixture sanitary line connection.
    b. Cleanouts shall be provided on the vent line above the fixture connection to the sanitary line located between the urinals by using a sanitary "T" with cleanout body and brass plug. In cases where there is only one urinal, the sanitary line shall be located to the side of the fixture centerline so as to accommodate the installation of the cleanout on the vent line above the fixture sanitary line connection.

B. Locate cleanouts accessibly and with 18" clearance to permit upstream and/or downstream rodding.

C. Wall cleanouts shall be flush with or protrude beyond finished walls or made accessible through an access door or panel. Provide offsets and/or extensions of piping as required.

D. Cleanouts Covers: Install floor and wall cleanout covers for concealed piping, types as indicated.

E. Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

F. Vent Flashing Sleeves: Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

3.07 INSTALLATION OF FLOOR DRAINS

A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.

B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

C. Set drain elevation depressed below finished slab elevation as listed below to provide proper slope to drain:

DEPRESSION IN INCHES	RADIUS OF AREA DRAINED - FEET
1/2	5
3/4	10
1	15
1-1/4	20
1-1/2	25

D. Trap all drains connected to the sanitary sewer and reseal from water supply of nearest water closet or sink.

E. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

F. Position drains so that they are accessible and easy to maintain.

3.08 INSTALLATION OF TRAP PRIMERS

A. Install trap primers with piping pitched towards drain trap, minimum of 1/8 inch per foot (1 percent). Adjust trap primer for proper flow.

3.09 CONNECTIONS

A. Piping Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the plumbing code.

B. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.10 FIELD QUALITY CONTROL

A. Inspections:

1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved.

2. During the progress of the installation, notify the Architect/Engineer at least 48 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the Plumbing Official.

a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
b. Final Inspection: Arrange for a final inspection official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.

3. Re-inspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for re-inspection.

B. Piping System Test: Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:

1. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved by the Plumbing Official. Expose all such work for testing that has been covered or concealed before it has been tested and approved.
3. Rough Plumbing Test Procedure: Except for outside leaders, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.
4. Finished Plumbing Test Procedure: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1" water column. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.
5. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
6. Prepare reports for all tests and required corrective action.

3.11 ADJUSTING AND CLEANING

A. Clean interior of piping system. Remove dirt and debris as work progresses.

B. Clean drain strainers, domes, and traps. Remove dirt and debris.

3.12 PROTECTION

A. Protect drains during remainder of construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

END OF SECTION

SECTION 22 33 00

WATER HEATERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of water heater work required by this section is indicated on drawings and schedules.

B. Refer to other Division-22 sections for water piping and specialties which are required external to water heaters for installation; not work of this section.

C. Electrical Work:

1. Provide factory-mounted and factory-wired controls and electrical devices as specified in this section.

D. Refer to Division-26 sections for other electrical wiring including disconnects, wires/cables, raceways, and other required electrical devices; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of water heaters of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. UL Compliance:
   a. Provide water heater components which are UL-listed and labeled.
2. NEC Compliance: Install electric water heaters in accordance with requirements of NFPA 70, "National Electrical Code", 2011 Ed.
3. ASME Code Symbol Stamps: Provide water heaters and safety relief valves which comply with ASME Boiler and Pressure Vessel Code, and are stamped with appropriate code symbols.
4. ASHRAE Compliance: Provide water heaters with Performance Efficiencies not less than prescribed in ASHRAE 90A, "Energy Conservation in New Building Design".

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data including rated capacities and efficiencies of selected model clearly indicated; operating weights; furnished specialties and accessories; and installation and start-up instructions.

B. Shop Drawings: Submit manufacturer's assembly type shop drawings indicating dimensions, required clearances, and methods of assembly of components.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for electrical power supply wiring to water heaters. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring required for final installation of water heaters and controls. Differentiate between portions of wiring that are factory-installed and portions that are to be field- installed.

D. Maintenance Data: Submit maintenance data and parts lists for each type and size of water heater, control, and accessory; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements.

E. Certificates: Submit appropriate Certificates of Shop Inspection and Data Report as required by provisions of ASME Boiler and Pressure Vessel Code.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Handle water heaters and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged water heaters or components; remove from site and replace with new.

B. Store water heaters and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

C. Comply with manufacturer's rigging and installation instructions for unloading water heaters, and moving units to final location for installation.

1.06 SPECIAL PROJECT WARRANTY

A. Warranty on Equipment and Workmanship: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, equipment with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. If found defective, replace with new heater at no cost to Owner.

1. Warranty Period: 5 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ELECTRIC WATER HEATER, TANKLESS

A. Electric water heaters shall be tankless type with a flow activation switch operating only when hot water side of faucet is turned on. The heat exchanger shall be constructed of a non-corrosive metal alloy. The units shall have high temperature thermal cutoffs which at a maximum temperature of 190 degrees F, will shut down the heating elements so not to create a steam situation. The minimum flow activation shall be 0.5 gpm and minimum pressure requirements shall be 5 psi. Maximum operating pressure of 150 psi. Units shall be tested to UL Standard 499.

B. Chronomite, Niagara, Acutemp or equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which water heaters are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF WATER HEATERS

A. General: Install water heaters in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

B. Piping: Connect cold water piping to units with shutoff valve and union. Connect hot water line to unit with union.

C. Electric Water Heaters:

1. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

a. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with water heater start-up until wiring installation is acceptable to water heater Installer.

3.03 FIELD QUALITY CONTROL

A. Start-up: Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

3.04 CLOSEOUT PROCEDURES

A. Training: Provide services of manufacturer's technical representative to instruct Owner's personnel in operation and maintenance of water heaters.

1. Schedule training with Owner, provide at least 7-day notice of training date.

END OF SECTION

SECTION 22 42 00

PLUMBING FIXTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section specifies plumbing fixtures and trim. The types of fixtures specified include the following:

1. Lavatories (including wheelchair type);
2. Water Closets;
3. Mop Basins;
4. Wall Mounted Water Coolers (including wheelchair type);
5. Faucets;
6. Fixture Supports (including wheelchair type);
7. Toilet Seats;
8. Fittings, Trim, and Accessories;

1.03 QUALITY ASSURANCE

A. Codes and Standards:

1. ARI Standard 1010: "Drinking-Fountains and Self-Contained Mechanically-Refrigerated Drinking-Water Coolers".
2. UL Standard 399: "Drinking-Water Coolers".
3. Miami-Dade County Water Conservation Ordinances.
4. Americans with Disabilities Act (ADA).
5. Florida Building Code – Plumbing.

1.04 SUBMITTALS

A. Product Data: Submit Product Data and installation instructions for each fixture, faucet, specialties, accessories, and trim specified; clearly indicate rated capacities of selected models of water coolers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store fixtures and trim in the manufacturer's original shipping containers. Do not stack containers or store in such a manner that may cause damage to the fixture or trim.

1.06 SEQUENCE AND SCHEDULES

A. Schedule rough-in installations with the installation of other building components.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, provide plumbing fixtures of one of the following:

1. Lavatories:
   a. Bradley.
   b. American Standard; U.S. Plumbing Products.
   c. Kohler Co.

2. Water Closets:
   a. Kohler Co.
   b. Toto.
   c. American Standard; U.S. Plumbing Products

3. Mop Basins:
   a. Acorn
   b. Kohler Co.
   c. Stern Williams

4. Water Coolers/Dinking Fountain:
   a. Halsey Taylor Div.; Household International Co.
   b. Acorn
   c. Elkay Manufacturing Co.

5. Faucets (Sensor Operated, Lavatory):
   a. Technical Concepts
   b. American Standard; U.S. Plumbing Products.
   c. Kohler Co.

6. Faucets (Standard, Sinks):
   a. American Standard; U.S. Plumbing Products
   b. Eljer Plumbingware Div.; Household International Co.
   c. Kohler Co.

7. Water Closet Seats:
   a. Bemis Manufacturing Co.
   b. Olsonite Corp.; Olsonite Seats.
   c. Beneke Corp.

8. Fixture Supports:
   a. Josam Mfg. Co.
   b. Wade Co.

c. Zurn Industries, Inc.; Hydromechanics Div.
d. J. R. Smith Manufacturing Co.

9. Domestic Water Wall Hydrants:
a. Zurn Industries.
b. Watts
c. J. R. Smith Manufacturing Co.

2.02 WATER CLOSETS (WC-1)

A. Material/Type: Vitreous china, floor mounted, water saver, elongated bowl, tank type. Similar to American Standard Loft #2535 (White). Maximum water consumption per flush shall be 1.28 gallons per flush.

B. Seat: Open front, less cover, and with self-sustaining check hinge. Mounting height of 17" - 19" from finished floor to top of seat. Acceptable manufacturers are as follows:

1. Beneke 525SS
2. Bemis 1955-SSC
3. Olsonite 1050 CC

2.03 LAVATORIES-ACCESIBLE (L-1: 1 Station)

A. Material/Type: Wall-mount bathroom sink with back shall be 19”x17”. Bathroom sink shall be made of cast iron and 1 hole. Quantity and location of anchors are per manufacturer’s requirements. Walls must be reinforced at anchor points. Fixture color is per Architect.

B. Trim:

1. Lavatories shall conform to ADA Criteria. Mounting height as required by latest ADA and governing codes

2. Provide with supply and stop, chrome plated, offset tail piece and chrome plated p-trap, with molded flexible vinyl insulation on trap and supply, Truebro Model #102 or similar.

3. Faucets for all lavatories shall be infrared sensor operated.

4. Faucet shall be chrome plated, brass lavatory spout with vandal-proof aerator and integral flow control. All faucets shall be provided with set anchor with a plate and bolts to prevent user from twisting the faucet. Sensor shall not be an integral part of the faucet; it shall be mounted adjacent to faucet on a common chrome plated base. Sensor shall be provided with anchoring method to prevent user from rotating sensor on base.

5. Solenoid valves and accessories shall be wall mounted, and located in an accessible chase, directly behind the fixture they serve.

6. Faucet shall be of the capacitive-sensing omnidirectional detection zone type with optional plug-in transformer. Provide with ADA Compliant Bradley 6315-KT sensor operated soap dispenser with 2000 shot (54oz) soap bottle and optional plug-in transformer. Provide with ADA under-sink knee protective foam.

7. Solenoid valves and faucets shall operate at 0.35 GPM and shall comply with Dade County Water Conservation Ordinance 91-15.

8. System shall have LED indicators to aid in final adjustments. LED light, visible inside the sensing element, shall indicate power availability. Green LED shall be provided for user awareness.

9. Sensor shall be vandal-proof, completely encapsulated and waterproof. Sensors shall be easily replaceable and shall have a scratch resistant optical surface.

10. All electrical connections shall be coated with moisture protection compound equivalent to blue grease to prevent moisture damage.

11. System must be warranted for a period of two years. All replacement parts must be available individually without the need for purchasing the entire assembly. Provide manufacturer's parts list and 10% spare parts (entire assembly), as part of the contract documents.

12. A continuous light beam shall be emitted from the sensor into the lavatory bowl. Immediately upon placing hands under the faucet, or touching the sensor, the solenoid valve shall open and remain open for as long as user's hands remain within range. When hands are removed, the water flow shall stop automatically. A timer shall prevent continuous operation of faucet for more than two minutes.

13. Provide in-line basket type strainers upstream of all solenoid valves. Strainer shall have screens that are easily removable for service.

14. ADA listed faucet shall be manufactured by Bradley Model No. CAP-DCA. American Standard or Kohler equivalent models are approved equals

C. Accessories:

1. Strainer: Acceptable manufacturers are as follows:

   American Standard - No. 2411.015 strainer.
   Eljer - 803-0552
   Kohler - K7715
   Crane - C-1065-G

2. Provide with chrome plated supply and stop, tail piece and cast brass, chrome plated p-trap.

2.04 SERVICE/MOP SINKS (MR-1)

A. Material/Type: Floor mounted molded one piece mop sink 24" x 24" unit with 12" high sides and center drain with stainless steel strainer. Service Sink shall be manufactured by Stern Williams, Model No. CORLow SBC-1700. Acorn, Eljer, or Fiat equivalent models are approved equals.

B. Trim: Provide with Stern Williams T-10-VB (service sink fitting with vacuum breaker, adjustable top brace, 3/4" hose thread on spout with bucket hook inlets - 8" on center, chrome finish), T-35 (hose and wall hook - hose 36" long, with 3/4" chrome coupling; wall bracket of stainless steel), T-40 (stainless steel mop hanger, 24" long with 3 rubber spring loaded grips, and BP (splash catcher panels of 20 ga. type 304 stainless steel), and silicone sealant for walls and floor. Provide with p-trap, supplies and stops.

C. Provide with 9KW instant water heater (IWH-2).

2.05 ELECTRIC WATER COOLERS (EWC-1)

A. Stainless steel splash basin, self-contained bi-level cooler. Provide p-trap, supply and stop. Acceptable manufacturers are as follows:

1. Halsey Taylor OVL-II Series Electronic Eye.
2. Oasis or Elkay equivalent models are approved equals.

B. All handicap accessible water coolers shall meet ADA requirements and Florida Statutes Chapter 553.

C. All electric water coolers shall be certified lead free. No joints shall be soldered with lead.

2.06 WALL HYDRANTS/HOSE BIBBS (HB-1)

A. Vandal proof ¾” loose-keyed hose bibb. Provide with integral vacuum breaker. Acceptable manufacturers are as follows:

1. Watts
2. Josam
3. Smith

2.07 FIXTURES SUPPORTS

A. Lavatory Supports: 3/8” bolts in quantity and location required by approved lavatory manufacturer.

2.08 FITTINGS, TRIM, AND ACCESSORIES

A. Toilet Seats: Elongated, solid white plastic, closed back/open front, less cover, and having stainless steel check hinge and replaceable bumpers.

B. Supplies and Stops for Lavatories and Sinks: Polished chrome-plated, loose-keyed angle stop having 1/2" inlet and 3/8" O.D. x 12" long flexible tubing outlet, and wall flange and escutcheon.

C. Traps: Cast brass, 1-1/4" adjustable "P" trap with cleanout and waste to wall lavatories.

D. Escutcheons: chrome-plated cast brass with set screw.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify all dimensions by field measurements. Verify that all plumbing fixtures may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Examine rough-in for potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures.

C. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATIONS

A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturer's written instructions, rough-in drawings, and pertinent codes and regulations, the original design, and the referenced standards.

B. Comply with the installation requirements of ANSI A117.1 and Public Law 90-480 with respect to plumbing fixtures for the physically handicapped.

C. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.

D. Set mop basins in a leveling bed of cement grout.

E. Install a stop valve in an accessible location in the water connection to each fixture.

F. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork.

G. Seal fixtures to walls and floors using silicone sealant. Match sealant color to fixture color.

3.03 FIELD QUALITY CONTROL

A. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning units, then retest.

B. Inspect each installed unit for damage. Replace damaged fixtures.

3.04 ADJUSTING

A. Adjust water pressure at drinking fountains, faucets, and flush valves to provide proper flow and stream.

B. Replace washers of leaking or dripping faucets and stops.

3.05 CLEANING

A. Clean fixtures, trim, and strainers using manufacturer's recommended cleaning methods and materials.

3.06 PROTECTION

A. Provide protective covering for installed fixtures, water coolers, and trim.

B. Do not allow use of fixtures for temporary facilities unless expressly approved in writing by the Owner.

END OF SECTION

SECTION 23 00 00

GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The other Contract Documents complement the requirement of this Section. The General Requirements apply to the work of this Section.

1.2 SCOPE

A. The Work shall include the furnishings of systems, equipment and materials specified in this Division and as called for on Mechanical Drawings, to include: supervision, operation, methods and labor for the fabrication, installation, start-up and tests for the complete mechanical installation.

B. Drawings for the Work are diagrammatic, intended to convey the scope of the Work and to indicate the general arrangement and locations of the Work. Because of the scale of the Drawings, certain basic items such as pipe fittings, access panels, and sleeves may not be shown. This Section shall be responsible for selecting the equipment to fit the space provided. The location and sizes for pipe fittings, sleeves, inserts, fire and/or smoke dampers, and other basic items required by Florida Building Code, 2014 Ed. and other sections shall be coordinated and included for the proper installation of the Work.

C. Equipment Specification may not deal individually with minute items required such as components, parts, controls and devices which may be required to provide the equipment performance specified or as required to meet the equipment warranties. Where such items are required, they shall be included by the supplier of the equipment, whether or not specifically called for in the Contract Documents.

D. Where the words “provide”, “furnish”, “include” or “install” are used in the Specification or on the Drawings, it shall mean to furnish, install and test complete and ready for operation, the items mentioned. If an item is either called for in the Specification or called for on the Drawings, it shall be considered sufficient for including same in the Work.

E. Where noted on the Drawings or where called for in other Sections of the Specification, the Contractor for this Division shall install equipment furnished by Others, and shall make required service connections. Contractor shall verify with the supplier of the equipment the requirements for the installation.

F. Coordinate with all trades in submittal of shop drawings. Shop drawings shall be prepared at scale of 1/4", 1'-0", clearly indicating all applicable components. Space conditions shall be detailed to the satisfaction of all concerned trades, subject to review and final acceptance by the Architect and Engineer. In the event that Contractor installs his work before coordinating with other trades or so as to cause any interference with work of other trades, the necessary changes shall be made in the work to correct the condition, at no additional cost to the Owner.

G. Should conflicts occur between the mechanical and plumbing drawing and Division 15000 through 15990 of the specifications, the more stringent requirements shall take precedent. Where items are shown or specified on the drawings or in the specifications, they shall be deemed as specified by both and included as part of the contract.

1.3 CODES AND STANDARDS

A. All work shall be performed in compliance with all applicable Laws, Codes and Regulations of the Governmental Bodies having jurisdiction over the site.

B. Work not regulated by Governmental Bodies shall be performed in accordance with current issues of the following Codes and Standards.

1. Air Moving and Conditioning Association - AMCA
2. American National Standards Institute - ANSI
3. Air-Conditioning and Refrigeration Institute - ARI
4. American Society of Mechanical Engineers - ASME
5. American Society for Testing and Materials - ASTM
6. American Water Works Association - AWWA
7. Factory Mutual - FM
8. Manufacturers Standardization Society of the Valve and Fittings Industry - MSS
9. National Electrical Manufacturers Association - NEMA
10. National Electrical Code – NEC, 2011 ed.
11. National Fire Protection Association - NFPA
12. Occupational Safety and Health Act of 1970, as amended - OSHA
13. Sheet Metal and Air Conditioning Contractors National Association - SMACNA
14. Underwriters' Laboratories - UL
15. Florida Building Code - Plumbing Section, 2014 Edition.
16. Florida Building Code - Mechanical Section, 2014 Edition.
17. ASHRAE Standard 62.1.
18. Other Codes and Standards as individually referred to in the Technical Sections of the Specification.

1.4 FEES, PERMITS AND INSPECTIONS

A. Coordinate and provide such inspections as are required by the Authorities with jurisdiction over the site.

B. Contractor shall be responsible for securing and paying for all fees and permits required under the Scope of Work defined under this division.

1.5 ACTIVE SERVICES

A. Existing active services: water, gas, sewer, electric, when encountered, shall be protected against damage. Do not prevent or disturb operation of active services which are to remain. If active services are encountered which require relocation, make request to authorities with jurisdiction for determination of procedures.

Where existing services are to be abandoned, they shall be terminated in conformance with requirements of the Utility or Municipality having jurisdiction.

1.6 SITE INSPECTION

A. Contractor shall inspect and carefully examine the site to familiarize himself with conditions of the site which will affect his work He shall verify points of connection with utilities, routing of outside piping to include required clearances from any existing structures, trees or other obstacles. Verify accessibility required for the installation of work under this contract and alert the Architect/Engineer to conditions which may be detrimental or will prevent proper execution of the work.

B. The submission of a bid will be construed that such an inspection has been performed and extra payment will not be allowed for changes in the Work required resulting from observable existing conditions.

1.7 OPENINGS, CUTTING AND PATCHING

A. Coordinate the placing of openings in the new structure as required for the installation of the Mechanical Work.

B. When additional patching is required due to failure to inspect work, then provide the patching required to properly close the openings, to include patch painting.

C. When cutting and patching of the structure is made necessary due to failure to install piping, ducts, sleeves or equipment on schedule, or due to failure to furnish, on schedule, the information required for the leaving of openings, then provide the cutting and patching as required.

D. Provide cutting and patching and patch painting as required for the installation of work, and furnish lintels and supports as required for openings. Cutting of structural support members will not be permitted without prior approval of the Architect.

Extent of cutting shall be minimized, use core drills, power saws or other machines which will provide neat, minimum openings. Patching shall match adjacent materials and surfaces and shall be performed by craftsmen skilled in the respective craft required.

1.8 WIRING FOR MECHANICAL SUPPORT

A. Division 26 shall provide power services for motors and equipment furnished by this Contractor to include safety disconnect switches and final connections. The entire fire alarm system including interlock wiring required for air handling unit shutdown (when applicable in areas not provided with means for smoke evacuation systems) shall be provided under Division 26. The Division 23 Contractor is only responsible for locating and physical mounting of the duct mounted detectors.

B. Division 23 shall provide internal wiring, alarm wiring, control wiring or interlock wiring (except the fire alarm system) for equipment furnished, to include temperature control wiring.

C. Division 23 shall furnish motor starters for motors furnished by this Contractor, except where other Sections call for starters to be furnished by others.

D. Coordinate with Division 26 all motors and other mechanical equipment which require electrical services. The schedule shall include the exact locations for rough-ins, electrical loads, size and electrical characteristics for all services required.

E. Where motors or equipment furnished require large services or services or of different electrical characteristics than those called for on the Electrical Drawings, this contractor shall provide material as required to fit the substitute equipment.

1.9 ACCURACY OF SENSORS

A. All sensors used by the Division 23 i.e., Carbon Dioxide, Carbon Monoxide, Temperature, Humidity, Pressure, etc. shall have a minimum measuring accuracy of plus or minus 1% or better.

1.10 PROTECTION

A. Special care shall be taken for the protection of equipment furnished. Equipment and material shall be complete protected from weather elements, painting, plaster, etc. until the project is completed. Damage from rust, paint, scratches, etc. shall be repaired as required to restore equipment to original condition.

B. Where the installation or connection of equipment requires work in areas previously finished by other Contractors, the area shall be protected and not marred, soiled or otherwise damaged during the course of such work. Contractor shall arrange with other Contractors for repairing and refinishing of such areas which may be damaged.

1.11 SUBMITTALS

A. Method or procedure for submitting shop drawings and submittal data shall be in compliance with the Contract Documents.

B. Submittal data for mechanical equipment shall consist of shop drawings and/or catalog cuts showing technical data necessary to evaluate the material or equipment, to include dimensions, wiring diagrams, performance curves, ratings, control sequence and other descriptive data necessary to describe fully the item proposed and its operating characteristics.

C. Submittals shall include, but not be limited to:

1. Air Handling Units
2. Valves (Plumbing and Hydronic)
3. Pipe Insulation
4. Duct Insulation
5. Plumbing Fixtures
6. Vibration Isolation
7. Duct Heaters
8. Grilles and Diffusers
9. Exhaust Fans, Supply Fans
10. Filters
11. Controls
12. Ductwork Shop Drawings

13. Hydronic Specialties
14. Thermometers and Gauges
15. Pumps
16. VAV Terminal Boxes
17. Variable Frequency Drives
18. Air Cooled Condensing Units
19. Ductwork, Metal and Flexible
20. Sensors
21. Cooling Towers.

1.12 PROJECT CLOSE-OUT

A. General

1. Prior to acceptance of the installation and final payment of the Contract, the Contractor shall perform the work outlined herein.

B. Cleaning

1. At the conclusion of the construction, the site and structure shall be cleaned thoroughly of all debris and unused materials remaining from the mechanical construction. All closed off spaces shall be cleaned of all packing boxes, and other waste materials used in the mechanical construction.
2. The entire system of piping and equipment shall be cleaned internally. The Contractor shall open all dirt pockets and strainers, completely blowing down as required and clean strainer screens of all accumulated debris. Passivate complete hydronic system via Miami-Dade County chemical treatment vendor, coordinate with Facilities Management Division.
3. All tanks, fixtures and pumps shall be drained and proven free of sludge and accumulated matter.
4. All temporary labels, stickers, etc., shall be removed from all fixtures and equipment. (Do not remove permanent name plates, equipment model numbers, ratings, etc.).
5. Heating and air conditioning equipment, tanks, pumps, traps, etc., shall be thoroughly cleaned and new filters or filter media installed.
6. Perform cleaning required by Special Conditions applicable to this Division of the work.

C. Project Recording Documents

1. Prepare and submit project record documents.

D. Operation and Service Manuals

1. In addition to the requirements of Division 1, the Contractor shall provide the Owner/User with an electronic file (in PDF format) containing the operating manual for all equipment furnished and installed under his work.
2. The manual shall include the manufacturer's maintenance and operating instructions and parts list and serial numbers for all operating equipment.
3. All controls and safety devices shall be clearly and permanently embossed or printed plates as to purpose and as to operation. Plates shall be laminated plastic (color

selected by Owner/User) with white or black letters, attached to the equipment device with tamper-proof screws, rivets or non-soluble – Non VOC emitting cement (glue).

4. Upon completion of the work, the Contractor shall put the system into service. The Contractor shall be entirely responsible for the equipment during all testing operations.

1.13 TEST AND DEMONSTRATIONS

A. Systems shall be tested and placed in proper working order prior to demonstrating systems to Owner.

B. Prior to acceptance of the mechanical installation, demonstrate to the Owner or his designated representatives all essential features and functions of all systems installed, and instruct the Owner in the proper operation and maintenance of such systems. The contract shall allow ten (10) working days to perform the demonstrations.

C. Provide necessary trained personnel to perform the demonstrations and instructions. Provide manufacturer's representatives for systems as required to assist with the demonstrations.

D. Dates and times for performing the demonstrations shall be coordinated with the Owner.

E. System demonstrations shall be in accordance with operating and maintenance data.

F. Upon completion of demonstrations, provide a certificate testifying that demonstrations have been completed. Certificate shall list each system demonstrated, dates demonstrations were performed, names of parties in attendance, and shall bear signatures of Contractor and Owner.

1.14 PAINTING AND IDENTIFICATION

A. Provide excavation necessary for sanitary sewers, water supply piping, gas piping, underground chilled water piping, etc., and backfill such trenches and excavations after work has been installed and tested.

Care shall be taken in excavating, that walls and footings and adjacent load bearing soils are not disturbed, except where lines must cross under a wall footing. Where a line must pass under footing, the crossing shall be made by the smallest possible trench to accommodate the pipe. Excavation shall be kept free from water by pumping if necessary. No greater length of trench shall be left open, in advance of pipe and utility laying, than that which is authorized.

B. Trenches for piping and utilities located inside foundation walls and to a point five (5) feet outside of the wall shall not be less than sixteen (16) inches nor more than twenty-four (24) inches wider than the outside diameter of the pipe to be laid. The widths of trenches for piping and utilities located more than five (5) feet outside of building foundation walls, other than for sewers, shall be governed by conditions found at the site.

C. Trenches for sewers shall be excavated so that the pipe may be laid to the alignment and depth required and the maximum trench widths up to the level of the outside top of the pipe shall be no more than twenty-four (24) inches. Other trench widths shall be governed by the conditions found at the site.

D. Bottoms of trenches shall be so shaped that when pipe is in place the lower fourth of the circumference for the full length of the barrel will be supported on compacted fill. Bell holes shall be dug so that no part of the right of the pipe is supported by the bell but shall be no larger than necessary for proper jointing. All sewer and piping requiring excavation below the compacted fill required for the structure shall be excavated to at least six (6) inches below pipe invert.

E. Sewer and drain trenches shall be made true to grade by means of substantial and accurately set batter-boards not more than 50 feet apart with a taut cord or wire stretched between them.

F. Immediately after testing and/or inspection, the trench shall be carefully backfilled with earth free from clods, brick, etc., to a depth one-half the pipe diameter and then firmly puddled and tamped in such a manner as not to disturb the alignment or joints of the pipe. Thereafter, the backfill shall be puddled and tamped every vertical foot.

1.15 CONCRETE WORK

A. Provide concrete bases and housekeeping pads for mechanical equipment unless indicated otherwise. Concrete work shall be as specified elsewhere in the Contract Documents. Vibration pads and equipment base shall be provided by this Contractor. All mechanical equipment 6” height concrete pads shall be provided by the General Contractor.

B. Provide equipment anchor bolts and coordinate their proper installation and accurate location.

1.16 ACCESS PANELS

A. Provide access panels where required, even if not depicted on the contract drawings, for installation by the drywall Contractor. Access panels shall be as specified elsewhere in the specifications. Coordinate location of access panels with Contractor and Architect.

1.17 SLEEVES

A. Sleeves passing through non-load bearing or non-fire related walls and partitions shall be galvanized sheet steel with lock seam joints of minimum gauges as follows: for pipes 2- 2: size and smaller - 24 gauge; 3" to 6" -22 gauge; over 6" - 20 gauge.

B. Sleeves passing through load bearing walls, concrete beams, fire-rated walls, foundations, footings and waterproof floors shall be Schedule 40 galvanized steel pipe or cast iron pipe.

C. Sleeves or insulated piping shall be of sufficient internal diameter to take pipe and insulation and to allow for free movement of pipe. Waterproof sleeves shall be of sufficient internal diameter to take pipe and waterproofing material.

D. In finished areas where pipes are exposed, sleeves shall be terminated flush with wall, partitions and ceilings, and shall extend 1/2" above finished floors. Extend sleeves 1" above finished floors in areas likely to entrap water.

E. Sleeves passing through waterproofing or firesafing shall be coordinated with requirements of the Contract Documents.

F. Piping and sleeves passing through floors, roof, smoke walls, fire walls, and other partitions, shall be provided with firestop by packing space between pipe and sleeve with fire safing insulation for full length of sleeve and caulked air tight with 3M caulk CP25 or Putty 303 for a minimum depth of 1 inch, at both ends of sleeve.

1.18 ESCUTCHEONS

A. Provide chrome-plated escutcheons at each sleeve opening into finished spaces. Escutcheons shall fit around insulation or around pipe when not insulated; outside diameter shall cover sleeve. Where sleeve extends above finished floor, escutcheons or plates to sleeve but not to insulation with set screws or other approved devices.

1.19 PROTECTION OF ELECTRICAL EQUIPMENT

A. Water piping shall not be installed directly above electrical equipment. When piping is required to be installed in electrical rooms, a drain pan shall be provided to protect the electrical equipment.

1.20 WARRANTY CALLS

A. During the one year period, all responses to warranty calls made by the contractor shall be documented by leaving a copy of the mechanics service ticket with the Operations Manager prior to leaving the site upon completion of his work.

1.21 INSULATION PROTECTION

A. Where exposed insulated piping extends to floor, provide sheet metal guard around insulation, as specified in Section 23 07 00 - MECHANICAL INSULATION.

1.22 PROJECT RECORD DOCUMENTS

A. Requirements and methods of preparing and procedure for submitting project records shall be in accordance with Division One. Additionally, the contractor shall maintain detailed as-built drawings (updated daily) of work performed on site. At the time of substantial completion, the contractor shall provide the A/E Team a complete set of as-built drawings in AutoCAD Release 2012 format. These as-built drawings shall have implemented all changes to system layout during construction.

1.23 OPERATION AND MAINTENANCE MANUALS

A. Requirements and methods of preparing and procedures for submitting Operating and Maintenance Manuals shall be in accordance with Division One.

1.24 ANCHORING OF EQUIPMENT

A. All equipment located on the floor slab, that is not mounted on wheels and is capable of being moved shall be secured to the floor with anchor bolts. A minimum of four bolts are required per each piece of equipment and bolts shall be of sufficient size to prevent overturning. Where allowed by space, bolts shall be placed 16” on center.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 23 01 00

BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this and the other sections of Division 23.

1.02 SCOPE OF WORK

A. Provide all labor, materials, necessary equipment and service to complete the mechanical work and related work, as indicated on the drawings, or as specified herein, including but not necessarily limited to, the following:

1. Plumbing fixtures, trim, fittings, and equipment.
2. Domestic cold and hot water piping systems.
3. Condensate drain piping systems.
4. Soil, waste and vent piping systems.
5. Chilled water piping system with accessories.
6. Air distribution ductwork systems.
7. Air distribution devices (VAV boxes), terminal units (outlets/inlets), accessories and equipment.
8. Chilled water air handling units with variable frequency drives.
9. Exhaust ventilation fans.
10. All electrical devices required for proper operation of equipment, including motors, starters, contactors, etc.
11. Thermal and acoustical ductwork, piping and equipment insulation and specialties.
12. Fire protection systems, fire sprinklers.
13. Vibration isolation equipment, devices and accessories.
14. Automatic control systems, including energy management, display, trend logging, central computer.
15. Start-up, testing, balancing and adjusting.
16. Piping, valve and equipment identification.
17. Manuals, charts and instructions, guarantees and warranties.
18. Cleanup of fixtures, equipment and job site debris.

1.03 SUMMARY

A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified:

1. Submittals.
2. Coordination drawings and record documents.
3. Maintenance manuals and operating instructions.
4. Rough-ins.

5. Mechanical installations.
6. Cutting and patching.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 23 Section “ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT”, for factory-installed motors, controllers, accessories, and connections.
2. Division 23 Section “BASIC MECHANICAL MATERIALS AND METHODS”, for materials and methods common to the remainder of Division 23, plus general related specifications including:

a. Access to mechanical installations.
b. Excavation for mechanical installations within the building boundaries, and from building to five (5) feet outside of building line.

1.04 QUALITY ASSURANCE

A. All work in this Division shall comply with the applicable sections of the following codes.

1. Florida Building Code, 2014 Edition
2. National Electrical Code, 2011 Edition.

B. The following additional Codes and Standards shall also be complied with, under this Division of the Specifications.

1. NFPA No. 13, currently adopted edition, Sprinkler Systems.
2. NFPA No. 14, currently adopted edition, Standpipe and Hose Systems.
3. NFPA No. 101, currently adopted edition, Life Safety Code.
4. NFPA No. 90A, currently adopted edition, Installation of Air Conditioning and Ventilating Systems.
5. NFPA No. 90B, currently adopted edition, Warm Air and Air Conditioning Systems.
6. ANSI B9.1-1971, Safety Code for Mechanical Refrigeration.
7. ASHRAE Guide - Equipment, Systems and Applications, latest Edition.
8. SMACNA - Low and Medium Pressure Duct Construction Standards.
9. UL 555, Fire and Smoke Dampers.

1.05 SUBMITTALS

A. General: Follow the procedures specified in Section "SUBMITTALS".

B. Submit, at one time, manufacturer's data, shop and detail drawings, certified prints, brochures, and material lists required by the sections of this Division of the specifications.

C. All submittals to be bound in single binder, sequentially arranged and indexed according to specification section number. Submit six sets for approval. Additional sets will be returned unmarked.

D. Submittals shall be made within 30 days after Notice to Proceed, and approval obtained before work is started. Contractor assumes the financial risks for proceeding with his work without approval of shop drawings.

E. Required submittals are indicated under the General portion of the Sections in this Division.

1.06 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 3/8"=1'-0" or larger for areas congested with equipment; detailing major elements, components and systems of air handling units, pumps, ductwork and materials in relationship with other systems, installations and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work. Drawings shall be submitted prior to commencement of any mechanical work. At a minimum, prepare drawings for mechanical rooms.

1.07 RECORD DOCUMENTS

A. Contractor shall keep a complete set of prints at job site at all times and shall adequately mark any changes, deviations, etc., to plans during construction.

B. Contractor shall furnish a complete set of "As-Built" cad drawings incorporating all changes, deviations, etc. that occurred during construction. These "As-Built" set of cad drawings must be delivered to Project Architect before substantial completion of job is given. All mark-ups to be done in a neat and professional manner. Contractor's "As-Built" mark-ups to include all modifications to shop drawings as well as plans, and especially control and wiring diagrams, piping below grade, and equipment substitution.

C. Following updated information to appear in "As-Built" documents.

1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams complete with valve tag chart. Refer to Division 15, Section “Mechanical Identification”. Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
5. Contract Modifications, actual equipment and materials installed.

1.08 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with project requirements. In addition to the project requirements, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

B. Submittal of two draft copies of the complete operating and maintenance manual shall be made for review by the Architect/Engineer within 60 calendar days after approval of mechanical equipment shop drawings. One (1) copy will be returned to the Contractor within 30 days after receipt by the Project Architect.

1. Submit two (2) final operating and maintenance manuals bound in 3-ring binders with tabs and index at least 5 days prior to the final acceptance inspection.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

1.10 GUARANTEES

A. Furnish owner copy of all guarantees and/or warranties for apparatus, equipment or materials which extend beyond the guarantee period specified in the provisions of these specifications.

B. Guarantee: Contractor shall guarantee all equipment, materials and labor to be free of all defects for a period of one (1) year after start of guarantee, unless otherwise indicated in the "General Conditions".

C. Guarantee, Date of Commencement: Guarantee shall commence on date of final acceptance of installation or when satisfactory beneficial use of installation is derived, whichever occurs first; date of final acceptance or commencement of beneficial use will be established by the Project Architect and the Contractor.

D. Repairs and Replacements, Expense: Any repairs or replacements required because of established vandalism, fire, wind-storm or other acts of God shall be established as the cost of materials and parts as shown on vendors bills, plus cost of transportation, plus cost of labor as set by minimum wage scale in the contract, plus cost of insurance, benefits, taxes, etc., plus a markup of 20% of the total.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications for rough-in requirements.

3.02 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Section "ACCESS DOORS" and Division 23 Section "BASIC MECHANICAL MATERIALS AND METHODS".
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.03 CUTTING AND PATCHING

A. General: Perform cutting and patching. In addition to the requirements specified, the following requirements apply:

1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

C. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

D. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

1. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. For Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
2. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. For Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

E. Training:

Contractor is to provide training for maintenance staff. Training will consist of two (2) eight hour sessions where all mechanical equipment will be visited and regular operation and service procedures discussed. Contractor shall obtain signed affidavits from maintenance staff that training was received. Specialized additional training is also included under Energy Management and Control Sections.

END OF SECTION

SECTION 23 05 00

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

B. Requirements specified in Division 23 Section "Basic Mechanical Requirements" apply to this Section.

1.02 SUMMARY

A. This Section includes limited scope general construction materials and methods for application with mechanical installations as follows:

1. Mechanical equipment nameplate data.
2. Excavation for underground utilities and services, from building to a point 5 feet from it including underground piping from building to utility connection.
3. Miscellaneous metals for support of mechanical materials and equipment.
4. Wood grounds, nailers, blocking, fasteners, and anchorage for support of mechanical materials and equipment.
5. Joint sealers for sealing around mechanical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
6. Access panels and doors in walls, ceilings, and floors for access to mechanical materials and equipment.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Specification Sections.

B. Product data for the following products:

1. Access panels and doors.
2. Joint sealers.

C. Shop drawings detailing fabrication and installation for metal fabrications, and wood supports and anchorage for mechanical materials and equipment.

D. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers, access panels, and doors.

B. Qualify welding processes and welding operators in accordance with AWS D1.1 “Structural Welding Code – Steel”.

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

C. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL “Building Materials Directory” for rating shown.

1. Provide UL Label on each fire-rated access door.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

1.06 PROJECT CONDITIONS

A. Conditions Affecting Excavations: The following project conditions apply:

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.
2. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.
3. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.
4. Remove existing underground utilities indicated to be removed.
   a. Uncharted or Incorrectly Charted Utilities: Contact utility owner immediately for instructions.
5. Use of explosives is not permitted.

B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do no apply joint sealers to wet substrates.

1.07 SEQUENCE AND SCHEDULING

A. Coordinate the connection of utility services with the utility company.

B. Notify the Architect at least 5 days prior to connection.

PART 2 PRODUCTS

2.01 MECHANICAL EQUIPMENT NAMEPLATE DATA

A. Nameplate: For each piece of power operated mechanical equipment provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Locate nameplates in an accessible location.

2.02 SOIL MATERIALS

A. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, or natural or crushed sand.

B. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2-inch sieve, and not more than 5 percent passing a No. 4 sieve.

C. Backfill and Fill Materials: Materials complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP; free of clay, rock, or gravel larger than 2 inches in any dimension; debris; waste; frozen materials; and vegetable and other deleterious matter.

2.03 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A36.

B. Cold-Formed Steel Tubing: ASTM A500.

C. Hot-Rolled Steel Tubing: ASTM A501.

D. Steel Pipe: ASTM A53, Schedule 40, welded.

E. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications.

F. Fasteners: Zinc-coated, type, grade, and class as required.

2.04 MISCELLANEOUS LUMBER

A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules or Number 3

boards complying with SPIB rules. Lumber shall be preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent.

B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less that 15/32 inches.

2.05 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Architect from manufacturer's standard colors.

C. Elastomeric Joint Sealers: Provide the following types:

1. One-part, non-acid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
2. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

D. Fire-Resistant Joint Sealers: Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.

2.06 ACCESS DOORS

A. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.

B. Frames: 16-gage steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.

1. For installation in masonry, concrete, ceramic tile, or wood paneling: 1 inch-wide-exposed perimeter flange and adjustable metal masonry anchors.
2. For gypsum wallboard or plaster: perforated flanges with wallboard bead.
3. For full-bed plaster applications: galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

C. Flush Panel Doors: 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.

1. Fire-Rated Units: Insulated flush panel doors, with continuous piano hinge and self-closing mechanism.

D. Locking Devices: Flush, screwdriver-operated cam locks.

E. Refer to architectural drawings for access door location and type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION FOR JOINT SEALERS

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

3.03 EXCAVATION

A. Slope sides of excavations to comply with Florida Building Code, 2014 Ed., local codes and ordinances.

B. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Not used.
2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.

C. Trenching: Excavate trenches for mechanical installations as follows:

1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearance on both sides of pipe and equipment.
2. Excavate trenches to depth indicated or required for piping to establish indicated slope and invert elevations.
3. Limit the length of open trench to that in which pipe can be installed, tested, and the trench backfilled within the same day.
4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of pipe. Provide a

minimum of 6 inches of stone or gravel cushion between rock bearing surface and pipe.

5. Excavate trenches for piping and equipment with bottoms of trench to accurate elevations for support of pipe and equipment on undisturbed soil.

D. Backfilling and Filling: Place soil materials in layers to required sub-grade elevations for each area classification listed below, using materials specified in Part 2 of this Section.

1. Under building slabs, use drainage fill materials.
2. Under piping and equipment, use sub-base materials where required over rock bearing surface and for correction of unauthorized excavation.

E. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Inspection, testing, approval, and locations of underground utilities have been recorded.
2. Removal of concrete formwork.
3. Removal of shoring and bracing, and backfilling of voids.
4. Removal of trash and debris.

F. Placement and Compaction: Place backfill and fill materials in layers of not more than 4 inches in loose depth for material compacted by hand-operated tampers.

G. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

H. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of piping and equipment by carrying material uniformly around them to approximately same elevation in each lift.

I. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils), determined in accordance with ASTM D 1557 and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

    a. Area Under Structures, Building Slabs and Steps, Pavements: Compact top 12 inches of sub-grade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.

2. Moisture Control: Where sub-grade or layer of soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum

quantity necessary to achieve required moisture content and to prevent water appearing on surface during, or subsequent to, compaction operations.

J. Subsidence: Where subsidence occurs at mechanical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent areas.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS “Structural Welding Code”.

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.06 APPLICATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
2. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

B. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

C. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around mechanical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.07 INSTALLATION OF ACCESS DOORS

A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.

B. Adjust hardware and panels after installation for proper operation.

END OF SECTION

SECTION 23 05 13

ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Related Sections: Separate electrical components and materials required for field installation and electrical connections are specified in Division 26, Section 26 29 13.

1.02 SUMMARY

A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment or are provided by this contractor. These components include, but are not limited to factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment or field supplied.

B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled on the Drawings.

C. Motors starter-controllers, or disconnect switches are supplied as part of mechanical equipment and wired under Division 26.

1.03 REFERENCES

A. NEMA Standards MG 1: Motors and Generators

B. NEMA Standard ICS 2: Industrial Control Devices, Controllers, and Assemblies.

C. NEMA Standard 250: Enclosures for Electrical Equipment

D. NEMA Standard KS 1: Enclosed Switches

E. Comply with National Electrical Code (NFPA 70).

1.04 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.05 QUALITY ASSURANCE

A. Electrical components and materials shall be UL labeled.

PART 2 PRODUCTS

2.01 MOTORS

A. The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
3. 2-speed motors shall have 2 separate windings on poly-phase motors.
4. Temperature Rating: Rated for 40 deg. C environment with maximum 50 deg. C temperature rise for continuous duty at full load (Class A Insulation).
5. Starting capability: frequency of starts as indicated by automatic control system and not less than 5 evenly time spaced starts per hour for manually controlled motors.
6. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.
7. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.

    a. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.

    b. Bearings:
        1. ball or roller bearings with inner and outer shaft seals;
        2. re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance;
        3. designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor;
        4. for fractional horsepower, light duty motors, sleeve type bearings are permitted.

c. Enclosure Type:
   1. open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation;
   2. guarded drip-proof motors where exposed to contact by employees or building occupants;
   3. weather protected Type I for outdoor use, Type II where not housed;

d. Overload protection: built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
e. Noise rating: "Quiet".
f. Efficiency: Provide "Energy Efficient" motors which shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, Test Method B.
g. Nameplate: indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.
h. Provide phase monitoring on all motors 5 HP and over.

2.02 STARTERS, ELECTRICAL DEVICES, AND WIRING

A. Motor Starter Characteristics:

1. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
2. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.

B. Manual switches shall have:

1. Extra positions for multi-speed motors.
2. Overload protection: melting alloy type thermal overload relays.

C. Magnetic Starters:

1. Maintained contact push buttons properly arranged for single speed or multi-speed operation as indicated.
2. Trip-free thermal overload relays, each phase.
3. Built-in 120 volts control circuit transformer, fused from line side, where

service exceeds 240 volts.
4. Externally operated manual reset.
5. Under-voltage release or protection.

D. Motor connections:

1. Flexible conduit, except where plug-in electrical cords are specifically indicated.

2.03 CAPACITORS

A. Features:

1. Individual unit cells
2. all welded steel housing
3. each capacitor internally fused
4. non-flammable synthetic liquid impregnant
5. craft tissue insulation
6. aluminum foil electrodes
7. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.

B. Disconnect Switches:

1. Fusible switches: fused, each phase; general duty; horsepower rated; non-teasible quick-make, quick-break mechanism; dead front line side shield; solderless lugs suitable for copper or aluminum conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "OPEN" position; arc quenchers; capacity and characteristics as indicated.
2. Non-fusible switches: for equipment 2 horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment larger than 2 horsepower, switches shall be the same as fusible type.

2.04 DISCONNECT SWITCHES

A. Fusible Switches: Fused, each phase; general duty; horsepower rated; 600V, non-teasible quick-make, quick-break mechanism; dead front line side shield; solderless lugs suitable for copper conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the “OPEN” position; arc quenchers; capacity and characteristics as indicated.

B. Non-Fusible Switches: For equipment 2 horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating per nameplate. For equipment larger than 2 horsepower, switches shall be the same as fusible type.

PART 3 EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 23 05 23

VALVES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this section.

B. Requirements of the following Division 23 Sections apply to this section:

1. "Basic Mechanical Requirements".
2. "Basic Mechanical Materials and Methods".
3. "Basic Piping Materials and Methods".

1.02 SUMMARY

A. This Section includes general duty valves common to most mechanical piping systems.

B. Valve tags and charts are specified in Division 23 Section "MECHANICAL IDENTIFICATION".

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Specification Sections.

B. Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Storage: Use the following precautions during storage:

1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

PART 2 PRODUCTS

2.01 VALVE FEATURES, GENERAL

A. Valve Design: Rising stem or rising outside screw and yoke stems.

1. Non-rising stem valves may be used where headroom prevents full extension of rising stems.

B. Pressure and Temperature Ratings: As required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Provide the following special operator features:

1. Hand wheels, fastened to valve stem, for valves other than quarter turn.
2. Lever handles, on quarter-turn valves 6-inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
3. Chain-wheel operators, for valves 2-1/2-inch and larger, installed 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-0" above finished floor elevation.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. End Connections: As indicated in the valve specifications.

1. Threads: Comply with ANSI B1.20.1.
2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
3. Solder-Joint: Comply with ANSI B16.18.

Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

H. All valves to be manufactured in the USA.

2.02 GATE VALVES

A. Gate Valves, 2-Inches and Smaller: MSS SP-80; Class 125, body and bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Gate Valves, 2-1/2-Inches and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A 126 Class B; with flanged ends, "Teflon" impregnated packing, and two-piece backing gland assembly.

C. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction to turn for opening.

2.03 BALL VALVES

A. Ball Valves, 1 Inch and Smaller: Rated for 150 psi saturated steam pressure, 400 psi W.O.G. pressure; two-piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals,

blowout-proof stem, and vinyl-covered steel handle. Provide solder ends for chilled water and domestic hot and cold water service.

B. Ball Valves, 1-1/4-Inches to 2-Inches: Rated for 150 psi saturated steam pressure, 400 psi W.O.G. pressure; 3-piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replace-able "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Provide solder ends for chilled water, and domestic hot and cold water service.

2.04 PLUG VALVES

A. Plug Valves, 2-Inches and Smaller: Rated at 150 psi W.O.G.; bronze body, with straightaway pattern, square head, and threaded ends.

B. Plug Valves, 2-1/2-Inches and Larger: MSS SP-78; rated at 175 psi W.O.G.; lubricated plug type, with semi-steel body, single gland, wrench operated, and flanged ends.

2.05 GLOBE VALVES

A. Globe Valves, 2-Inches and Smaller: MSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Globe Valves, 2-1/2-Inches and Larger: MSS SP-85; Class 125 iron body and bolted bonnet conforming to ASTM A 126, Class B; with outside screw and yoke, bronze mounted, flanged ends, and "Teflon" impregnated packing, and two-piece backing gland assembly.

2.06 BUTTERFLY VALVES

A. Butterfly Valves, 2-1/2-Inches and Larger: MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc, stainless steel stem and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead-end service or requiring additional body strength.

2.07 CHECK VALVES

A. Swing Check Valves, 2-Inches and Smaller: MSS SP-80; Class 125, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being re-ground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

B. Swing Check Valves, 2-1/2-Inches and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast-iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.02 VALVE ENDS SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2-Inches and Smaller: Solder ends.
2. Steel Pipe Sizes, 2-Inches and Smaller: threaded or grooved end.
3. Steel Pipe Sizes 2-1/2 Inches and Larger: grooved end or flanged.

3.03 VALVE INSTALLATIONS

A. General Application: If not specifically indicated, use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Refer to piping system specification sections and drawings for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install valves in horizontal piping with stem at or above the center of the pipe.

E. Install valves in a position to allow full stem movement.

F. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.
2. Wafer Check Valves: Horizontal or vertical position, between flanges.
3. Lift Check Valve: With stem upright and plumb.

3.04 SOLDER CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate and globe valves to full open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.05 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.06 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. 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 with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.07 FIELD QUALITY CONTROL

A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.08 ADJUSTING AND CLEANING

A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.09 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

VALVES, 2-INCHES AND SMALLER

SERVICE	GATE	GLOBE	BALL	CHECK
Chilled Water	150	150	175	150
Domestic Hot and Cold Water	150	150	175	150

VALVES, 2-1/2-INCHES AND LARGER

SERVICE	GATE	GLOBE	BALL	CHECK
Chilled Water	150	150	200	150
Domestic Hot and Cold Water	150	150	200	150

END OF SECTION

SECTION 23 05 29

SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawing and general provisions of Contract apply to this Section.

B. Requirements of the following Division 23 Sections apply to this section:

1. “Basic Mechanical Requirements”.
2. “Basic Mechanical Materials and Methods”.
3. “Basic Piping Materials and Methods”.

1.02 SUMMARY

A. This section includes the following:

1. Horizontal-piping hangers and supports.
2. Vertical-piping clamps.
3. Hanger-rod attachments.
4. Building attachments.
5. Saddles and shields.
6. Spring hangers and supports.
7. Miscellaneous materials.
8. Equipment supports.

B. Related sections: The following sections contain requirements that relate to this section:

1. Division 23 Section "Vibration Control" for vibration-isolation hangers and supports.
2. Division 23 Section "Mechanical Insulation" for pipe insulation.

1.03 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Specification Sections.

B. Product data, including installation instructions for each type of support and anchor. Submit pipe hanger and support schedule showing Manufacturer's figure number, size, location, and features for each required pipe hanger and support.

C. Maintenance data for supports and anchors for inclusion in Operating and Maintenance Manual specified in Division 23 Section “Basic Mechanical Requirements”.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the Florida Building Code (Building, Plumbing, and Mechanical), 2014 Ed. pertaining to product materials and installation of supports and

anchors.

B. NFPA Compliance: Hangers and supports shall comply with NFPA Standard No. 13 when used as a component of a fire protection system.

C. UL and FM Compliance: Hangers, supports, and components shall be listed and labeled by UL and FM where used for fire protection piping systems.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

A. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-58.

1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.
2. Pipe attachments shall have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

2.02 MISCELLANEOUS MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix ratio shall be 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which supports and anchors are to be installed. Do not proceed with installing until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69 and SP-89. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacing complying with MSS SP-69. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

B. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at

changes in direction of piping.

C. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

D. Field-Fabricated, Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS D-1.1.

E. Support fire protection systems piping independently from other piping systems.

F. Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

G. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ASME B31.9 Building Services Piping Code is not exceeded.

I. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
3. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060

4. Insert material shall be at least as long as the protective shield.

3.03 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and with AWS Standards D1.1.

3.04 EQUIPMENT SUPPORTS

A. Fabricate structural steel stands to suspend equipment from structure above or support

equipment above floor.

B. Grouting: Place grout under supports for piping and equipment.

3.05 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe anchors and equipment supports. Install and align fabricated anchors in indicated locations.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and 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. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours welded surfaces to match adjacent contours.

3.06 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Touch-Up Painting: Immediately after erection of anchors and supports, clean field welds and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA-1 requirements for touch-up of field-painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION

SECTION 23 05 48

VIBRATION CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Division-23 Basic Mechanical Materials and Methods section and each Division-23 section making reference to vibration control products specified herein.

1.02 DESCRIPTION OF WORK

A. Extent of vibration control work required by this section is indicated on drawings and schedules, and/or specified in other Division-23 sections.

B. Types of vibration control products specified in this section include the following:

1. Neoprene Pads.
2. Spring Isolators, Housed.
3. Isolation Hangers.
4. Flexible Pipe Connectors.

C. Refer to other Division-23 sections for equipment foundations, hangers, sealants, gaskets, and other work related to vibration control work.

D. Refer to other Division-23 sections for requirements of duct connections to air handling equipment isolated on vibration control products.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products, of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.

1. Except as otherwise indicated, obtain vibration control products from single manufacturer.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instruction for each type of vibration control product. Submit schedule showing size, type, deflection, and location for each product furnished.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide vibration control products of one of the following:

1. Amber/Booth Co.
2. Korfund Dynamics Corp.
3. Mason Industries, Inc.
4. Vibration Eliminator Co., Inc.
5. Vibration Mountings and Controls, Inc.

2.02 VIBRATION CONTROL MATERIALS AND SUPPORT UNITS

A. Neoprene Pads: Oil-resistant neoprene sheets, of manufacturer's standard hardness with cross-ribbed or waffled pattern.

B. Spring Isolator, Housed: Except as otherwise indicated, provide vibration isolation spring between telescoping steel housings with top and bottom loading plates, and with pad-type isolator bonded to bottom of loading plate. Include resilient inserts to separate and guide telescoping housings.

1. Equip top loading plate with equipment anchorages as indicted or as required for support and attachment.
2. Include pad-type isolator bonded to top of top loading plate, except on units with leveling bolts.
3. Include holes in bottom plate for bolting unit to substrate.

C. Isolation Hangers: Hanger units formed with brackets and including manufacturer's standard compression isolators of type indicated. Design brackets for 3 times rated loading of units. Fabricate units to accept misalignment of 15 degrees off center in any direction before contacting hanger box, and for use with either rod or strap type members, including acoustical washers to prevent metal-to-metal contacts.

1. Provide vibration isolation spring with cap in lower part of hanger and rubber hanger element in top, securely retained in unit.

D. Flexible Pipe Connectors:

1. For ferrous piping, provide stainless steel hose covered with stainless steel wire braid with NPT steel nipples or 150 psi ANSI flanges, welded to hose.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which vibration control units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 PERFORMANCE OF ISOLATORS

A. General: Comply with minimum static deflections recommended by ASHRAE, for selecting and application of vibration isolation materials and units as indicated.

B. Manufacturer's Recommendations: Except as otherwise indicated, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units.

3.03 APPLICATIONS

A. Piping: For piping connected to equipment mounted on vibration control products, install isolation hangers for first 3 points of support for pipe sizes 4" and less, for first 4 points of support for sizes 5" through 8".

B. Air Handling Units: Mount air handling units on housed spring isolators sitting on neoprene pads. Provide flexible hoses for piping connections.

C. Ceiling inline fans suspended with spring hangers.

3.04 INSTALLATION

A. General: Except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration control materials and units. Adjust to ensure that units have equal deflection, do not bottom out under loading, and are short-circuited by other contacts or bearing points. Remove space blocks and similar devices intended for temporary support during installation.

B. Install units between substrate and equipment as required for secure operation and to prevent displacement by normal forces, and as indicated.

C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where substrate in not level.

D. Locate isolation hangers as near overhead support structure as possible.

E. Flexible Pipe Connectors: Install on equipment side of shutoff valves, horizontally and parallel to equipment shafts wherever possible.

3.05 ADJUSTING AND CLEANING

A. Clean each vibration control unit, and verify that each is working freely, and that there is no dirt or debris in immediate vicinity of unit that could possibly short-circuit unit isolation.

END OF SECTION

SECTION 23 05 53

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Division-23 Basic Mechanical Materials and Methods section and each Division-23 section making reference to identification devices specified herein.

1.02 DESCRIPTION OF WORK

A. Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-23 sections.

B. Types of identification devices specified in this section include the following:

1. Painted Identification Materials.
2. Plastic Pipe Markers.
3. Plastic Tape.
4. Valve Tags.
5. Engraved Plastic-Laminate Signs.
6. Plastic Equipment Markers.

C. Mechanical identification furnished as part of factory-fabricated equipment, is specified as part of equipment assembly in other Division-23 sections.

D. Refer to Division-26 sections for identification requirements of electrical work; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ANSI Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide mechanical identification materials of one of the following:

1. Allen Systems, Inc.
2. Brady (W.H.) Co.; Signmark Div.
3. Seton Name Plate Corp.

2.02 MECHANICAL IDENTIFICATION MATERIALS

A. General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-15 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.03 PAINTED IDENTIFICATION MATERIALS

A. Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-1/4" high letters for ductwork and not less than 3/4" high letters for access door signs and similar operational instructions.

B. Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

C. Identification Paint: Standard identification enamel colors indicated or, if not indicated for piping systems, comply with ANSI A13.1 for colors. Coordinate with Institution to use their standard colors.

PIPE IDENTIFICATION CHART
{tc \l2 "PIPE IDENTIFICATION CHART}

Symbol		Pipe Color	Marker Background Color
CW	Domestic Cold Water	Light Green	Green
HW	Domestic Hot Water Supply	Orange	Orange
CHWS	Chilled Water Supply	Dark Blue	Blue
CHWR	Chilled Water Return	Light Blue	Blue
RWL	Rain Water Leader	Brown	Brown
SD	Storm Dainage	Brown	Brown
SW	Sanitary Waste	Brown	Brown
CD	Condensate Drain	Black	White
VTR	Vent Thru Roof	Beige	White
F	Fire Protection	Red	Red

2.04 PLASTIC PIPE MARKERS

A. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1.

B. Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying with ANSI A13.1.

C. Small Pipes: For external diameters less than 6" (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:

1. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
2. Adhesive lap joint in pipe marker overlap.
3. Laminated or bonded application of pipe marker to pipe (or insulation).
4. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4" wide; full circle at both ends of pipe marker, tape lapped 1-1/2".

D. Large Pipes: For external diameters of 6" and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:

1. Laminated or bonded application of pipe marker to pipe (or insulation).
2. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2" wide; full circle at both ends of pipe marker, tape lapped 3".
3. Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless steel bands.

E. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.

F. Lettering: Comply with piping system nomenclature as specified, scheduled or shown, and abbreviate only as necessary for each application length.

1. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.05 PLASTIC TAPE

A. General: Provide manufacturer's standard color-coded pressure-sensitive (self-adhesive) vinyl tape, not less than 3 mils thick.

B. Width: Provide 1-1/2" wide tape markers on pipes with outside diameters (including insulation, if any) of less than 6", 2-1/2" wide tape for larger pipes.

C. Color: Comply with ANSI A13.1, except where another color selection is indicated.

2.06 VALVE TAGS

A. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener.

1. Provide 1-1/2" diameter tags, except as otherwise indicated.

2.08 ENGRAVED PLASTIC-LAMINATE SIGNS

A. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness: 1/16", except as otherwise indicated.

C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.09 PLASTIC EQUIPMENT MARKERS

A. General: Provide manufacturer's standard laminated plastic, color coded equipment markers. Conform to the following color code:

1. Green: Cooling equipment and components.
2. Red: Fire protection equipment.
3. Blue: Equipment and components that do not meet any of the above criteria.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.02 PIPING SYSTEM IDENTIFICATION

A. General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

1. All mechanically (HVAC, Fire Protection) exposed pipes shall be painted in colors to match service standards (i.e. fire protection/red, chilled water/blue).
2. Stenciled markers, including color-coded background band or rectangle, and contrasting lettering of black or white. Extend color band or rectangle 2" beyond ends of lettering.
3. Stenciled markers, with lettering color complying with ANSI A13.1.

4. Plastic pipe markers, with application system as indicated under "Materials" in this section. Install on pipe insulation segment where required for hot non-insulated pipes.
5. Stenciled markers, black or white for best contrast, wherever continuous color-coded painting of piping is provided.

B. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
3. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.03 VALVE IDENTIFICATION

A. General: Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.

3.04 MECHANICAL EQUIPMENT IDENTIFICATION

A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Fans, blowers VAV boxes.
2. HVAC central-station air handling units.

B. Sign to carry the equipment initials and order number indicated on Contract Documents.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Related Sections:

1. Other Division-23 Sections specify balancing devices and their installation, and materials and installations of mechanical systems.

1.02 SUMMARY

A. This Section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. Test, adjust, and balance the following mechanical systems:

1. Supply air systems, all pressure ranges; including variable volume systems:
2. Return air systems;
3. Exhaust air systems;
4. Hydronic systems;
5. Verify temperature control system operation.

1.03 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

1. The balance of air and water distribution;
2. Adjustment of total system to provide design quantities;
3. Electrical measurement;
4. Verification of performance of all equipment and automatic controls;
5. Sound and vibration measurement.

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch Main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

1.04 SUBMITTALS

A. Technicians Data:

1. Submit the qualifications of the Technician assigned to supervise the procedures.

B. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

C. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC are proposed.

D. Certified Reports: Submit testing, adjusting, and balancing reports bearing signature of the Test and Balance Technician. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. This report must be submitted to and approved by the Architect/Engineer prior to the substantial completion walk-thru. For this purpose, the Architect/Engineer must receive report at least five (5) working days prior to substantial completion walk-thru. Only 1 complete set of draft reports will be returned.

2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

    a. General Information and Summary
    b. Air Systems
    c. Hydronic Systems
    d. Temperature Control Systems
    e. Special Systems
    f. Sound and Vibration Systems (if required).

4. Report Contents: Provide the following minimum information, forms and data:
    a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
    b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

E. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.05 QUALITY ASSURANCE

A. Agency: This Contractor shall include an allowance for the Test and Balance work as part of his bid. Additionally, he shall solicit quotes for test and balance work from at least (3) qualified companies. Submit quotes and names to Architect Project Manager for Owner's and A/E consideration and selection.

B. Agency Qualifications:

1. Test and Balance Engineer (a Professional Engineer registered in the State of Florida) shall be certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) and have at least 3 years of successful testing, adjusting, and balancing experience on projects similar to those required for this project.

C. Codes and Standards:

1. NEBB: Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
2. AABC: "National Standards For Total System Balance".
3. ASHRAE: ASHRAE Handbook (latest edition), HVAC Systems and Applications Volume, Chapter 57, Testing, Adjusting, and Balancing.
4. Florida Building Code – Energy Conservation, 2014 Ed.

D. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect/Engineer and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.06 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures. Coordinate test and balance effort to conduct a preliminary air flow tests prior to the complete installation of the ceiling.

1.07 SEQUENCING AND SCHEDULING

A. Test, adjust, and balance the air systems before hydronic, systems.

B. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg F wet bulb temperature of maximum summer design condition, and within 10 deg F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent (T & B Agency).
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams (T & B Agency).
3. Compare design to installed equipment and field installations (T & B Agency).
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design (T & B Agency).

5. Check filters for cleanliness (T & B Agency).
6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes (T & B Agency).
8. Determine best locations in main and branch ductwork for most accurate duct traverses (T & B Agency).
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting (T & B Agency).
11. Check fan belt tension (T & B Agency).
12. Check fan rotation (T & B Agency).

3.02 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves (T & B Agency).
2. Remove and clean all strainers (Mechanical Contractor).
3. Examine hydronic systems and determine if water has been treated and cleaned (Mechanical Contractor).
4. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type) (Mechanical Contractor).
5. Set temperature controls so all coils are calling for full flow (T & B Agency).
6. Check operation of automatic bypass valves (T & B Agency).

3.03 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.04 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.05 TESTING FOR SOUND AND VIBRATION

A. Test and adjust mechanical systems if required by Architect/Engineer for sound and vibration in accordance with the detailed instructions of the referenced standards.

3.06 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.07 AIR HANDLING UNIT PULLEYS/BELTS

A. Mechanical Contractor is responsible for changing belts and pulleys on air handling units to achieve system desired performance and/or as requested by Test and Balance Agency or Architect/Engineer.

END OF SECTION**{tc \l1 "**END OF SECTION 15990**}**

SECTION 23 07 00

MECHANICAL INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of mechanical insulation required by this section is indicated on drawings and schedules, and by requirements of this section.

B. Types of mechanical insulation specified in this section include the following:

1. Piping System Insulation:
   a. Cellular Glass.
   b. Flexible Unicellular.

2. Ductwork System Insulation:
   a. Fiberglass.

C. Refer to Division-23 section "Supports and Anchors" for protection saddles, protection shields, and thermal hanger shields; not work of this section.

D. Refer to Division-23 section "Mechanical Identification" for installation of identification devices for piping, ductwork, and equipment; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; do not allow installed insulation to become wet; remove from project site.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

1. CertainTeed Corp.
2. Mansville Products Corp.
3. Owens-Corning Fiberglas Corp.
4. Pittsburgh Corning Corp.
5. Rubatex Corp.

2.02 PIPING INSULATION MATERIALS

A. Cellular Glass Piping Insulation: ASTM C 552, Type II, Class 2.

B. Flexible Unicellular Piping Insulation: ASTM C 534, Type I.

C. Jackets for Piping Insulation: ASTM C 921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at Installers option.

1. Encase pipe fittings insulation with one-piece pre-molded PVC fitting covers, fastened as per manufacturer's recommendations.

D. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.

E. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

2.03 DUCTWORK INSULATION MATERIALS

A. Rigid Fiberglass Ductwork Insulation: ASTM C 612, Class 1.

B. Flexible Fiberglass Ductwork Insulation: ASTM C 553, Type I, Class B-4.

C. Jackets for Ductwork Insulation: ASTM C 921, Type I for ductwork with temperatures below ambient.

D. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.

E. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 PLUMBING PIPING SYSTEM INSULATION

A. Insulation Omitted: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawl spaces or tunnels, buried piping, fire protection piping, and pre-insulated equipment.

B. Cold Piping:

1. Application Requirements: Insulate the following cold plumbing piping systems:
   a. All condensate drain from A/C units and all drain from water coolers.

2. Insulate each piping system specified above with the following type and thickness of insulation:
   a. Flexible Unicellular: 3/4" thickness rated for use in suspended ceiling space used as return air plenums.

3.03 HVAC PIPING SYSTEM INSULATION

A. Cold Piping (40 deg. F (4.4 deg. C) to ambient):

1. Application Requirements: Insulate the following cold HVAC piping systems:

   a. HVAC chilled water supply and return piping above ground.

B. Insulate each piping system specified above with one of the following types and thickness of insulation:

1. Cellular Glass: For use in chilled water pipes, pump casings, chilled water valves. Thickness of insulation to meet or exceed minimum values listed in 2014 Ed. of the Florida Building Code – Energy, Table C403.2.8, with attention to footnote “b” of this table.
2. Flexible Unicellular: ¾” inch thick. For use in small chilled water pipe (1" thick for pipe sizes up to 1-1/2", largest size permitted), chillers, entire run of condensate drain lines of air conditioning units (AHU and Fan Coils) - (except when installed underground), electric water coolers drain lines, and storm drainage lines.

C. Insulation in equipment rooms shall be finished with continuous layer of white Glasfab embedded in F.B. 35.00 white mastic with a gloved-on smooth finish coat. Take extra care to provide final finish as smooth as possible.

3.04 DUCTWORK SYSTEM INSULATION

A. Cold Ductwork (Below Ambient Temperature):

1. Application Requirements: Insulate the following cold ductwork:
   a. Outdoor air intake ductwork between air entrance and fan inlet or HVAC unit inlet.
   b. All HVAC supply ductwork between fan discharge and room terminal outlet.
   c. Insulate neck and bells of supply diffusers.

2. HVAC return ductwork between room terminal inlet and HVAC unit inlet.
3. HVAC plenums and unit housings not pre-insulated at factory.

B. Insulate each ductwork system specified above with one of the following types and thickness of insulation:

1. Rigid Fiberglass: 1-1/2" thick, increase thickness to 2" in equipment rooms.
2. Flexible Fiberglass: 1-1/2" thick, application limited to concealed locations.

3.05 INSTALLATION OF PIPING INSULATION

A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation on pipe systems subsequent to painting, testing, and acceptance of tests.

C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.

D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

E. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.

F. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.

G. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

H. Butt pipe insulation against pipe hanger insulation inserts. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.

3.06 INSTALLATION OF DUCTWORK INSULATION

A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to insure that insulation serves its intended purpose.

B. Install insulation materials with smooth and even surfaces.

C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

D. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.

E. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated.

END OF SECTION

SECTION 23 07 19

PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED SECTIONS

A. Section 23 21 13 - Hydronic Piping.

B. Section 23 05 53 - Mechanical Identification.

1.03 REFERENCES

A. ANSI/ASTM C578 - Preformed, Block Type Cellular Polystyrene Thermal Insulation.

B. ASTM E84 - Surface Burning Characteristics of Building Materials.

C. ANIS/ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.

1.04 QUALITY ASSURANCE

A. Applicator: Company specializing in piping insulation application with three years minimum experience.

B. Materials: Flame spread/smoke developed rating of 25/50 under provisions of ASTM E84.

1.05 SUBMITTALS

A. Submit product data under provisions of Section “Submittal Procedures”.

B. Include product description, list of materials and thickness for each service and locations.

C. Submit manufacturer's installation instructions under provisions of Section “Submittal Procedures”.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - INSULATION

A. Pittsburgh Corning.

B. IMCOA.

C. Owens-Corning.

D. Armstrong.

E. Knauf.

F. Cell-U-Foam

2.02 ACCEPTABLE MANUFACTURERS – PRE-INSULATED PIPING

A. Thermacor

B. Perma-Pipe

C. Rovanco

2.03 INSULATION

A. Type A: For interior above ground domestic hot water supply and recirculating piping.

1. Pipe:
   a. ANSI/ASTM C547.
   b. Two-piece, rigid preformed, heavy density fiberglass pipe insulation and factory applied reinforced foil vapor barrier, all service jacket with self-sealing longitudinal lap and butt adhesive joints, -60 to 450 Degree F, non-combustible.
   c. Maximum Water Vapor Transmission Rating: 0.20 perm.
   d. ‘K’ value of 0.24 at 75 Degree F.
   e. Equivalent to Owens-Corning 25ASJ/SSL

2. Fittings:
   a. One-piece, preformed PVC fitting insulation.
   b. Same thickness as adjacent pipe covering.
   c. Equivalent to Zeston 25/50.

B. Type B: For condensate drain, refrigeration suction lines and refrigeration hot gas lines. Protect with two coats of UV inhibited vinyl latex finish if installed outdoors exposed to weather.

1. Pipe:
    a. ANSI/ASTM C578.
    b. One piece, preformed closed cell tubular pipe insulation.
    c. Maximum Water Vapor Transmission Rating: 0.10 perm.
    d. 'K' value of 0.23 at 75 Degree F.
    e. Equivalent to Armstrong Armaflex 2000.

C. Type C: For interior above ground chilled water piping.

1. Pipe:
    a. ASTM C552.
    b. Two-piece, rigid preformed closed cell foamglass pipe insulation with fire resistant jacket.
    c. Maximum Water Vapor Transmission Rating: 0.10 perm.
    d. 'K' value of 0.33 at 75 Degree F.
    e. Equivalent to Pittsburgh Corning Foamglas.

2. Fittings:
    a. Fittings finished with mastic and reinforced with glass fabric.

D. Type D: For underground chilled water piping.

1. Field Insulated Pipe:
    a. ASTM C552
    b. Two-piece, rigid preformed cellular glass pipe insulation with self-sealing 45 mil non-metallic waterproof membrane.
    c. Maximum Water Vapor Transmission Rating: 0.10 perm.
    d. 'K' value of 0.33 at 75 Degree F.
    e. Equivalent to Pittsburgh Corning Foamglas with Pittwrap CW jacket.

2. Pre-Insulated Pipe:
    a. ASTM A-53 Grade B, electric resistance welded or seamless for sizes 5 inch and larger or ASTM A-120/A-53, Grade A, continuous welded for 4 inch and smaller, Schedule 40, black steel.
    b. 90-95% closed cell polyurethane foam insulation of 2.5 to 3.5 PCF density.
    c. “K” value of 0.14 at 75 Degree F.
    d. Fittings: Factory prefabricated and pre-insulated with precut sectional urethane foam to the thickness specified, covered with PVC jacket with joints sealed with polyethylene backed, pressure sensitive 30 mil thick butyl rubber tape.
    e. Jacket: ASTM D-1784, PVC, wall thickness ten times nominal jacket diameter, but not less than 60 mils.

f. Pipe ends insulated with precut sectional urethane foam to the thickness specified, covered with PVC jacket with joints sealed with polyethylene backed, pressure sensitive 30 mil thick butyl rubber tape.
g. Equivalent to Thermacor “Ferro-Therm”.

E. Type E: For exterior above ground chilled water piping.

1. ASTM C552.
2. Two-piece, rigid preformed closed cell foamglass pipe insulation with 0.016 inch aluminum jacket, fittings finished with mastic and reinforced with glass fabric.
3. Maximum Water Vapor Transmission Rating: 0.10 perm.
4. 'K' value of 0.33 at 75 Degree F.
5. Equivalent to Pittsburgh Corning Foamglas.

2.04 JACKETS

A. Interior Above Grade Application:

1. Vapor Barrier Jacket: Kraft reinforced foil with self-sealing adhesive joints.
2. PVC Jacket: ASTM D-1784, one-piece PVC sleeve.

B. Exterior Above Grade Application:

1. Aluminum Jacket: 0.016 inch thick, smooth finish, snap lock longitudinal seam and aluminum banding.

2.05 ACCESSORIES

A. Insulation Bands: 3/4 inch wide x 0.007 inch thick galvanized steel band with positive cinch worm gear and screwdriver slot hex head.

B. Adhesives: Water base, fire resistive, non-toxic and compatible with insulation. Petroleum-base products are PROHIBITED.

C. Fibrous Glass Cloth: Untreated 10 x 10 mesh; 9 Oz/Sq. Yd. weight.

D. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.

E. Finishing Cement: ASTM C449.

PART 3 EXECUTION

3.01 PREPARATION

A. Do not apply insulation until after all pressure testing is complete, all surfaces to be covered are clean and dry and all foreign materials such as oil, grease, rust, scale and dirt have been removed.

B. Apply clean and dry insulation only.

3.02 INSTALLATION

A. Install insulation under provisions of the manufacturer's instructions.

B. Install insulation on all supply piping and condensate piping in concealed areas as well as exposed areas including condensate piping located between the first floor ceiling and the second floor slab to prevent condensation from forming on the pipe and falling onto the ceiling tiles.

C. Insulate all cold surfaces including metal hangers, anchors, supports, control sensors, wells and similar items subject to condensation with materials of the same composition to which they are attached and of sufficient length and thickness to prevent condensation. Provide a complete moisture and vapor seal wherever the insulation terminates against metal hangers, anchors and other projections on cold surfaces.

D. Provide continuous insulation through sleeves and openings except at pipe sleeves piercing exterior walls, floors or ceilings below ground level. Pack annular spaces with fireproof, self-supporting insulation material.

E. On insulated piping with a vapor barrier, install same thickness insulation as the adjoining pipe insulation on valves and other fittings, unions, flanges, strainers, flexible connections and expansion joints and locate so as to obtain the maximum strength and securement. Terminate insulation neatly with plastic material trowelled on bevel. Seal joints, protruding metal parts and valve stems thoroughly as recommended by the manufacturer.

F. On insulated piping without a vapor barrier and conveying fluids 140 Degree F or less, other than chilled water piping, do not insulate flanges, unions, strainers, flexible connections and expansion joints. Bevel and seal ends of insulation at such locations. Provide an insert of not less than 6 inches long and of the same thickness and contour as adjoining insulation between the support shield and the piping, but under the finish jacket on piping 2 inches and larger to prevent insulation from sagging at the support points. Inserts shall be factory fabricated of cork or other heavy density insulating material suitable for the planned temperature range.

G. Jackets:
   1. Concealed Indoor Piping Conveying Fluids Above Ambient Temperature: Insulated pipes shall be provided with a standard jacket containing a factory applied vapor barrier. Fittings, unions and valves shall be insulated with insulation of like material and thickness as adjoining pipe and finished with glass cloth and adhesive. PVC jackets may be used.
   2. Concealed Indoor Piping Conveying Fluids Below Ambient Temperature: Insulated pipes conveying fluids below ambient temperature shall be provided with a field applied standard jacket containing a factory applied vapor barrier. Fittings, unions and valves shall be insulated with insulation of like material and thickness as adjoining pipe and finished with glass cloth and adhesive. PVC jackets are PROHIBITED.
   3. Exposed Indoor Piping: Insulated pipes, fittings, unions and valves in mechanical rooms or in finished areas shall be provided with a canvas jacket and painted. PVC jackets are PROHIBITED.
   4. Exterior Piping: Insulated pipes shall be provided with a factory applied vapor barrier jacket and covered with an aluminum jacket with seams located on the bottom side on horizontally installed piping. Fitting, unions and valves shall be insulated with insulation of like material and thickness as adjoining pipe and finished with fibrous glass mesh cloth, reinforced vapor cement and covered with an aluminum jacket.

H. Insulate anchors and hangers which are secured directly to cold piping as specified for a minimum distance of 8 inches from the surface of the pipe insulation sufficient to prevent sweating.

I. Hot Water Piping: Cover fittings and valves with equivalent thickness of insulation material. Apply adhesive to butt joints. For valves and fittings on exposed piping, apply hydraulic setting cement paste over insulating material before applying canvas covering.

J. Where possible, slide foam plastic insulation on condensate drain, chilled water runouts and refrigerant suction piping without splitting insulation. Where insulation is split, use insulation manufacturer's adhesive to cement joints together. Secure all longitudinal joints and seams with 18 gauge copper weld wire on 18 inch centers and secure transverse joints with manufacturer's tape. Insulate all fittings with fabricated pipe insulation.

K. Cover insulation exposed to outdoor exterior weather with 0.016 inch aluminum jacket with 1/2 inch wide aluminum bands on 8 inch centers. Lap joints 3 inches minimum and seal with compatible waterproof lap cement.

L. If Armstrong Armaflex or equivalent insulation is used in non-plenum areas, finish with two coats of white vinyl latex paint as recommended by the manufacturer wherever exposed. Exposed is deemed to mean wherever exposed to view and weather other than mechanical equipment rooms. Piping concealed by other exposed piping is considered exposed.

M. Repair separation of joints or cracking of insulation due to thermal movement of poor workmanship.

N. Insulate all appurtenances such as thermometer stems, drain valves, gauge cock stems, etc. on chilled water lines with removable IMCOA FLEX caps and/or NO DRIP moldable tape.

3.03 SCHEDULE

A.

Pipe Content	Type	Nominal Pipe Size	Thickness - In Inches
Domestic Cold Water Supply	None	N/A	N/A
Domestic Hot Water Supply	A	Thru 1-1/2 inches	3/4 inch
Domestic Re-Circulating Hot Water	A	Thru 1-1/2 inches	1/2 inch
Chilled Water (Interior Above Grade)	C	Thru 4 inches	1-1/2 inches
Chilled Water (Interior Above Grade)	C	Over 4 inches	2 inches
Chilled Water (Exterior Above Ground)	E	All	2 inches
Chilled Water (Underground)	D	All	2 inches
Condensate Drains	B	All	3/4 inch
Refrigeration Line (Suction)	B	All	3/4 inch
Line (Hot Gas)	B	All	3/4 inch

END OF SECTION

SECTION 23 08 01

TESTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 23 Sections apply to this section:

1. "Basic Mechanical Requirements".
2. "Basic Mechanical Materials and Methods".
3. "Basic Piping Materials and Methods".

1.2 SUMMARY

A. This Section specifies requirements for the testing of mechanical equipment and systems, including but not limited to pressure testing of piping and ductwork.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 PIPING PRESSURE TESTS

A. Domestic water piping shall be hydrostatically tested to a pressure of 150 psi or 1-1/2 times design pressure, whichever is larger. Test shall be performed for a minimum period of 24 hours with no fluctuation in pressure. Pressure testing shall be performed prior to installation of thermal insulation.

3.2 DUCT SYSTEM LEAKAGE TESTS

A. Tests shall demonstrate that the leakage is less than 1% of the design air flow at 125% of design pressure. The leakage tests shall be conducted per procedures in the HVAC Air Duct Leakage Test Manual (SMACNA latest revision). If a test indicates excess leakage, sealing and retesting must be conducted.

B. Leakage test required for supply ductwork, having an internal pressure of 2 inch H_2O or greater.

3.3 HVAC EQUIPMENT AND SYSTEMS PERFORMANCE TESTS

A. HVAC equipment and systems performance tests shall be executed by the TAB Agency, per details listed in Section: Testing, Adjusting and Balancing@ of these specifications.

3.4 REFRIGERANT PIPING PRESSURE TEST

A. Field assembled refrigerant piping and apparatus, other than factory tested equipment shipped from the factory with refrigerant holding operating charge, shall be tested with a suitable dry gas such as nitrogen or air. Test procedures shall be in accordance with the latest edition of ASHRAE Standard 15, Safety Code for Mechanical Refrigeration. Leaks in pipe joints shall be corrected by remaking the joints. Caulking will not be permitted. Charging of the equipment with refrigerant shall follow the test as closely as is practical to minimize the possibility of air or moisture being returned to the system. After charging and prior to capacity tests, joints in refrigerant piping and apparatus shall be checked with a sensitive leak detector. If leaks are found, the system shall be pumped down and the leaks corrected.

3.5 REPORTING REQUIREMENTS

A. Furnish written report of all tests conducted for approval and inclusion in Operating and Maintenance Manuals.

END OF SECTION

SECTION 23 21 16

VALVES AND SPECIALTIES (HVAC)

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 23 21 13 – Hydronic Piping.

1.02 REFERENCES

A. The American Society of Mechanical Engineers (ASME) Publications: ASME Boiler and Pressure Vessel Code - Current Edition.

1.03 SUBMITTALS

A. Submit the following:

1. Thermometers and Pressure Gages: Catalog cuts, proposed range, and calibrated accuracy.
2. Strainers: Catalog cuts, pressure drop curves.
3. Pressure relief and reducing valves: Catalog cuts; pressure range, and settings.
4. Air vents: Catalog cuts.
5. Flexible Connectors: Catalog cuts.
6. All valves: Catalog cuts, schedule of proposed installation locations, pressure ratings, and materials of construction.
7. Inserts: Catalog cuts and load tables.
8. Supports: Catalog cuts or drawings.
9. Anchors: Drawings and details of installation.
10. Water flow tube station: Catalog cuts, pressure drop charts, and engineering information.
11. Expansion Tank: Shop drawings, catalog cuts of accessories and shop drawings of tank support.
12. Shop Drawings of all support equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Valves:

1. Clow.
2. Crane.
3. DeZurik.
4. Grinnell.
5. Homestead.

6. Jenkins Lunkenheimer.
7. Mueller.
8. Stockham.

B. Expansion Tanks:

1. Taco.
2. Accepted equivalent.

2.02 VALVES

A. Gate Valves:

Size	Description
To 2 inches	150 lb. w.s.p., bronze, solid wedge disc, inside screw, rising stem, union bonnet, screwed ends. Grinnell 3080 or accepted equivalent.
2-1/2 inches and above	150 lb. wsp, iron body, bronze mounted, renewable seats, solid wedge disc, rising stem, bolted bonnet, flanged ends. Grinnell 6060A or accepted equivalent.

B. Globe and Angle Valves:

Size	Description
Up to 2 inches	150 lb. w.s.p., bronze, renewable disc and seat, stainless steel plug disc and seat ring, union bonnet, screwed ends. Grinnell 3210SJ, 3220, or accepted equivalent.
2-1/2 inches and above	150 lb. w.s.p., renewable disc seat, iron body, bronze mounted beveled bronze disc and seat ring, OS&Y flanged ends. Grinnell 6200 or accepted equivalent.

C. Butterfly Valves:

Size:	Description:
2 1/2 inches and above	150 lb. w.s.p., cast iron body with extended neck, Buna-0 seat, stainless steel stem, bronze disc, lugged, drilled per ANSI B16, Class 150, iron flanges. Valves rated and tested for bubble tightness at 175 psi minimum. Provide lock type infinite position lever operators. Valves 8 inches and larger, enclosed gear operators with handle. Extended necks for insulated piping. Grinnell Series 8000 or accepted equivalent.

D. Balancing Valves:

Size	Description
All sizes	175 psi WOG, non-lubricated eccentric type, nickel seat, semi-steel body, neoprene resilient plug, Buna filled Teflon U-ring seal or Buna (Vee) packing, with memory stop and lever handle. Valves 2 inches and smaller screwed ends; 2-1/2" and larger flanged ends. DeZurik Series 100 or accepted equivalent.

E. Check Valves:

Size	Description
To 2 inches	150 lb. w.s.p., bronze body, regrind bronze disc, screwed ends. Grinnell 3300 or accepted equivalent.
2-1/2 inches and above	Spring loaded, silent, non-slam type, 125 lb. w.s.p., Class "B" iron body, bronze seat and single disc, stainless steel spring, guided disc top and bottom, flanged ends. Muessco No. 105 AP or accepted equivalent.

F. Ball Valves:

Size	Description
To 1-1/2 inches	400 lb. WOG at 275 degrees F. bronze body, chrome plated bronze or stainless steel ball, viton "O" ring, screwed ends and TFE seats. Valve shall be single cartridge type and shall be serviced without disturbing valve body. Grinnell 3700 or accepted equivalent.

G. Automatic Flow Control Wafer Type Valves:

Size	Description
6 inches	Class 150, ductile iron (A-445-10, Class 60-45-18) body and stainless steel flow control cartridge assemblies. Valve shall be rated at 200 psi/250^{o}F; shall be mechanically compatible with ANSI B/16.5 - 1968 or MSS-SP-44, 150 lb. steel flanges; shall be supplied with dual pressure/temperature test valves for verifying accuracy of flow performance; shall be permanently marked to show flow rate ste points (425 gpm), PSID control range (B-128) and direction of flow; shall have single or multiple, parallel-installed stainless steel cartridge assemblies to provide rated flow rate; shall include all plated steel studs required for installation. Griswold 334 or accepted equivalent.

2.03 SPECIALTIES

A. Strainers:

Size	Description
3/4" to 2"	"Y" type, 20 mesh monel screen, iron body, 250 lb. w.s.p. with blow-off outlet and plug, screwed ends. Muessco #11, or accepted equivalent.
2-1/2" to 8"	"Y" type, 1/8", iron flanged body, 150 lb. w.s.p. with blow-off tapping and plug, Muessco #751 or accepted equivalent. Basket type, cast iron flanged body, 125 lb. WSP, with blow-off tapping and plug.
8" and above	"Basket" type, heavy gage perforated brass basket 0.057 inch diameter perforations in sizes to 4 inches and 0.125 inch diameter perforations in sizes larger than 4 inches. Muessco No. 165 or accepted equivalent.

B. Flexible Connectors:

Size	Description
All	Full line size with floating flanges. Rated 150 psi at 180 degrees F. Wire reinforced, double arched, control rods, and rubber washers. Mason Industries or accepted equivalent.

C. Pressure Relief Valves:

Size	Description
3/4"	Brass body, micro finished bevel for seats, cadmium plated springs, manual chilled lift ring, ASME Std. Bell and Gossett or water accepted equivalent.

D. Pressure Reducing Valves:

Size	Description
3/4"	Brass body and brass working parts with built-in strainer, 125 W.S.P. Bell and Gossett or accepted equivalent.

E. Air Vents: Provide air vents at high points in chilled water systems; vents, automatic type unless otherwise indicated. Automatic vents shall be Metraflex Model MU15 or accepted equivalent. Manual air vents shall be bronze needle valves.

F. Industrial, liquid filled, glass thermometers shall have 9 inches scale "V" shape and adjustable angle separable socket well. Operating temperature shall display at midpoint of thermometer range. Accuracy shall be plus or minus 0.5 degrees F. Casings shall be brass or aluminum as manufactured be H.O. Trerice, Marshalltown, Ashcroft, or Taylor.

G. Thermometer wells shall be of stainless steel construction with cap and chain as manufactured by H.O. Trerice, Marshalltown, Ashcraft, or Taylor. Provide extended neck wells in insulated piping. Provide tees at lines 3 inches or smaller for thermometer wells.

H. Pressure gages shall be of standard depth, cast aluminum, black finished, chrome plated close type ring, clear glass window, bronze bourdon tube, precision movement and plus or minus 0.5 percent accuracy. Gage shall have a minimum 4-1/2" diameter face and with the operating pressure displaying at the middle range of the scale. As manufactured by H.O. Trerice, Marshalltown, Ashcroft, or Taylor.

I. Gage valves shall be brass, needle valve type, as manufactured by H.O. Trerice, Model No. 735-2, or accepted equivalent. Provide pressure snubbers at gage cocks manufactured by H.O. Trerice, Model 872 or accepted equivalent of Marshalltown, Ashcroft, or Taylor.

J. Dielectric pipe fittings: Dielectric pipe fittings shall consist of insulators, insulating gasket, pipe connector and nut or flange as required. Pipe connectors shall be suitable for soldered, screwed, or welded joints as required. Dielectric unions shall be rated at 250 psi and cast iron flange unions at 175 psi. Dielectric fitting shall be plated according to Federal Specifications of 0.0005". Fittings shall be as manufactured by Epco.

K. Water flow sensors shall be Annubar ANR-75, stainless steel.

1. Instrument connections shall be No. C-22; 1/4" valves on 1-3/8" square head. Valve rating shall be maximum 5000 psi at 100 degrees F.
2. Flow sensor in steel pipe shall be weld nipple mounted.
3. Flow sensor in PVC pipe shall be saddle mounted.
4. Manufacturer shall be Dietrich Standard Corp.

L. Inline type air purger with tappings for an air vent and a makeup water line as indicated, shall be Amtrol, 150 psi, flanged, cast iron.

M. Provide and install immersion wells and pressure taps as required for automatic control system.

2.04 EXPANSION TANKS

A. Size, capacity, and arrangement as shown on Construction Documents. Manufactured by Taco or equivalent.

B. Designed, constructed and stamped according to ASME Code for 150 psig.

C. Welded black steel construction, rustproof coated, with base mount for vertical installation.

D. Provided with lifting ring and connection tappings.

E. Sealed in elastomer diaphragm suitable for 240 degrees.

F. Built-in air charger valve. Pre-charge tank to 20 psi.

2.05 PIPE HANGERS AND SUPPORTS

A. Provide hangers, supports, and supplementary steel as required for the different applications.

B. Inserts, Hangers, Rods, and Clamps: Fig. numbers used refer to Grinnell, Fee and Mason, or Michigan Hanger Co.

1. Inserts: (Galvanized or stainless steel except as noted.)
   a. Universal concrete insert, Fig. 282.
   b. Wedge type concrete insert, Fig. 281.
   c. Expansion case, Fig. 117.

2. Clamps:
   a. UFS beam clamp with weldless eye nut, Fig. 292, clamp size 1, rod size 3/4".
   b. C-clamp with retaining clip, Fig. 87.
   c. 1 beam clamp, Fig. 131.
   d. Universal side 1 beam clamp, Fig. 225.
   e. C-clamp, copper finish, Fig. CT-88.

3. Hangers: Use adjustable clevis type hangers as specified. Hangers for insulated pipes shall have a diameter large enough to include insulation and a protection shield shall be installed with each hanger.

   a. Cast iron pipe: Fig. 590.
   b. Copper tubing: Fig. CT-65.
   c. Insulated steel pipe: Fig. 300.
   d. Un-insulated steel pipe: Fig. 260.
   e. Trapeze.

4. Rods: Continuous thread, Fig. 146. Sizes shall be as specified.

5. Riser Clamps:
   a. Black steel, Fig. 261.
   b. Plastic coated, Fig. 261C.
   c. Copper finish, Fig. CT 121.

C. Horizontal Steel Piping Support Spacing and Rod Size:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1-1/4"	3/8"	8 feet
1-1/2" and 2 inches	3/8"	10 feet
2-1/2" and 3 inches	1/2"	12 feet
4 and 5 inches	5/8"	12 feet
6 inches	3/4"	15 feet
8 and 12 inches	7/8"	18 feet
14 and 16 inches	1 inch	24 feet

D. Horizontal Copper Piping:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1 inch	3/8"	6 feet
1-1/4" and 1-1/2"	3/8"	6 feet
2 inches	3/8"	8 feet
2-1/2"	1/2"	8 feet
3 and 4 inches	1/2"	8 feet

E. Insulation Protection Shield: Fig. 167.

F. Wall Access: As specified under General Provisions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide shut-off valves at inlets and outlets of equipment and branch connections to mains and as shown on Construction Documents.

B. Final connections to apparatus, equipment, automatic control valves, and pressure reducing valves shall be made with flanges or unions between shut-off valve and connection.

C. Connections to cooling coils and refrigeration machines shall have flanges or unions next to equipment to allow tube removal without extensive dismantling of piping.

D. Strainers shall be full line size and shall be full size valved for servicing. Strainers shall be installed upstream of automatic control valves and other locations as shown on Construction Documents.

E. Pressure Relief Valves: Provide at cooling coil side of shut-off valves and where shown on Construction Documents.

F. Flexible Connectors: Provide where shown on Construction Documents.

G. Location of Valves and Chain Operators: Install valves to be accessible for operation and free from interferences when operated. Position so leakage will not contact any electrical equipment located below. Provide valve chain operators for valves 4 inches and larger following the requirements of Specification Section 15100-2.07-B.

H. Thermometer Wells: Provide for thermometers and at the inlet and outlet of each cooling coil, next to sensing bulbs of controllers and remote temperature indicators, and as shown on Construction Documents. Install wells in a vertical position, with open end up.

I. Thermometers: Provide at the inlet and outlet of each air handling unit coil bank and as shown on and as shown on Construction Documents.

J. Pressure Gages: Provide as shown on Construction Documents and at following locations:

1. At suction and discharge of circulating pumps.
2. At inlet and outlet of evaporator and condenser.
3. At makeup water inlet to expansion tanks and equipment.

K. Pipe Hangers and Supports: Provide adjustable hangers, inserts, brackets, rolls, clamps, and supplementary steel as required for proper support of pipe lines. Design hangers to allow for expansion and contraction of pipe lines and of adequate size to allow covering to run continuously through hangers. Support piping independently of equipment. Coordinate location of hangers with light fixtures. Wire brush steel or iron supports and prepare surfaces under this section for painting.

1. Install plastic pipe loose to allow for contraction and expansion. Hangers for PVC piping in storage tanks do not need rollers and hangers can be shop fabricated from stainless steel strap and anchor bolts.
2. Pipes supported by trapeze hangers and not mounted on pipe rollers shall be secured to the trapeze with pipe clamps or "U" bolts.
3. Hangers shall be placed at each change of direction, within 1 foot of valves and other appurtenances installed in horizontal piping and not more than 3 feet from end of each branch run-out.
4. Special Supports: Provide clamps, hangers, and supports according to equipment manufacturer's recommendations.
5. Supports of wire, rope, wood, chain, strap, perforated bar, or any other makeshift devices are not allowed.
6. Where overhead construction does not allow fastening hanger rods in required locations, provide additional steel framing as required.
7. Refer to "Vibration Isolation" Section for supports requiring vibration isolators.
8. Maximum loading on inserts shall not exceed 75 percent of catalog rating.
9. Floor supports, wall brackets, and expansion tank supports as shown on Construction Documents or as required to support equipment. Submit shop drawings.
10. Buckling of piping due to inadequate provision for expansion shall be Contractor's responsibility. Piping shall be properly guided between expansion joints and anchor points.

L. Expansion Tanks

1. Suspended from structure (horizontal type).
2. Connect to makeup water piping provided under plumbing work.
3. Pipe relief valve to nearest drain.

M. Water Flow Sensors: Install water flow tube stations according to manufacturer's published recommendations and as shown on Contract Documents.

N. Dielectric Fittings: Provide dielectric fittings between piping of dissimilar metals.

3.02 IDENTIFICATION

A. Provide brass tags, chained to valve stem for permanent identification, coded to as-built drawings.

END OF SECTION

SECTION 23 23 16

REFRIGERANT (DX) PIPING AND SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping.

B. Refrigerant.

C. Moisture and liquid indicators.

D. Valves.

E. Strainers.

F. Check valves.

G. Pressure relief valves.

H. Filter-driers.

I. Solenoid valves.

J. Expansion valves.

K. Receivers.

L. Flexible connections.

M. Pressure switches.

N. Silver solder.

1.02 RELATED SECTIONS

A. Section 23 05 29 – Supports and Anchors.

B. Section 23 05 53 - Mechanical Identification.

C. Section 23 07 19 - Piping Insulation.

1.03 REFERENCES

A. ANSI/ARI 495 - Refrigerant Liquid Receivers.

B. ANSI/ARI 710 - Liquid Line Dryers.

C. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

D. ANSI/ASHRAE 34 - Number Designation of Refrigerants.

E. ANSI/ASME Section 8D - Boilers and Pressure Vessels Code, Rules for Construction of Pressure Vessels.

F. ANSI/ASME Section 9 - Boilers and Pressure Vessels Code, Welding and Brazing Qualifications.

G. ANSI/ASME B16.22 -Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

H. ANSI/ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes.

I. ANSI/ASME B31.5 - Refrigeration Piping.

J. ANSI/ASME B31.9 - Building Services Piping.

K. ANSI/ASTM B32 - Solder Metal.

L. ANSI/ASTM B88 - Seamless Copper Water Tube.

M. ANSI/AWS A5.8 - Brazing Filler Metal.

N. ANSI/AWS D1.1 - Structural Welding Code, Steel.

O. ANSI/UL 429 - Electrically Operated Valves.

P. ARI 750 - Thermostatic Refrigerant Expansion Valves.

Q. ARI 760 - Solenoid Valves for Use With Volatile Refrigerants.

R. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

S. Florida Building Code – Mechanical., 2014 Ed.

1.04 SUBMITTALS

A. Submit product data to site under as required by “Submittal Procedures”.

B. Submit manufacturer's installation instructions as required by “Submittal Procedures”.

C. Submit shop drawings indicating schematic layout of system, including equipment, critical dimensions and sizes.

D. Submit product data indicating general assembly of specialties, including manufacturers’ catalogue information.

E. Submit data indicating pipe sizing.

F. Submit test reports.

G. Submit Test reports indicating results of leak test, acid test.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site as required by “Product Delivery, Storage and Handling Requirements”.

B. Store and protect products as required by “Product Delivery, Storage and Handling Requirements”.

C. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

PART 2 PRODUCTS

2.01 PIPING

A. Copper Tubing: ASTM B280, Type ACR hard drawn.

1. Fittings: ANSI/ASME B16.22 wrought copper.
2. Joints: ASTM B32 , lead free solder, 95-5 tin-antimony or tin silver with melting range of 430 to 535 Degree F or AWS A5.8, brazed, BcuP silver/phosphorous/copper alloy with melting range of 1190 to 1480 Degree F.

B. Copper Tubing to 7/8 Inch OD: ANSI/ASTM B88, Type K, annealed.

1. Fittings: ANSI/ASME B16.26 cast copper, long radius.
2. Joints: ASTM B32, lead free solder, 95-5 tin-antimony or tin silver with melting range of 430 to 535 Degree F or AWS A5.8, brazed, BcuP silver/phosphorous/copper alloy with melting range of 1190 to 1480 Degree F.

2.02 REFRIGERANT

A. Refrigerant: 410A.

2.03 MOISTURE AND LIQUID INDICATOR

A. Single port type, UL listed with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator and plastic cap, maximum working pressure of 500 PSIG and maximum temperature of 200 Degree F.

2.04 VALVES

A. Packed Ball Valves: Two piece forged brass body with chrome plated ball, teflon seats, brass seal cap, neoprene ring stem seals, copper tube extension, maximum working pressure of 500 PSIG and maximum temperature of 300 Degree F.

B. Packed Angle Valves: Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends, maximum working pressure of 500 PSIG and maximum temperature of 275 Degree F.

2.05 STRAINER

A. Straight Thru Type: Steel shell, copper plated fittings, stainless steel wire screen.

B. Straight Thru or Angle Type: Brass or steel shell, steel cap and flange, replaceable cartridge of stainless steel wire or monel reinforced with brass screen, maximum working pressure of 430 PSIG.

2.06 CHECK VALVE

A. Globe Type: Bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc, maximum working pressure of 450 PSIG and maximum temperature of 300 Degree F.

B. Straight Thru Type: Brass body, brass disc, phosphor-bronze or stainless steel spring, neoprene seat, maximum working pressure of 500 PSIG and maximum temperature of 250 Degree F.

2.07 PRESSURE RELIEF VALVE

A. Straight Thru or Angle Type: Brass body and disc, neoprene seat, factory sealed, ASME stamped, National Board Certification, standard pressure setting, ANSI/ASHRAE 15 Standard selection.

2.08 FILTER DRIER

A. Angle Type (Replaceable Cartridge): ANSI/ARI 710, UL listed, brass shell, bronze cap, perforated brass shell and molded desiccant filter core, maximum working pressure of 350 PSIG.

B. Straight Thru Type (Permanent): ANSI/ARI 710, UL listed, steel shell with molded desiccant filter core, maximum working pressure of 400 PSIG.

2.09 SOLENOID VALVE

A. Valve: ARI 760, pilot operated, copper or brass body, copper or brass internal parts, synthetic seat, stainless steel stem, stainless steel plunger assembly, flared, soldered or threaded ends, maximum working pressure of 500 PSIG. Stem shall permit manual operation in case of coil failure.

B. Coil Assembly: UL listed, replaceable, molded electromagnetic coil, moisture and fungus proof, surge protector, color coded lead wires, integral junction box.

2.010 METERING DEVICE (EXPANSION VALVE)

A. Angle or Straight Thru Type: ARI 750, capillary tube for under three tons or thermostatic expansion valve for three tons and larger, brass body, internal or external equalizer, adjustable superheat setting, replaceable inlet strainer.

B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10

Degree F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.011 RECEIVER

A. 6 Inch I.D. and Under: ANSI/ARI 495, UL listed, steel body, brazed; 400 PSIG maximum pressure rating with lappings for inlet, outlet and pressure relief valve.

B. Over 6 Inch I.D.: ANSI/ARI 495, welded steel body, tested and stamped under provisions of Section 8D of the ANSI/ASME Boiler and Pressure Vessels Code; 400 PSIG maximum pressure rating with lappings for inlet, outlet and pressure relief valve.

2.012 FLEXIBLE CONNECTOR

A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; maximum working pressure 400 PSIG.

2.013 PRESSURE SWITCH

A. High and low adjustable pressure switches with manual resets.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends and remove burrs.

B. Remove dirt and scale on inside and outside before assembly.

3.02 INSTALLATION

A. Install specialties under provisions of the manufacturer's instructions.

B. Route piping in orderly manner with plumbing parallel to building structure and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

E. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not exposed. Locate valves and metering devices in easily accessible locations having adequate clearance to service devices.

H. Scrape, brush clean and apply one coat of zinc rich primer to welding joints wherever pipe support members are welded to structural building frame.

I. Prepare pipe, fittings, supports and accessories for finish painting.

J. Use dielectric fittings or couplings for dissimilar metals.

K. Insulate piping and accessories.

L. Locate capillary tube sensing bulb immediately downstream of evaporator on suction line.

M. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

N. Install flexible connectors at right angles to axial movement of compressor.

O. Fully charge completed system with refrigerant after evacuation and testing.

P. Provide electrical connection to solenoid valves.

3.03 APPLICATION

A. Provide line size liquid indicators in main liquid line leaving condenser or if receiver is provided, in liquid line leaving receiver. Install moisture indicator so it can be viewed from service area.

B. Provide line size strainer upstream of each automatic valve. In addition to multiple expansion valves with integral strainers, install single main liquid line strainer.

C. Provide shutoff valves on each side of the strainer.

D. Provide replaceable cartridge filter-driers for each refrigerant circuit. Install vertically in liquid line adjacent to receivers with a valve bypass assembly to permit isolation of driers for servicing.

E. Provide solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control. In addition, provide in liquid line of single or multiple evaporator systems and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

F. Provide refrigerant charging connections (packed angle valve) in liquid line between the receiver shutoff valve and expansion valve.

G. Utilize flexible connectors at or near compressors when the piping configuration does not absorb vibration.

3.04 FIELD QUALITY CONTROL

A. Provide field testing of all mechanical equipment and installations.

B. Test refrigeration system in accordance with ANSI/ASME B31.5.

C. Pressure test system with small amount of refrigerant and dry nitrogen at 300 PSIG. Use halide torch or electronic leak detector to check for leaks. Perform final test at 30 inches, vacuum for a 24 hour period with no pressure deviation. Provide written verification of the system test to the Owner's representative.

END OF SECTION

SECTION 23 31 00

METAL DUCTWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

B. Exterior insulation of metal ductwork is specified in other Division-23 sections and is included as work of this section.

C. Refer to other Division-23 sections for ductwork accessories; not work of this section.

D. Refer to other Division-23 sections for fans and air handling units; not work of this section.

E. Refer to other Division-23 sections for testing, adjusting, and balancing of metal ductwork systems; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.

C. Codes and Standards:

1. SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.

2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.

3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" and NFPA 90B "Standard for the Installation of Warm Air Heating and Air Conditioning Systems".

4. Florida Building Code – Mechanical, 2014 Ed.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products.

B. Shop Drawings: Submit scaled (1/4"=1'-0") layout drawings of metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced. Mechanical room shop drawing prepared at a scale of 2" =1'-0".

C. Record Drawings: At project closeout, submit record drawings of installed metal ductwork and ductwork products, in accordance with requirements of Division 1.

D. Maintenance Data: Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.

B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 PRODUCTS

2.01 DUCTWORK MATERIALS

A. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lock-forming quality; with G 90 zinc coating in accordance with ASTM A 525.

2.02 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15 degrees change of direction per section. Unless specifically detailed otherwise, use 45 degrees laterals and 45 degrees elbows for branch takeoff connections. Where 90 degrees branches are indicated, provide conical type tees.

C. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable

for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. Seal Class A or B.

D. Duct Cement: Non-hardening migrating mastic or liquid neoprene based cement, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.

E. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork, in conformance with the latest edition of SMACNA Duct Construction Standards.

F. Flexible Ducts: Flexible ductwork shall be spiral formed out of 3003 bright reflective finished aluminum alloy and mechanically locked. It shall be UL listed under Class 1 Air Ducts and Class 1 Connectors, meet all requirements of UL 181, and comply with NFPA 90A and 90B.

2.03 FABRICATION

A. Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for re-assembly and coordinated installation.

B. Shop fabricate ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards", pressure class as indicated on mechanical drawings. Class six (6) and class two (2) ductwork requirements have been provided in these specifications for reference purposes. In addition to the above listed ductwork pressure classes, mechanical drawings do indicate requirements for class eight (8) and class four (4) ductwork.

C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30 deg. for contracting tapers and 20 degrees for expanding tapers.

D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "Ductwork Accessories" for accessory requirements.

2.04 FACTORY-FABRICATED DUCTWORK, 2" WG PRESSURE CLASS

A. General: At installer's option, provide factory- fabricated spiral seam duct and fittings, in lieu of shop-fabricated duct and fittings.

B. Material: Galvanized sheet steel complying with ASTM A 527, lock-forming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.

C. Gage: 26-gage and 24-gage minimum for round and oval ducts and fittings, 4" through 24" diameter/major dimension duct width, respectively.

D. Elbows: One piece construction for 90 degree and 45 degree elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.

E. Divided Flow Fittings: 90 degree tees, constructed with saddle tap spot welded and bonded to duct fitting body.

F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering factory-fabricated ductwork which may be incorporated in the work include the following:

1. Semco Mfg., Inc.
2. Duct Design Corporation

G. Joints of all ductwork shall be made airtight by an approved method of sealing joints during fabrication. External taping is not acceptable.

2.05 FACTORY-FABRICATED DUCTWORK, 6" WG PRESSURE CLASS

A. General: At Installer's option, provide factory-fabricated spiral seam duct and fittings, in lieu of shop-fabricated duct and fittings.

B. Round and Flat Oval Ductwork: Construct of galvanized sheet steel complying with ASTM A 527 by the following methods and in minimum gages listed.

Diameter	Major Dimension Duct Width	Minimum Gage	Method of Manufacture
3" to 14"	-----	26	Spiral Lockseam
15" to 26"	Up to 24"	24	Spiral Lockseam
27" to 36"	25" to 48"	22	Spiral Lockseam
37" to 50"	49" to 70"	20	Spiral Lockseam
51" to 60"	71" and Up	18	Spiral Lockseam

Provide locked seams for spiral duct; fusion-welded butt seam for longitudinal seam duct.

1. Fittings and Couplings: Construct of minimum gages listed. Provide continuous welds along seams.

Diameter	Minimum Gage
3" to 36"	20
38" to 50"	18
Over 50"	16

C. Rectangular Ductwork: Construct of galvanized sheet steel complying with ASTM A 527, of lockseam or welded construction, in minimum gages listed, reinforced per SMACNA Table 1-8.

1. Fittings and Couplings: Construct of minimum gages listed. Provide continuous weld along seams.

D. Available Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork of one of the following:

1. Semco Mfg., Inc.
2. Duct Design Corporation

E. Joints of all ductwork shall be made air tight by an approved method of sealing joints during fabrication. External taping is not acceptable.

2.06 DUCT LINER

A. Duct Liner: Fiberglass-free flexible foam (closed cell) black lining, one (1) inch thick (R-4.2), (1.5) inch thick (R-6) or (2) inch thick (R-8), complying with ASTM C1071 Type 1. The thermal conductivity (K value) is to be as required, but not exceed 0.25 at 75 degrees F, per ASTM C 518. Noise reduction Coefficient shall be 0.70 or higher based on ASTM E 795 "Type A mounting" and tested in accordance to ASTM C 423. Maximum velocity of 5,000 ft/min (25.4 m/sec). The lining shall meet the requirements of NFPA 90A and NFPA 90B. In addition, it shall meet the UL Fire Hazard Classification of Flame Spread not over 25 and Smoke Developed not over 50.

B. Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives for Duct Thermal Insulation".

C. Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

PART 3 EXECUTION

3.01 INSPECTION

A. General: Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF METAL DUCTWORK

A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve airtight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

B. Inserts: Install concrete inserts for support of ductwork in coordination with form work, as required to avoid delays in work.

C. Field Fabrication: Complete fabrication of work at project as necessary to match

shop-fabricated work and accommodate installation requirements.

D. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

E. Electrical Equipment Spaces: Do not route ductwork through transformer vaults, electrical equipment spaces and enclosures, and telecommunications and telephone equipment room.

F. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate.

1. Where ducts pass through fire-rated floors, walls, or partitions, provide airtight seal to maintain required fire integrity.
2. Where ducts pass through fire-rated floors, walls, or partitions, provide fire damper sized per duct size to maintain said fire rating.
3. Where ducts pass through smoke-rated floors, walls, or partitions, provide smoke damper sized per duct size to maintain said fire rating. Provide connection to fire alarm system for activation of damper on fire alarm.
4. Where ducts pass through fire/smoke-rated floors, walls, or partitions, provide fire/smoke damper sized per duct size to maintain said fire/smoke rating. Provide connection to fire alarm system for activation of damper on fire alarm.
3. Provide four (4) inches high waterproof curbs around all floor/duct penetrations.

G. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

H. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards.

3.03 DUCT LINER

A. Provide acoustical duct liner for the first ten (10) feet of supply ductwork, measured from the air handling unit’s discharge and where indicated on the mechanical drawings.

3.04 INSTALLATION OF FLEXIBLE DUCTS

A. Maximum Length: For any duct run using flexible ductwork, do not exceed 8' - 0" extended length.

B. Installation: Install in accordance with Section III of SMACNA's, "HVAC Duct Construction Standards, Metal and Flexible".

3.05 FIELD QUALITY CONTROL

A. Leakage Tests: After each duct system which is constructed for duct classes over 2" is completed, test for duct leakage in accordance with SMACNA HVAC Air Duct Leakage Test Manual. Repair leaks and repeat tests until total leakage is less than 1% of system design air flow.

3.06 EQUIPMENT CONNECTIONS

A. General: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as required.

3.07 ADJUSTING, CLEANING, AND TEMPORARY WORK

A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

B. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

C. Phasing Closure: Provide airtight permanent or temporary closure caps to isolate ductwork systems during phasing or to close connections to temporary work.

D. Balancing: Refer to Division-23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION

{tc \l1 "END OF SECTION 15891**}**

SECTION 23 33 00

DUCTWORK ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.

B. Types of ductwork accessories required for project include the following:

1. Dampers.
2. Low pressure manual dampers.
3. Control dampers.
4. Fire and smoke dampers.
5. Turning vanes.
6. Duct hardware.
7. Duct access doors.
8. Flexible connections.

C. Refer to other Division-23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of ductwork accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".
2. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers".
3. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of ductwork accessories.
4. Florida Building Code – Mechanical, 2014 Ed.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions.

PART 2 PRODUCTS

2.01 DAMPERS

A. Low Pressure Manual Dampers: Provide dampers of single blade type or multi-blade type, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

B. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:

1. Greenheck, Inc.
2. Airguide Corp.
3. Ruskin Mfg. Co.

2.02 FIRE/SMOKE DAMPERS

A. Fire Dampers: Provide fire/smoke dampers, of types and sizes indicated. Construct casings of 16-ga galvanized steel. The blades shall be airfoil shaped double skin construction with 14 ga. equivalent thickness. Blade action to be opposed. Bearings shall be stainless steel. Blade edges shall be silicone rubber mechanically locked. Dampers rated in accordance with UL 555 leakage Class I. Damper equipped with UL rated 165°F fusible link to lock damper closed when temperature exceeds set temperature. Dampers marked as “HT” are to be provided with high temperature fusible links rated for 212°F

B. Combination fire/smoke damper as manufactured by Greenheck, Ruskin Manufacturing Co. or approved equal.

2.03 TURNING VANES

A. Manufactured Acoustic Turning Vanes: Provide turning vanes constructed of 1-1/2" wide curved blades set at 3/4" o.c., supported with bars perpendicular to blades set at 2" o.c., and set into side strips suitable for mounting in ductwork. Vanes constructed of airfoil shaped aluminum extrusions with perforated faces and fiberglass-free closed cell flexible foam fill.

B. Manufacturer: Subject to compliance with requirements, provide turning vanes of one of the following:

1. Aero Dyne Co.
2. Airsan Corp.
3. Duro Dyne Corp.

2.04 DUCT HARDWARE

A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:

1. Test Holes: Provide in ductwork at AHU fan inlet and outlet, duct test holes, consisting of slot and cover, for instrument tests.
2. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

B. Manufacturer: Subject to compliance with requirements, provide duct hardware of one of the following:

1. Ventfabrics, Inc.
2. Young Regulator Co.

2.05 DUCT ACCESS DOORS

A. General: Provide where fire dampers are installed or where shown on drawings, duct access doors. Minimum 12 in x 12 in or maximum size allowed by duct or as indicated in drawings.

B. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for un-insulated ductwork, extended frames for externally insulated duct. Provide one size hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors. Doors to have continuous gasket all around for airtight seal.

C. Manufacturer: Subject to compliance with requirements, provide duct access doors of one of the following:

1. Air Balance Inc.
2. Duro Dyne Corp.
3. Ruskin Mfg. Co.
4. Ventfabrics, Inc.

2.06 FLEXIBLE CONNECTIONS

A. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof high temperature (min. 500°F) fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

B. Manufacturer: Subject to compliance with requirements, provide flexible connections of one of the following:

1. American/Elgen Co.; Energy Div.

2. Duro Dyne Corp.
3. Flexaust (The) Co.
4. Ventfabrics, Inc.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Install turning vanes in square or rectangular 90 deg. elbows in supply air systems, and elsewhere as indicated.

C. Install access doors to open against system air pressure.

D. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.03 FIELD QUALITY CONTROL

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.04 ADJUSTING AND CLEANING

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

1. Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing".

B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.05 EXTRA STOCK

A. Furnish extra fusible links to Owner, one link for every 10 installed of each temperature range; obtain receipt.

END OF SECTION**{tc \l1** "END OF SECTION 15910**}**

SECTION 23 34 00

AIR MOVING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:

1. Section 23 05 48: Vibration Control.
2. Section 23 31 00: Metal Ductwork.

1.2 REFERENCES

A. Air Moving and Conditioning Association (AMCA), Fan Construction and Testing Standards.

1.3 SUBMITTALS

A. Fans: Shop drawings, catalog cuts, and certified performance curves.

1.4 QUALITY ASSURANCE

B. Fans shall be constructed and rated according to AMCA standards.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Fans:

1. Greenheck.
2. Loren Cook.
3. Carnes.
4. Penn Ventilator.
5. Buffalo Force.
6. New York Blower.

2.2 EQUIPMENT

A. Unless otherwise noted, fans shall be as follows:

1. Centrifugal type.
2. Fan wheels shall be statically and dynamically balanced at the factory.
3. Fan brake horsepower ratings shall not exceed those scheduled.
4. Belt drives for fans shall be matched multiple V-belts rated for at least l.3 times motor horsepower.
5. Pulleys shall be cast iron adjustable pitch type.
6. Fan blades and housing of proper design, sufficient strength and rigidity to operate

under installed conditions without objectionable noise and vibrations.

7. Surfaces provided with approved corrosion resistant coatings.
8. Provide drives to deliver design capacity at actual static pressures developed.

B. Propeller Fans:

1. Heavy-duty industrial type and designed for wall mounting.
2. Fans may be direct or belt driven by an open drip-proof electric motor.
3. Direct driven fans shall have fan wheel mounted on extension of motor shaft.

    a. Mount motor in rigid streamlined frame designed to provide vibration isolation for motor and with concealed wiring run to motor.
    b. Mount fan on a steel frame and shall have aluminum or steel blades with heavy hubs.
    c. Bearings shall be of permanently lubricated type.
    d. Motor speed shall not exceed 1800 rpm.
    e. Provide fan with a heavy gauge wire personnel guard easily removable for servicing fan.

4. If standard mounting is not large enough to fit the opening provided, fabricate auxiliary mounting plates to not impair air flow to wheel at the opening provided.

    a. Plates shall be made of zinc-coated steel in thicknesses as follows:

Wheel Diameter	Plate Thickness (M.S. Gage)
12" and under	18
Over 12" and not over 16"	16
Over 16" and not over 24"	14
Over 24" and not over 36"	12
Over 36" and not over 60"	10

C. Inline Centrifugal / Axial Fans:

1. Fans shall be steel or aluminum construction, centrifugal, with belt or direct drives.
2. Fan wheels shall have aluminum airfoil blades, backwardly inclined non-overloading.
3. Motors on belt driven units shall be supported on exterior of fan casing with bearings encased within fan tube.
4. Support fan with vibration isolators.
5. Extend bearing lubrication lines outside of casing.
6. Provide variable inlet vanes as indicated.

D. Centrifugal Vent Set:

1. Fan housing and scroll shall be steel with baked-on enamel finish inside and out.
2. Fan wheel shall be steel with forward curved blades.
3. Support fan shaft by resiliently mounted pre-lubricated ball bearings.
4. Fan motors shall be open drip-proof type with belt drives and adjustable pulleys.

E. Ceiling Mounted Fans:

1. Fans shall have a centrifugal wheel enclosed in an acoustically insulated housing.
2. Units shall have integral back draft damper and an inlet grille.
3. Motor shall be resiliently supported and shall be completely removable through the face of the unit.
4. Discharge position shall be changeable through use of interchangeable casing panels.

F. Power Roof Exhauster:

1. Fans shall be standard outlet or up blast as scheduled, centrifugal type with backward inclined non-overloading wheels, and belt driven by an electric motor.
2. Fan shall have weatherproof, low profile aluminum housing suitable for curb mounting.
3. Fan shall have motor space accessible from outside and local disconnect switch.
4. Motor and fan shall be resiliently mounted.
5. Each fan shall be provided with aluminum or galvanized steel bird screen, disconnect switch, and multi-blade backdraft damper as indicated.
6. Belt drives shall be provided with not less than double belt pulleys and 2 belts.
7. Upblast fans shall be provided with a non-corrosive epoxy coating.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide roof or concrete openings required for proper fan installation.

B. Refer to Section: Vibration Isolation for proper isolator requirements.

C. Install fans according to manufacturer's recommendations and as shown on Construction Documents.

END OF SECTION

SECTION 23 36 00

AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, and Specification Section 23 31 00 (Metal Ductwork), apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Shutoff single-duct air terminal units.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include rated capacities, furnished specialties, sound-power ratings, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Include a schedule showing unique model designation, room location, model number, size, and accessories furnished.
2. Wiring Diagrams: Power, signal, and control wiring.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

D. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section “Closeout Procedures, Operation and Maintenance Data”, include the following:

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.

E. Warranty:

1. Units shall have one-year parts and labor warranty.

2. Electric heating coils and fan motors shall have a five-year parts and labor warranty.
3. Warranty shall be effective from owner acceptance of final completion.

1.4 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air terminal units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements".

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. NFPA Compliance: Install air terminal units according to NFPA 90A, AStandard for the Installation of Air Conditioning and Ventilating Systems".

1.5 COORDINATION

A. Coordinate layout and installation of air terminal units and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Manufactures: Subject to compliance with requirements, provide products by one of the manufactures specified.
2. Refer to other Sections for Division 23 such as 23 00 00, 23 09 23, etc. for additional requirements.

2.2 SHUTOFF SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers:

1. Titus
2. Trane
3. JCI.

B. Configuration: Volume-damper assembly inside unit casing with control components located inside a protective metal shroud.

C. Casing: 0.34-inch (0.85-mm) min. steel or 0.032-inch (0.8 mm) min. aluminum.

1. Casing Lining: The interior surface of the unit shall be acoustically and thermally lined with 1", 4 1b/cu. ft. minimum density closed-cell insulation, shall be UL listed

and meet NFPA-90 A and UL - 181 standards. The insulation shall have a minimum R-value of 4.2 and shall be double-walled.

2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Access: Removable panels for access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket.

D. Regulator Assembly: Extruded-aluminum or galvanized-steel components; key damper blades onto shaft with nylon-fitted pivot points located inside unit casing.

1. Automatic Flow-Control Assembly: Combined spring rates shall be matched for each volume-regulator size with machined dashpot for stable operation.
2. Factory-calibrated and field-adjustable assembly with shaft extension for connection to externally mounted control actuator.

E. Regulator Assembly: System-air-powered bellows section incorporating polypropylene bellows for volume regulation and thermostatic control. Bellows shall operate at temperatures from 0 to 140 deg. F (minus 18 to plus 60 deg. C); shall be impervious to moisture and fungus; shall be suitable for 10-inch wg (2500-Pa) static pressure; and shall be factory tested for leaks.

F. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 6-inch wg (1500-Pa) inlet static pressure.
2. Damper Position: Normally open (Fail open, Spring Return)

G. Attenuator Section: 0.032-inch (0.8-mm) aluminum sheet metal.

1. The insulation shall have a minimum R-value of 4.1 and shall be double-walled.

H. Multi-Outlet Attenuator Section: Not Acceptable.

I. Electric Heating Coil: Slip-in-type, open-coil design with integral control box factory wired and installed. Include the following features:

1. Primary and secondary over-temperature protection.
2. Nickel chrome 80/20 heating elements.
3. Airflow switch.
4. Non-interlocking disconnect switch connected to single-point electrical connection to power source (independent form circuit feeding the control module)
5. Fuses (for coils more than 48 A).
6. Mercury contactors.
7. Pneumatic-electric switches and relays.
8. Magnetic contactor for each step of control (for three-phase coils).

J. Electric Controls: Damper actuator and thermostat.

K. Factory-Mounted and-Wired Controls: Electrical components shall be mounted in control box with removable cover. Incorporate single-point electrical connection to power source for control module and single-point electrical connection to power source to heater module.

1. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
2. Wiring Terminations: Fan and controls to terminal strip, and terminal lugs shall match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
3. Disconnect Switch: Factory-mounted, fused type.

L. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

M. Electric Controls: See Section 23 09 23.

1. Control Contractor shall provide controls to VAV Manufacturer for factory installed and tested units. Field installed controls shall NOT be acceptable.

N. Electronic Controls: Bi-directional damper operator and microprocessor-based controller with integral airflow transducer and room sensor shall be compatible with temperature controls specified in Division 23 Section " Automatic Controls and EMS" and shall include, but will not be limited to, the following features:

1. Proportional, plus integral control of room temperature.
2. Time-proportional reheat-coil control.
3. Occupied and unoccupied operating mode.
4. Remote reset of airflow or temperature set points.
5. Adjusting and monitoring with portable terminal.
6. Communication with temperature-control system specified in Division 23 09 23 Section "Automatic Controls and EMS".

O. DDC Controls: Single-package unitary controller and actuator specified in Division 23 Section "Automatic Controls and EMS". See Section 23 09 23 for requirements.

2.3 SOURCE QUALITY CONTROL

A. Identification: Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set air flows, coil type, and ARI Certification seal.

B. Verification of Performance: Rate air terminal units according to ARI 880.

C. BACnet compliance verification as outlined in Section 23 09 23.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install air terminal units leveled and plumb. Maintain sufficient clearance for normal service and maintenance.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install electrical conduits adjacent, but clear of the maintenance access panels, to air terminal units to allow service and maintenance.

C. Connect ducts to air terminal units according to division 23 Section “Metal Ductwork”.

D. Ground units with electric heating coils according to Division 26 - Grounding.

E. Connect wiring according to Division 26 - Wires and Cables.

F. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values. If manufacturer’s torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coil and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer=s written instructions and do the following:

1. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
2. Verify that controls and control enclosure are accessible.
3. Verify that control connections are complete.
4. Verify that nameplate and identification tag are visible.
5. Verify that controls respond to inputs as specified.

3.5 DEMONSTRATIONS

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air terminal units. Refer to Division 1 Section "Demonstration and Training".

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.

B. Types of air outlets and inlets required for project include the following:

1. Ceiling air diffusers.
2. Ceiling registers and grilles.
3. Return air grilles.

C. Refer to other Division-23 sections for ductwork and duct accessories required in conjunction with air outlets and inlets; not work of this section.

D. Refer to other Division-23 sections for balancing of air outlets and inlets; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual".
3. ADC Seal: Provide air outlets and inlets bearing ADC Certified Rating Seal.
4. ASHRAE Standard 55

C. All outlets and inlets shall not exceed NC.20 criteria as established by manufacturer certified tests.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:

1. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
2. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections on data.

B. Contractor shall provide a certified letter of compliance indicating that the diffusers, grilles and similar items will fit in the specified ceiling grid suspension system. Submittals should be approved prior to ordering materials.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

PART 2 PRODUCTS

2.01 CEILING AIR DIFFUSERS

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

D. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule. The following requirements shall apply to nomenclature indicated on schedule:

1. Diffuser Faces:
   a. Perforated (PR): Square, or rectangular housing covered with removable perforated panel in frame. Conceal air pattern devices above panel.

2. Diffuser Mountings:
   a. Flush (FL): Diffuser housing above ceiling surface with flush perimeter flange and gasket to seal against ceiling.
   b. Lay-In (L-I): Diffuser housing sized to fit between ceiling exposed suspension tee bars and rest on top surface of tee bar.

3. Diffuser Patterns:
   a. 1 Way (1-W): Fixed louver face for 1-direction air flow, direction indicated on drawings.
   b. 2 Way (2-W): Fixed louver face for 2-direction air flow, directions indicated on drawings.
   c. 3 Way (3-W): Fixed louver face for 3-direction air flow, directions indicated on drawings.
   d. 4 Way (4-W): Fixed louver face for 4-direction air flow, directions indicated on drawings.

4. Diffuser Dampers:
   a. Opposed Blade (O-B): Adjustable opposed blade damper assembly, key operated from face of diffuser.

5. Diffuser Accessories:
   a. Equalizing Deflectors (E-D): Adjustable parallel blades in frame for straightening air flow.
   b. Plaster Ring (P-R): Perimeter ring designed to act as plaster stop and diffuser anchor.
   c. Operating Keys (OP-KY): Tools designed to fit through diffuser face and operate volume control device and/or pattern adjustment.

6. Diffuser Finishes:
   a. White Enamel (W-E): Semi-gloss white enamel prime finish.

E. Manufacturer: Subject to compliance with requirements, provide diffusers of one of the following only:

1. Anemostat Products Div.; Dynamics Corp. of America.
2. Titus Products Div.; Philips Industries, Inc.
3. Tuttle & Bailey.

2.02 CEILING REGISTERS AND GRILLES

A. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Ceiling Compatibility: Provide registers and grilles with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling construction which will contain each type of ceiling register and grille.

D. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule. The following requirements shall apply to nomenclature indicated on schedule:

1. Register and Grille Materials:
   a. Aluminum Construction (AL): Manufacturer's standard extruded aluminum frame and adjustable blades.

2. Register and Grille Faces:
   a. Vertical Straight Blades (V-S): Vertical blades, individually adjustable, at manufacturer's standard spacing. Fixed blades for exhaust registers only.

3. Register and Grille Dampers:
   a. Opposed Blade (O-B): Adjustable opposed blade damper assembly, key operated from face of register.
   b. Operating Keys (OP-KY): Tools designed to fit through register or grille face and operate volume control device and/or pattern adjustment.

4. Register and Grille Finishes:
   a. White Enamel (A-E): Semi-gloss white enamel prime finish.

E. Manufacturer: Subject to compliance with requirements, provide registers and grilles of one of the following only:

1. Anemostat Products Div.,; Dynamics Corp. of America.
2. Tuttle & Bailey.
3. Titus Products Div.; Philips Industries, Inc.

PART 3 EXECUTION

3.01 EXECUTION

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling modules.

3.03 SPARE PARTS

A. Furnish to Owner, with receipt, 3 operating keys for each type of air outlet and inlet that require them.

END OF SECTION

SECTION 23 62 00

PACKAGED COMPRESSOR AND CONDENSER UNITS

PART 1 GENERAL

1.1 SUMMARY

A. Submit catalog cuts on unit showing fabrication details, capacity at scheduled conditions ratings and labels, and all information necessary to demonstrate compliance with requirements of construction documents.

B. Related Sections:

1. 23 05 48 – Vibration Control
2. 23 21 16 – Valves and Specialties (HVAC).

1.2 SUBMITTALS

A. Submit properly identified product data before starting work.

B. Unit Schedule: Provide air cooled condensing units of type, size, efficiency rating, and capacity shown in unit schedule.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Air Cooled Condensing Units:

1. Trane.
2. York.

2.2 EQUIPMENTS

A. Air Cooled Condensing Units:

1. Casing:

a. Fully weatherproof unit, suitable for outdoor installation with hail-proof casing.
b. Fabricate casing of galvanized or zinc-coated steel and finish with baked enamel.
c. Fabricate structural members of continuous galvanized steel with steel channel.
d. Provide openings for power and refrigerant connections and adequate removable panels for service access.
e. Unit shall be welded hermetic type with internal vibration isolation and be covered with a shield to muffle operating sound.

f. Compressor shall have both thermal and current sensitive overload devices and internal high pressure protection.

g. Entire assembly to be provided with a Heresite (rustproof) coating.

2. Condenser Fans: Direct drive, propeller-type fans arranged for vertical discharge.

a. Resilient mount fans factory statically and dynamically balanced and provide heavy gage safety guards.

1. Condenser Coils:

a. Copper or Aluminum Plate Fins: Mechanically bonded to copper tubes.
b. Adequately protect fins against hail damage on coils for 20 tons or greater.
c. Fin Coating: Factory applied heresite or Bronze Glow epoxy coating.

2. Control Center and Accessories:

a. Factory wired controls within a weatherproof cabinet.
b. Accessories:

1) 1 stage Heating – 2 stage cooling digital and programmable thermostat with sub-base suitable for continuous or automatic fan operation.
2) Head pressure control to maintain proper condensing temperature at low ambient temperature.
3) Low voltage control transformer.
4) Indoor fan relay.

3. Capacity Control: Unit 6 Tons capacity and above shall be provided with multiple compressors. Units 6 to 20 Tons capacity will be capable of 100%, 75%, 50%, 25% and 0% capacity steps. Capacity reduction may be accomplished by shutting down compressors, unloading cylinders, varying speed, hot gas bypass, or a combination of the above. Evaporator coils shall be intertwined, split by rows and maintain a full energized face at all times. Coils split by face are not acceptable.
4. Safeties shall include low and high pressure cutouts.
5. Provide pump down control when available from the manufacturer.
6. Provide five minute time delay to prevent short cycling.

7. Refrigerants:

a. HCF 134a.
b. HFC 410A.

8. Efficiency Rating: Air cooled condensing unit shall comply with FPL Commercial/Industrial Energy Conservation Program Standards.

9. Provide a copy of the AHRI sheets showing minimum equipment efficiency compliance.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install according to manufacturer's recommendations, accepted Shop Drawings, and as indicated on Construction Documents.

B. Refrigerant circuit shall include a liquid line solenoid, sight glass and moisture indicator.

END OF SECTION

SECTION 23 73 00

MODULAR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes constant and variable volume, modular air-handling units with coils for indoor and outdoor installations.

1.2 SUBMITTALS

A. Product Data: For each type of modular indoor air-handling unit indicated. Include the following:

1. Certified fan-performance curves with system operating conditions indicated.
2. Certified fan-sound power ratings.
3. Certified coil-performance ratings with system operating conditions indicated.
4. Motor ratings, electrical characteristics, and motor and fan accessories.
5. Material gages and finishes.
6. Filters with performance characteristics.
7. Dampers, including housings, linkages, and operators.

B. Shop Drawings:

1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Coordination Drawings: Submit with Shop Drawings. Show mechanical-room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

D. Source Limitations: Obtain modular indoor air-handling units through one source from a single manufacturer.

E. Product Options: Drawings indicate size, profiles, and dimensional requirements of modular indoor air-handling units and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

G. NFPA Compliance: Modular indoor air-handling units and components shall be designed, fabricated, and installed in compliance with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems".

H. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

I. ARI Certification: Modular indoor air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.

J. Comply with NFPA 70.

1.3 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Structural Engineering Specifications.

B. When applicable, coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Architectural Section "Roof Accessories".

C. Coordinate size and location of structural-steel support members.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: A minimum of one set for each modular indoor air-handling unit.
2. Fan Belts: One set for each modular indoor air-handling unit fan.
3. Gaskets: One set for each access door.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Approved manufacturer shall be Trane or York. Manufacturers not pre-approved, must obtain pre-approval in writing from consulting engineer and owner’s engineering department prior to bid day. Alternates must comply with all performance and features as called for in this specification. Job awarded on basis of specified equipment. Alternate will be evaluated and considered after job is awarded.

B. Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to consulting engineer prior to bid date. Acceptance of deviation(s) from specifications shall be in the form of written approval from the consulting engineer. Mechanical Contractor is responsible for expenses that occur due to exceptions made.

2.2 APPROVED MANUFACTURER

A. Trane.

2.3 APPROVED ALTERNATE MANUFACTURERS

A. York

2.4 MANUFACTURED UNITS

A. Modular indoor air-handling units shall be factory assembled and consist of fans, motor and drive assembly, coils, damper, plenums, filters, condensate pans, mixing dampers, control devices, and other accessories, sections, or components as shown in the Contract Documents.

B. Provide protection for all openings and components during equipment transport. Externally mounted components shall be protected during all phases of transport from exposure, including moisture and ambient temperatures outside of any component's operating range. Externally mounted components include, but are not limited to, VFD's, actuators, sensors, and weather hoods.

2.5 CABINET

A. General: Manufacturer to provide an integral base frame for either ceiling suspension of units or to support and raise all sections of the unit for proper trapping. Contractor will be responsible for providing a housekeeping pad of sufficient height (but never smaller than 4"H) to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in trap.

B. Materials: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

C. Unit Casing:

1. Unit manufacturer shall ship unit in segments as specified by the contractor for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Casing finished to meet ASTM B117 250-hour salt-spray test. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.
2. Casing performance - Casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL X P0.65.
3. Air leakage shall be determined at 1.00 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.

4. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times design static pressure, or 8-inch w.g., whichever is less, and shall not exceed 0.0042 per inch of panel span (L/240).
5. Under 55F supply air temperature and design conditions on the exterior of the unit of 81F dry bulb and 73F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them. In lieu of AHU manufacturer providing a written guarantee, the installing contractor must provide additional external insulation on AHU to prevent condensation.
6. Floor panels, when required, shall be double-wall construction and designed to support a 250-lb load during maintenance activities and shall deflect no more than 0.0042 per inch of panel span.
7. Unit casing panels shall be 2-inch double-wall construction, with solid galvanized exterior and solid galvanized interior, to facilitate cleaning of unit interior.
8. Unit casing panels (roof, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) of 13 Hr*Ft2*°F/BTU.
9. Unit casing panels (roof, walls, floor) and external structural frame members shall be completely insulated filling the entire panel cavity in all directions so that no voids exist. Panel insulation shall comply with NFPA 90A.
10. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior frame. A mid-span, **no-through-metal**, internal thermal break shall be provided for all unit casing panels.
11. Access panels and/or access doors shall be provided in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance.
12. Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of interior surfaces.

D. Access Panels and Doors: Same materials and finishes as cabinet, complete with hinges, latches, handles, and gaskets. Inspection and access panels and doors shall be sized and located to allow periodic maintenance and inspections. Provide access panels and doors in the following locations:

1. Fan Section: Inspection and access doors.
2. Access Section: Doors.
3. DX Intertwined Coil Section: Inspection panel.
4. Damper Section: Inspection and access doors.
5. Filter Section: Inspection and access doors to allow periodic removal and installation of filters.

All doors downstream of the cooling coil shall be provided with a thermal break construction of door panel and door frame. Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance. Handle hardware shall be designed to prevent unintended closure.

E. Condensate Drain Pans: Formed sections of stainless-steel sheet complying with requirements in ASHRAE 62 for all cooling coils. Fabricate pans with slopes in two planes to collect condensate from coils (including coil piping connections and return bends) when units are operating at maximum catalogued face velocity across cooling coil.

1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
2. Drain Connections: Both ends of pan.
3. Pan-Top Surface Coating: Elastomeric compound.
4. Units with stacked coils shall have an intermediate drain pan or drain trough to collect condensate from top coil. Drain intermediate pan to main pan via copper downspout.

F. Condensate Pump: Fractional horsepower, non-ferrous impeller, close or direct coupled pump for installation in drain pan complete with floats or sensors to detect water level and cycle pump accordingly. When noted on drawings, each drain pan shall have a minimum of one pump.

2.6 FAN SECTION

A. Fan-Section Construction: Belt or direct-drive fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure and equipped with formed-steel channel base for integral mounting of fan, motor, and casing panels. Mount fan with vibration isolation.

B. Centrifugal Fan Housings: Formed- and reinforced-steel panels to make curved scroll housings with shaped cutoff, spun-metal inlet bell, and access doors or panels to allow entry to internal parts and components.

1. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
2. Performance Class: AMCA 99-2408, Class II or III.
3. Horizontal Flanged Split Housing: Bolted construction.
4. Forward Curve (FC), Airfoil (AF), or Backward Incline (BI) Fans: With steel cabinet. Fabricate without fan scroll and volute housing.

C. Fan Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and motor horsepower.

D. Airfoil-Fan Wheels: Steel construction with smooth-curved inlet flange, heavy backplate, and hollow die-formed airfoil-shaped blades continuously welded at tip flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

E. Coatings: Hot-dip galvanized.

F. Shafts: Statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.

1. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.

2. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

G. Bearings:

1. Bearing Types:

a. Pre-lubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
b. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
c. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.

2. Bearing Rating Life:

a. Ball-Bearings: ABMA 9, L50 at 200,000.
b. Roller-Bearings: ABMA 11, L50 at 200,000.

H. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor Based on Fan Motor Size: 1.5.
2. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
3. Motor Pulleys:

a. Air handling units specified with a Constant Volume (CV) system, use adjustable pitch. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
b. Air handling units specified with a Variable Air Volume (VAV) system, provide with motors with a VFD; use fixed pitch.

4. Belts: Oil resistant, non-sparking, and non-static; matched sets for multiple belt drives. Minimum amount of belts is to comply with the Florida Building Code, 2014 Ed. Requirements for air moving equipment.
5. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
6. Motor Mount: Adjustable for belt tensioning.

I. Vibration Control: Install fans on open-spring vibration isolators having a minimum of 1-inch (25-mm) static deflection and side snubbers.

J. Fan-Section Source Quality Control:

1. Sound Power Level Ratings: Comply with AMCA 301, “Methods for Calculating Fan Sound Ratings from Laboratory Test Data”. Test fans according to AMCA 300, “Reverberant Room Method for Sound Testing of Fans”. Fans shall bear AMCA-certified sound ratings seal.

2. Factory test fan performance for flow rate, pressure, power, air density, rotation speed, and efficiency. Establish ratings according to AMCA 210, “Laboratory Methods of Testing Fans for Rating”.
3. Fans integral to units shall not exceed 85% of class rating at the selection point.

2.7 MOTORS

A. General: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment".

B. All motors and drives shall be factory-installed and run tested. All motors shall be installed on a slide base to permit adjustment of belt tension. Slide base shall be designed to accept all motor sizes offered by the air-handler manufacturer for that fan size to allow a motor change in the future, should airflow requirements change. Fan sections without factory-installed motors shall have motors field installed by the contractor. The contractor shall be responsible for all costs associated with installation of motor and drive, alignment of sheaves and belts, run testing of the motor, and balancing of the assembly.

C. Motors shall meet or exceed all NEMA Standards Publication MG 1 - 2006 requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL Listed.

D. Fan Motors shall be heavy duty, Totally Enclosed Fan Cooled (TEFC) operable at 460 volts, 60Hz, 3-phase. Motor efficiency shall meet or exceed NEMA Premium efficiencies.

E. Noise Rating: Quiet.

F. Provide VFDs for all fan motors when required in equipment schedule on drawings.

2.8 COILS

A. Coil Sections: Common or individual, insulated. Design and construct to facilitate removal and replacement of coil for maintenance and to ensure full airflow through coils. For multizone units, provide air deflectors and air baffles to balance airflow across coils.

B. Refrigerant Coils: Cleanable coil fabricated according to ARI 410.

1. Coils shall have galvanized steel casings and be mounted in the coil casing with the same end connections accessible for service for coil removal from the unit through the roof or through the piping enclosure.

2. Tubing:
   a. a. Coils shall be copper 1/2" to 5/8" outside diameter.
   b. Fins shall be (aluminum) (copper) mechanically bonded by tubing expansion with a maximum spacing of 10 fins per inch unless noted otherwise.
   c. Coils shall have supply and return connections on the same end.
   d. Provide with venturi type refrigerant distributor arranged for down feed.
   e. Coils shall be proof tested at 450 psig and leak tested at 300 psig air pressure under water.
   f. Clean, dehydrate, and seal with a dry nitrogen charge.

g. Coils shall be suitable for a working pressure of up to 300 psig.

C.

1. Drain pans: Provide
2. Ratings: Design tested and rated according to ASHRAE 33 and ARI 410.
   a. Working-Pressure Ratings: 200 psig (1380 kPa), 325 deg F (163 deg C).
3. Source Quality Control: Test to 300 psig (2070 kPa) and to 200 psig (1380 kPa) underwater.

D. Electrical Heating Coils, Controls, and Accessories: Comply with UL 1995.

1. Casing Assembly: Slip-in or flanged type with galvanized-steel frame.
2. Heating Elements: Open-coil resistance wire of 80 percent nickel and 20 percent chromium supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame.
3. Overtemperature Protection: Disk-type, automatically resetting, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or unit.

   a. Secondary Protection: Load-carrying, manually resetting or manually replaceable, thermal cutouts; factory wired in series with each heater stage.

4. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:

   a. Magnetic contactor.
   b. Mercury contactor.
   c. Solid-state stepless pulse controller.
   d. Toggle switches, one per step.
   e. Step controller.
   f. Time-delay relay.
   g. Pilot lights, one per step.
   h. Airflow proving switch.

2.9 DAMPERS

A. General: Leakage rate, according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating," shall not exceed 2 percent of air quantity at 2000-fpm (10-m/s) face velocity through damper and 4-inch wg (1000-Pa) pressure differential.

B. Damper Operators: Electric specified in Division 23 09 23 Section "Automatic Controls and EMS".

C. Low-Leakage, Outside-Air Dampers: Double-skin, airfoil-blade galvanized-steel dampers with compressible jamb seals and extruded-vinyl blade edge seals, in opposed or parallel-blade arrangement as indicated in the Contract Documents with steel operating rods rotating in a stainless-steel sleeve or sintered bronze or nylon bearings mounted in a single galvanized-steel frame, and with operating rods connected with a common linkage. Leakage rate shall not exceed 5 cfm/sq. ft. (0.22 L/s per sq. m) at 1-inch wg (250 Pa) and 9 cfm/sq. ft. (0.4 L/s per sq. m) at 4-inch wg (1.0 MPa).

D. Mixing Boxes: Parallel-blade galvanized-steel dampers mechanically fastened to steel operating rod in reinforced, galvanized-steel cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

E. Combination Filter and Mixing Box: Parallel-blade galvanized-steel dampers mechanically fastened to steel operating rod in reinforced, galvanized-steel cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously. Cabinet support members shall hold 2-inch- (50-mm-) thick, pleated, flat permanent or throwaway filters. Provide hinged access panels or doors to allow removal of filters from both sides of unit.

2.10 FILTER SECTION

A. Filter Section: Provide filter holding frames arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or the face.

B. Refer to AHU schedule in Contract Documents for the quantity, performance, and type of filter sections.

C. Quality Assurance: Comply with NFPA 90A or 90B as required.

2.11 FACTORY MOUNTED CONTROLS

A. All end devices shall be factory mounted to prevent field alterations to the unit casing (refer to controls specifications for a list of end devices).

B. Air handler manufacturer shall furnish factory installed end devices wired to a terminal strip in the unit.

C. Terminal strip shall be centrally located on the side of the unit and easily accessible for installation and service.

D. Air handler manufacturer shall not compromise the casing performance when installing controls end devices.

2.12 OUTDOOR UNITS

A. In addition to the above, units that are installed outdoors shall also include the following:

1. VFDs for fan motors shall be installed either inside the unit’s case or in external, NEMA 4X enclosures. Provisions shall be made by the manufacturer to keep VFD from overheating whether installed internal or external to the AHU cabinet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Concrete Bases: Install floor mounting units on 6-inch- (150-mm-) high concrete bases. See Division 23 Section "Common Work Results for HVAC" for concrete base materials and fabrication requirements.

B. Install modular indoor air-handling units with the following vibration and seismic-control devices. Vibration and seismic-control devices are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment".

1. Units with Internally Isolated Fans: Set units on 1/2" neoprene pads, 40 durometer, on concrete bases. Secure units to anchor bolts concrete bases.
2. Floor-Mounted Units without Internally Isolated Fans: Support on concrete bases using housed-spring isolators. Secure units to anchor bolts installed in concrete bases.
3. Suspended Units: Suspend units from structural-steel support frame using threaded steel rods and spring hangers.

C. Arrange installation of units to provide access space around modular indoor air-handling units for service and maintenance.

D. Install external, insulated pipe chases for all outdoor units.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Connect VFDs to associated fan motors. Comply with Divisions 23 and 26 for installation requirements.

D. Connect piping to modular indoor air-handling units mounted on vibration isolators with flexible connectors.

E. Install condensate pump in drain pan and route condensate discharge to indirect waste.

1. Install condensate trap of adequate depth to seal against the pressure of fan section. Install cleanouts in piping at changes of direction.
2. Install condensate piping at appropriate slope to gravity drain.

F. Connect condensate drain pans using minimum NPS 1-1/4 (DN 32), Type M copper tubing. Extend to nearest equipment or floor drain. Install condensate trap of adequate depth to seal against the pressure of fan section and connect to drain pan. Install cleanouts at changes in direction of condensate piping.

G. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. For units without internally isolated fans, make final duct connections with flexible connections. Internally isolated fan units do not require flexible connections.

H. Electrical: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.

I. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems".

J. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

K. Connect all control points indicated in the Contract Documents to the FMS.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

1. Leak Test: After installation, fill water and steam coils with water and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
2. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.
3. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Final Checks before Startup: Perform the following:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Perform cleaning and adjusting specified in this Section.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Set zone dampers to fully open position for each zone.
7. Set face-and-bypass dampers to full face flow.
8. Set outside- and return-air mixing dampers to minimum outside-air setting.
9. Comb coil fins for parallel orientation.
10. Install clean filters.
11. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

C. Starting procedures for modular indoor air-handling units include the following:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
2. Measure and record motor electrical values for voltage and amperage.
3. Manually operate dampers from fully closed to fully open position and record fan performance.
4. Adjust damper linkages for proper damper operation.

D. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for modular indoor air-handling system testing, adjusting, and balancing.

3.6 CLEANING

A. Clean modular indoor air-handling units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face.

B. After completing system installation and testing, adjusting, and balancing modular indoor air-handling and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain modular indoor air-handling units. Refer to Division 01 Section "Demonstration and Training".

END OF SECTION

SECTION 26 00 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this and the other sections of Division 26.

1.02 SUMMARY

A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified:

1. Submittals.
2. Record documents.
3. Maintenance manuals.
4. Rough-ins.
5. Electrical installations.
6. Cutting and patching.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 23 Section “ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT”, for factory-installed or field supplied motors, controllers, accessories, and connections.

2. Division 26 Section “BASIC ELECTRICAL MATERIALS AND METHODS”, for materials and methods common to the remainder of Division 26, plus general related specifications including:
   a. Access to electrical installations.
   b. Excavation for electrical installations within the building boundaries and from building to utility connections.

1.03 SUBMITTALS

A. General: Follow the procedures specified in Section “SUBMITTALS”.

1.04 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Section “PROJECT CLOSEOUT”. In addition to the requirements specified, indicate installed conditions for:

1. Major raceway systems for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.

2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.05 MAINTENANCE MANUALS

A. Prepare a minimum of four (4) sets of maintenance manuals in accordance with Section "PROJECT CLOSEOUT". In addition to the requirements specified, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications for rough-in requirements.

3.02 ELECTRICAL INSTALLATIONS

A. The work included under this Division shall include, but not be limited to, furnishing all labor, materials, equipment and services required to construct and install the complete electrical system shown on accompanying plans and specified herein and briefly described as follows:

1. Complete distribution system for normal and emergency lighting and power, wiring devices, equipment, connection of equipment provided by others, controls,

panelboards, etc. as shown on the drawings and specified under this Division.

2. Automatic fire alarm and detection system.
3. Grounding systems.
4. Telecommunication distribution conduit system, including boxes, outlets, raceways.
5. Complete electrical testing.
6. Temporary service.

B. The Drawings and Specifications are intended to be complete and considered supplementary to one and the other. Materials or workmanship indicated, called for, or implied by one and not the other shall be furnished and installed as though specifically called for by both.

C. It is the intent of the Drawings and Specifications to obtain a complete and satisfactory installation. An attempt has been made to separate and completely define the work in separate sections of the Specifications; however, such separation will not relieve the Contractor from full responsibility of compliance with the work of his trade which may be indicated on any of the Drawings and in other Sections of the Specifications.

D. The Drawings and risers indicate in diagrammatic form the arrangements desired for the equipment fixtures, principal apparatus, and shall be followed as closely as possible. However, the Contractor shall include any additional conduit, boxes and wiring due to structural or other obstructions. Proper judgment shall be exercised in carrying out the work to secure a neat arrangement of all work.

E. Before commencing work, the Contractor shall verify measurements at building site and differences existing between actual dimensions and those shown on the drawings must be submitted to the A/E for consideration and decision before proceeding with the work. This will be required only if such differences directly affect this Contractor's work.

F. The Contractor is responsible for actions of his employees for compliance with all laws and ordinances governing his work for establishing elevations, etc., in strict accordance with plans, for accuracy in the layout, for providing personal supervision for the work. He shall lay out his lines of conduits and sleeves, etc., in accordance with drawings, in ample time so that all chases and other openings in walls may be built in advance to avoid cutting.

G. Contractor to inform himself fully regarding peculiarities and limitation of existing spaces available for installation of all materials under contract and provide ready accessibility to apparatus, including any part of the system required to be reached for maintenance or operation. Notify A/E of any non-accessibility prior to installation for clarification and correction.

H. Where interferences occur and departures from indicated arrangements are required, coordination with the other trades involved will be required to determine changed locations and elevations of fixtures, conduit, equipment, etc. Approval from the A/E for such changes will be required. This problem is normally minimized or avoided by maintaining close coordination with other trades during course of construction.

I. General: Sequence, coordinate, and integrate the various elements of electrical systems,

materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other building components. It is the intent of the design to locate all conduits and wiring concealed in walls and/or in the suspended ceiling space above unless otherwise indicated. Exposed conduits are not allowed unless specifically approved in writing by the A/E.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning within the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of electrical systems with utility services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "ACCESS DOORS" and Division 26 Section "BASIC ELECTRICAL MATERIALS AND METHODS".
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.03 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Section “CUTTING AND PATCHING”. In addition to the requirements specified, the following requirements apply:

1. Perform cutting, fitting, and patching of electrical equipment and materials required to:

    a. Uncover Work to provide for installation of ill-timed Work.
    b. Remove and replace defective Work.
    c. Remove and replace Work not conforming to requirements of the Contract Documents.
    d. Upon written instructions from the Architect, uncover and restore Work to

provide for Architect observation of concealed Work.

e. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

f. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

g. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.04 CODES AND STANDARDS

A. The latest edition and revision of the following codes and standards are considered minimum requirements for materials, workmanship and safety where not covered elsewhere in these specifications.

1. In addition to "Florida Building Code 2014" all, or the specific portions cited, of the latest edition of the following building codes are hereby incorporated by reference and made a part of this rule. In the case of conflicting requirements or where the FBC is mute, the more, or most stringent shall apply.

a. NEC. National Electrical Code, 2011 (NFPA 70).
b. NFPA. National Fire Protection Association
c. OSHA. Occupational Safety and Health Administration

3.05 SHOP DRAWINGS

A. Submit at one time in bound-book form, six (6) copies of shop and detail drawings, factory certified prints and material lists below: No action will be taken on partial submittals.

1. Panelboards, breakers, safety switches.
2. Lighting fixtures and wiring devices.
3. Fire alarm equipment and point to point wiring diagram.
4. Grounding system components.

3.06 SUBSTITUTIONS AND EQUALS

A. Products, materials, etc. shall be as specified in plans and specifications. Proposed alternate manufacturers, together with catalog cuts and model numbers, shall be submitted in writing to the Engineer with reason for alternative proposal and cost savings to Owner, prior to bid award.

B. The proposed substitution must meet all requirements of capacity, noise level, details of construction and warranties.

C. Base bid shall include costs of all specified materials and equipment. Approved alternate proposals shall be submitted separately itemizing the cost savings to the Owner.

D. The proposed substitution must be comparable type and basic design as that specified, and any deviations must be <u>specifically</u> noted in the submittals.

E. The proposed substitution shall in no way cause extra work for other trades, unless this Contractor agrees to pay for all extra costs caused by this substitution.

F. The responsibility to accept or reject any proposed substitution remains with the A/E. The Contractor assumes the financial risk of using a substitute item in his base bid.

3.07 MATERIALS AND WORKMANSHIP

A. Provide all new materials, free from defects and UL listed and approved.

3.08 AS-BUILT DRAWINGS

A. Contractor shall keep a complete set of prints at job site at all times and shall adequately mark any changes, deviations, etc., to plans during construction.

B. Contractor shall furnish a complete set of red-lined blueprints incorporating all changes, deviations, etc., that occurred during construction. These "as-built" set of prints shall be delivered to the Engineer at the substantial completion of the job. All work to be done in a neat and professional manner.

3.09 OPERATION AND INSTRUCTION

A. Operating Instructions: Complete operating and maintenance instructions shall be mounted under glass in the equipment rooms; installation data and parts catalogs which are received with the equipment shall be carefully saved and transmitted to the Project Architect as soon as it is of no further use to the Contractor installing the equipment and before final inspection.

3.10 TRAINING

A. Contractor is to provide training for maintenance staff. Training will consist of two (2) eight hour sessions where all electrical equipment will be visited and regular operation and service procedures discussed. Contractor shall obtain signed affidavits from maintenance staff that training was received.

END OF SECTION

SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. Requirements specified in Division 26 Section "Basic Electrical Requirements" apply to this Section.

1.02 SUMMARY

A. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:

1. Miscellaneous metals for support of electrical materials and equipment.
2. Wood grounds, nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment.
3. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
4. Access panels and doors in walls, ceilings, and floors for access to electrical materials and equipment.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for the following products:

1. Access panels and doors.
2. Joint sealers.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers, access panels, and doors.

B. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating shown.

1. Provide UL Label on each fire-rated access door.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

1.06 PROJECT CONDITIONS

A. Conditions Affecting Excavations: The following project conditions apply:

1. Maintain and protect existing building services which transit the area affected by selective demolition.
2. Use of explosives is not permitted.

B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do no apply joint sealers to wet substrates.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Sub-Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, or natural or crushed sand.

B. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2-inch sieve, and not more than 5 percent passing a No. 4 sieve.

C. Backfill and Fill Materials: Materials complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP; free of clay, rock, or gravel larger than 2 inches in any dimension; debris; waste; and vegetable and other deleterious matter.

2.02 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A 36.

B. Cold-Formed Steel Tubing: ASTM A 500.

C. Hot-Rolled Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Non-Shrink, Nonmetallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications.

F. Fasteners: Zinc-coated, type, grade, and class as required.

2.03 MISCELLANEOUS LUMBER

A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules, or Number 3 boards complying with SPIB rules. Lumber shall be preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent.

B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less that 15/32 inches.

2.04 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Architect from manufacturer's standard colors.

C. Elastomeric Joint Sealers: Provide the following types:

1. One-part, non-acid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
2. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

D. Acrylic-Emulsion Sealants: One-part, non-sag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications on interior and protected exterior locations involving joint movement of not more than plus or minus 5 percent.

E. Fire-Resistant Joint Sealers: Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. “Dow Corning Fire Stop Foam”, Dow Corning Corp.
   b. “Pensil 851", General Electric Co.

2.05 ACCESS DOORS

A. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.

B. Frames: 16-gage steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.

1. For installation in masonry, concrete, ceramic tile, or wood paneling: 1 inch-wide-exposed perimeter flange and adjustable metal masonry anchors.
2. For gypsum wallboard or plaster: perforated flanges with wallboard bead.
3. For full-bed plaster applications: galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

C. Flush Panel Doors: 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.

1. Fire-Rated Units: Insulated flush panel doors, with continuous piano hinge and self-closing mechanism.

D. Locking Devices: Flush, screwdriver-operated cam locks.

E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Karp Associates, Inc.
2. Milcor Div. Inryco, Inc.
3. Nystrom, Inc.

F. Refer to Architectural drawings for access doors location, type and size required.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION FOR JOINT SEALERS

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

3.03 EXCAVATION

A. Slope sides of excavations to comply with local codes and ordinances. Shore and brace as required for stability of excavation.

B. Shoring and Bracing: Establish requirements for trench shoring and bracing to comply with local codes and authorities. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

1. Remove shoring and bracing when no longer required. Where sheeting is allowed to remain, cut top of sheeting at an elevation of 30 inches below finished grade elevation.

C. Install sediment and erosion control measures in accordance with local codes and ordinances.

D. De-watering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of bearing materials. Provide and maintain de-watering system components necessary to convey water away from excavations.
2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

E. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip-line of trees indicated to remain.

2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS AStructural Welding Code@.

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.06 APPLICATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
2. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

B. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

C. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.07 INSTALLATION OF ACCESS DOORS

A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.

B. Adjust hardware and panels after installation for proper operation.

END OF SECTION

SECTION 26 05 19

WIRE AND CABLE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Requirements of the following Division 26 Sections apply to this section:

1. Basic Electrical Requirements.

1.02 SUMMARY

A. This Section includes wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

B. Related Sections: The following Sections contain requirements that relate to this section:

1. Division 26 Section "Electrical Boxes and Fittings" for connectors for Terminating Cables in boxes and other electrical enclosures.

1.03 SUBMITTALS

A. Product Data for electrical wires, cables and connectors.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following code:

B. NFPA 70 "National Electrical Code", 2011 Edition.

1. Conform to applicable codes and regulations regarding toxicity of combustion products of insulating materials.

C. UL Compliance: Provide components which are listed and labeled by UL.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wire and Cable:
   American Insulated Wire Corp.
   Brintec Corp.
   Southwire Company.

2. Connectors for Wires and Cable Conductors:
   3M Company
   O-Z/Gedney Co.
   Square D Company.

2.02 WIRES AND CABLES

A. General: Provide wire and cable suitable for the temperature, conditions and location where installed.

B. Conductors: Provide solid copper conductors for all power and lighting circuits. Branch circuit conductors shall be #12 AWG minimum.

C. Conductor Material: copper for all to include:

1. All wire and cable.
2. All bussing in switchboards and panelboards.
3. All lugs and connectors.

   a. Lugs must be copper (not aluminum or Cu/Al).
   b. All compression lugs and connectors shall be installed per UL Article 486-B and terminated with combination dual rated compression tool.

D. Provide color coding for phase identification in accordance with Table 1 in Part 3 below.

E. Insulation: In general, provide THHN/THWN insulation for all conductors. In addition, provide THW or XHHW insulation as appropriate for the locations where installed.

F. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90 deg. bends, for pulls in conduits underground or under slabs on grade, and where indicated.

G. Cables: Provide cables in NEC approved locations and applications where indicated. Provide cable UL listed for particular application.

2.03 CONNECTORS FOR CONDUCTORS

A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 EXECUTION

3.01 WIRING METHOD

A. Use the following wiring methods as indicated:

1. Wire: install all wire in raceway. Not more than five (5) wires, including equipment ground conductor shall be installed in a conduit run except by special permission.

3.02 INSTALLATION OF WIRES AND CABLES

A. General: Install electrical cables, wires, and connectors in compliance with NEC.

B. Coordinate cable installation with other Work.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

E. Conceal all cable in finished spaces.

F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.

G. Keep conductor splices to minimum.

H. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced.

I. Use splice and tap connectors which are compatible with conductor material.

J. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

K. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

L. 120 volt circuits for lighting and receptacles exceeding 100 feet in length from the panelboard to the first outlet shall be #10 AWG to the first outlet and #12 AWG there on.

3.03 FIELD QUALITY CONTROL

A. Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.

B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.

C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

3.04 TABLE 1

A. Color Coding for Phase Identification:

1. Color code secondary service, feeder, and branch circuit conductors as follows:

Wire of size No. 6 and smaller shall be factory color coded. Wire sizes larger than No. 6 may be factory color coded or color coded with properly applied tape. Should tape be used, it shall cover not less than 6 inches of cable, at each outlet, cabinet or junction box, Scotch No. 461.

Colors to be used in coding shall be:

208/120 Volts	Phase
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Division-26 Basic Materials and Methods sections apply to work of this section.

C. Requirements of this section apply to electrical grounding and bonding work specified elsewhere in these specifications.

1.02 SUMMARY

A. Extent of electrical grounding and bonding work is indicated by drawings and schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.

B. Type of electrical grounding and bonding work specified in this section includes the following:

1. Solidly grounded.

C. Applications of electrical grounding and bonding work in this section include the following:

1. Metal building frames.
2. Electrical power systems.
3. Grounding electrodes.
4. Separately derived systems.
5. Raceways.
6. Service equipment.
7. Enclosures.
8. Equipment.

D. Refer to other Division-26 sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electrical grounding and bonding work; not work of this section.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.

B. Wiring Diagrams: Submit wiring diagrams for electrical grounding and bonding work which indicates layout of ground rings, location of system grounding electrode connections, routing

of grounding electrode conductors, also include diagrams for circuits and equipment grounding connections.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of grounding and bonding products, of types, and ratings required, and ancillary grounding materials, including stranded cable, copper braid and bus , grounding electrodes and plate electrodes, and bonding jumpers whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with electrical grounding work similar to that required for project.

C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.
2. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869, "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment. In addition, comply with UL Standard 486A, “Wire Connectors and Soldering Lugs for Use with Copper Conductors”. Provide grounding and bonding products which are UL-listed and labeled for their intended usage.
3. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141 and 142 pertaining to grounding and bonding of systems, circuits and equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide grounding and bonding products of one of the following (for each type of product):

1. Adalet-PLM Div; Scott Fetzer Co.
2. Burndy Corporation.
3. Cadweld Div; Erico Products Inc.
4. Crouse-Hinds Div; Cooper Industries.
5. Eagle Electric Mfg Co.
6. Ideal Industries, Inc.
7. Joslyn Corporation.
8. Okonite Company.
9. OZ Gedney Div; General Signal Corp.
10. Thomas and Betts Corp.

2.02 GROUNDING AND BONDING

A. General: Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.

B. Conductors: Provide separately run "green" electrical grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC 250-66, 250-122, for all feeders and all power and lighting branch circuits.

C. Bonding Plates, Connectors, Terminals and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by bonding plate, connector, terminal and clamp manufacturers for indicated applications.

D. Ground Electrodes and Plates:

1. Grounding Electrodes: Steel with copper welded exterior, 3/4" dia. by 10 feet.
2. Grounding Plate: 1/4"D x 4"W x 18"L.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS:

A. General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

C. Weld grounding conductors to underground grounding electrodes.

D. Ground electrical service system neutral at service entrance equipment to grounding electrodes.

E. Ground each separately-derived system neutral to building steel and/or effectively grounded cold water pipe.

F. Connect together system neutral, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

G. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

H. Connect grounding electrode conductors to 1-inch diameter, or greater, metallic cold water pipe using a suitably sized ground clamp. Provide connections to flanged piping at street side of flange.

I. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

J. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

K. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.

L. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester. Where tests show resistance-to- ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance.

END OF SECTION

SECTION 26 05 29

SUPPORTING DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Requirements of the following Division 26 Sections apply to this section:

1. “Basic Electrical Requirements”.
2. “Basic Electrical Materials and Methods”.

1.02 SUMMARY

A. This Section includes secure support from the building structure for electrical items by means of hanger rods, supports, anchors, sleeves, inserts, seals, and associated fastenings.

B. It is the intent of the contract plans and specifications to locate all major electrical components in accessible locations above the drop ceiling spaces, securely fastened as described herein.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Refer to other Division 26 sections for additional specific support requirements that may be applicable to specific items.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Specification Sections.

B. Product data for each type of product specified.

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code", 2011 Edition.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Slotted Metal Angle and U-Channel Systems:
   a. American Electric
   b. B-Line Systems, Inc.
   c. Unistrut Diversified Products.

2. Conduit Sealing Bushings:
   a. Bridgeport Fittings, Inc.
   b. Red Seal Electric Corp.
   c. Thomas & Betts Corp.

2.02 COATINGS

A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

2.03 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and threaded hanger rods may be used.

1. Raceways shall not be suspended or supported from ceiling suspension wires.
2. Raceways shall not be suspended or supported from ductwork or piping.
3. Raceways shall not be suspended or supported with wires. Proper conduit hangers are required.
4. Raceways shall be grouped and suspended on "trapeze" supports, with dedicated pipe clamps per conduit.

B. Fasteners: Types, materials, and construction features as follows:

1. Expansion Anchors: Carbon steel wedge or sleeve type.
2. Toggle Bolts: All steel springhead type.
3. Powder-Driven Threaded Studs: Heat-treated steel, designed specifically for the intended service.

C. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

D. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

E. U-Channel Systems: 16-gage steel channels, with 9/16- inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

2.03 FABRICATED SUPPORTING DEVICES

A. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.

B. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

C. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gage metal for sleeve diameter noted:
   3-inch and smaller: 20-gage.
   4-inch to 6-inch: 16-gage.
   over 6-inch: 14-gage.
2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.
2. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
3. Support parallel runs of horizontal raceways together on trapeze-type hangers.
4. Space supports for raceways in accordance with Table I of this section. Space supports for raceway types not covered by the above in accordance with NEC.
5. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
6. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

D. Vertical Conductor Supports: Install simultaneously with installation of conductors.

E. Sleeves: Install in concrete slabs and walls and all other fire-rated floors and walls for raceways and cable installations. For sleeves through fire rated- wall or floor construction,

apply UL-listed firestopping sealant in gaps between sleeves and enclosed conduits and cables in accordance with “Fire Resistant Joint Sealers” requirement of Division 7 Section “Joint Sealers”.

F. Conduit Seals: Install seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.

G. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with the following:

1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
3. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.

TABLE I: SPACING FOR RACEWAY SUPPORTS

Raceway Size (Inches)	No. of Conductors In Run	Location	Maximum Spacing of Supports (Feet)
		HORIZONTAL RUNS	
1/2, 3/4	1 or 2	Flat ceiling or wall.	5
1/2, 3/4	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	7
1/2, 3/4	3 or more	Any location.	7
1/2 - 1	3 or more	Any location.	7
1 & larger	1 or 2	Flat ceiling or wall.	6
1 & larger	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	10
1 & larger	3 or more	Any location.	10
Any	. . . .	Concealed.	10

Raceway Size (Inches)	No. of Conductors In Run	Location	Maximum Spacing of Supports (Feet)
		VERTICAL RUNS	
1/2, 3/4	. . . .	Exposed.	7
1, 1-1/4	. . . .	Exposed.	8
1-1/2 and larger	. . . .	Exposed.	10
Up to 2	. . . .	Shaftway.	10
2-1/2	. . . .	Shaftway.	10
3 & larger	. . . .	Shaftway.	10
Any	. . . .	Concealed.	10

END OF SECTION

SECTION 26 05 33.13

RACEWAYS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Requirements of the following Division 26 Sections apply to this Section:

1. "Basic Electrical Requirements".
2. "Basic Electrical Materials and Methods".

1.02 SUMMARY

A. This Section includes raceways for electrical wiring. Types of raceways in this section include the following:

1. Electrical metallic tubing (EMT).
2. Flexible metal conduit.
3. Liquidtight flexible conduit.
4. Galvanized rigid metal conduit (GRC).
5. Intermediate metallic conduit (IMC).
6. Polyvinyl Chloride Conduit (PVC).

B. Related Sections: The following Division 26 Sections contain requirements that relate to this Section:

1. "Wire and Cable" for other wiring methods.
2. "Supporting Devices" for raceway supports.
3. "Electrical Boxes and Fittings" for boxes used with conduit and tubing systems.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Product Data for the proposed products.

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code", 2011 Edition.

B. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.

C. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate with other Work, including metal and concrete deck installation, as necessary to interface installation of electrical raceways and components with other Work.

B. Careful coordination with the work of Division 23 will be required to avoid conflicts. In particular, note that homeruns to electrical rooms are not direct. HVAC ductwork has priority.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Allied
2. Wheatland
3. Triangle
4. Midwest Electric.

2.02 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Steel Conduit: UL 1242.

C. Electrical Metallic Tubing and Fittings: ANSI C80.3.

D. Flexible Metal Conduit: UL 1, zinc-coated steel.

E. Liquidtight Flexible Metal Conduit and Fittings: UL 360.

2.03 CONDUIT BODIES

A. General: Types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion- resistant screws.

B. Metallic Conduit and Tubing: Use metallic conduit bodies. Use bodies with threaded hubs for threaded raceways.

C. Conduit Bodies: Use bodies with steel set screw fittings and connectors.

PART 3 EXECUTION

3.01 WIRING METHOD

A. Galvanized Rigid Conduit (GRC)

1. Galvanized rigid conduit may be used for all applications. Except where indicated otherwise, galvanized rigid conduit must always be used in the following applications:

a. Underground, where indicated on the drawings.
b. Cast in floor slabs.
c. Anywhere there is exposed conduit, up to 8'-0" above floor.
d. All conduits trade size 2" and above.

B. Intermediate Metal Conduit (IMC)

1. Intermediate metal conduit (IMC) may be used for the same applications as rigid galvanized, except:

a. IMC may not be used underground.
b. IMC may not be used in or below the ground floor.

C. Electrical Metallic Tubing (EMT)

1. EMT may be used for the following applications, unless indicated otherwise:
a. Indoors in concealed areas (in partitions, above ceiling).
b. Exposed in storage rooms and in mechanical and electrical rooms.
c. Above 8'-0" in areas of exposed conduit.

2. EMT may not be used in the following applications:
a. Out-of-doors.
b. Damp or moist locations.
c. Exposed under exterior canopies or overhangs.

D. Flexible Metal Conduit

1. Flexible metal conduit shall be used for connections to indoor lighting fixtures in lengths not to exceed six (6) feet.
2. Liquid-tight type flexible steel metal conduit shall be used for all other applications where flexible connections are required.

E. PVC Conduit

1. PVC conduit may be used for the following applications, unless indicated otherwise:
a. Underground.

3.02 INSTALLATION

A. General: Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements of NEC, and as follows:

B. Conceal Conduit and EMT, unless indicated otherwise, within finished walls and ceilings. Keep raceways at least 6 inches away from parallel runs of hot water pipes. Install raceways level and square and at proper elevations.

C. Elevation of Raceway: Where possible, install horizontal raceway runs above water piping.

D. Complete installation of electrical raceways before starting installation of conductors within raceways.

E. Provide supports for raceways as specified elsewhere in Division 26.

F. Prevent foreign matter from entering raceways by using temporary closure protection.

G. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.

I. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For rigid and intermediate steel conduit, use threaded rigid steel conduit fittings. All EMT fittings shall be steel set screw type; die cast or pot metal are not acceptable.

J. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated. This does not apply to conduits in crawl spaces.

K. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical.

L. Run exposed, parallel, or banked raceways together. Make bends in parallel or banked runs from the same center line so that the bends are parallel. Factory elbows may be used in banked runs only where they can be installed parallel. This requires that there be a change in the plane of the run such as from wall to ceiling and that the raceways be of the same size. In other cases provide field bends for parallel raceways.

M. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.

N. The minimum size of raceways shall be 3/4" throughout the entire length of run.

O. Terminations: Raceways shall be terminated with locknuts and bushings. Align the raceway

to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box. All GRS runs shall be terminated with an insulated throat steel bushing.

P. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

Q. Install pull wires in all empty raceways. Use polyester or monofilament plastic line having not less than 200 -lb. tensile strength. Leave not less than 12 inches of slack at each end of the pull wire. Identify pull wires at both ends. Pull wire shall be #14TW Thomas Industries Set Line #232.

R. Telephone and Signal System Raceways 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways 2-inches and smaller trade size in maximum lengths at 150 feet and with a maximum of two, 90-deg bonds or equivalent. Install pull or junction boxes where necessary to comply with these requirements.

S. Flexible Connections: Use short length (maximum of 6 ft.) of flexible conduit for recessed and semi-recessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors. Install separate ground conductor across flexible connections.

T. Select each surface raceway outlet box to which a lighting fixture is attached to be of sufficient diameter to provide a seat for the fixture canopy.

U. Where a surface raceway is used to supply a fluorescent lighting fixture having central stem suspension with a backplate and a canopy, with or without extension ring, the backplate and canopy will serve as the outlet box and no separate outlet box need be provided.

V. Provide surface raceway outlet box, in addition to the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end stem suspension.

W. Where a surface raceway extension is made from an existing outlet box on which a lighting fixture is installed, provide a backplate slightly smaller than the fixture canopy, and no additional surface mounted outlet box need be installed.

X. Conduits rigidly secured to building construction on opposite sides of a building expansion joint shall be provided with expansion joints and deflection couplings.

Y. Deflection/Expansion Fittings: O-Z/Gedney Type DX for GRC, IMC or PVC conduit, UL listed, watertight allowing minimum 3/4" movement in all directions, up to 30^{o} deflection in any direction, with bonding jumper.

3.03 ADJUSTING AND CLEANING

A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

END OF SECTION

SECTION 26 05 33.16

ELECTRICAL BOXES AND FITTINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. This section is a Division-26 Basic Electrical Materials and Methods section, and is a part of each Division-26 section making reference to electrical wiring boxes and fittings specified herein.

1.02 DESCRIPTION OF WORK

A. Extent of electrical box and associated fitting work is indicated by drawings and schedules.

B. Types of electrical boxes and fittings specified in this section include the following:

1. Outlet boxes.
2. Junction boxes.
3. Pull boxes.
4. Bushings.
5. Locknuts.
6. Knockout closures.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical boxes and fittings, of types, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.

C. UL Compliance: Comply with applicable requirements of UL 50, UL 514-Series, and UL 886 pertaining to electrical boxes and fittings. Provide electrical boxes and fittings which are UL-listed and labeled.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical boxes and fittings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following:

1. Adalet-PLM Div, Scott Fetzer Co.
2. Appleton Electric; Emerson Electric Co.
3. Bell Electric; Square D Company
4. Eagle Electric Mfg. Co., Inc.
5. Midland-Ross Corp.
6. OZ/Gedney; General Signal Co.
7. Pass and Seymour, Inc.
8. RACO Div; Harvey Hubbell Inc.

2.02 FABRICATED MATERIALS

A. Outlet Boxes: Provide galvanized coated flat rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.

1. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code-compliance option.

B. Device Boxes: Provide galvanized coated flat rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding.

1. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code-compliance option.

C. Raintight Outlet Boxes: Provide corrosion-resistant cast- metal raintight outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit holes for fastening electrical conduit, cast-metal face plates with spring-hinged watertight caps suitably configured for each application, including face plate gaskets and corrosion-resistant plugs and fasteners.

D. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

E. Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant box knockout closures at all unused box openings, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

PART 3 EXECUTION

3.01 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

A. General: Install electrical boxes and fittings as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

C. Coordinate the exact location and mounting height of all system boxes with architectural plans prior to rough-in.

D. The Architect/Engineer reserves the right to offset and/or modify the exact location of device backboxes prior to rough-in without additional cost to the Owner.

E. Provide weathertight outlets for interior and exterior locations exposed to weather or moisture.

F. Provide knockout closures to cap unused knockout holes where blanks have been removed.

G. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.

H. Avoid installing boxes back-to-back in walls. Provide not less than 6" (150 mm) separation.

I. Position recessed outlet boxes accurately to allow for surface finish thickness.

J. Set floor boxes level and flush with finish flooring material.

K. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surfaces.

L. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.

M. Subsequent to installation of boxes, protect boxes from construction debris and damage.

N. Die cast or pot metal boxes, extensions or mud rings are not acceptable.

O. Boxes, where used to enclose flush devices, shall be provided with the proper mud ring to insure that the front edge to finish complies with NEC. No goofrings will be acceptable.

P. Extension rings shall not be permitted.

3.02 GROUNDING

A. Upon completion of installation work, properly ground electrical boxes and demonstrate compliance with requirements.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions, Special Provisions and Specification Sections, apply to this Section.

B. Requirements of the following Division 26 Sections apply to this section:

1. “Basic Electrical Requirements”.
2. “Basic Electrical Materials and Methods”.

1.02 SUMMARY

A. This Section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including but not limited to the following:

1. Identification labeling for raceways, cables, and conductors.
2. Warning and caution signs.
3. Equipment labels and signs.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 26 Section 26 05 19 "Wire and Cable" for requirements for color coding of conductors for phase identification.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Specification Sections.

B. Product Data for each type of product specified.

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 “National Electrical Code”, 2011 edition.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. American Labelmark Co.
2. National Band and Tag Co.
3. Panduit Corp.
4. Seton Name Plate Co.
5. Standard Signs, Inc.
6. W. H. Brady, Co.

2.02 ELECTRICAL IDENTIFICATION MATERIALS

A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.

B. Color-Coded Conduit Markers:

1. General: Provide manufacturer's standard pre-painted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, extending 360 degrees around conduits; designed for attachment to conduit by adhesive, adhesive lap joint of marker, matching adhesive plastic tape at each end of marker, or pre-tensioned snap-on. Except as otherwise indicated, provide lettering which indicates voltage of conductor(s) in conduit. Provide 8" minimum length for 2" and smaller conduit, 12" length for larger conduit.
2. Colors: Unless otherwise indicated or required by governing regulations, provide white markers with black letters.

C. Color-Coded Plastic Tape:

1. General: Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2" wide.
2. Colors: Unless otherwise indicated or required by governing regulations, provide orange tape.

D. Cable/Conductor Identification Bands:

1. General: Provide manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type, either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identifications.

E. Plasticized Tags:

1. General: Manufacturer's standard pre-printed or partially pre-printed accident-prevention and operational tags, of plasticized card stock with matte finish suitable for writing, approximately 3-1/4" x 5-5/8", with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording, e.g., DANGER, CAUTION, DO NOT OPERATE.

F. Engraved Plastic-Laminate Signs:

1. General: Provide engraving stock melanine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, black face and white core plies (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
2. Thickness: 1/6", except as otherwise indicated.
3. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

PART 3 EXECUTION

3.01 APPLICATION AND INSTALLATION

A. General Installation Requirements:

1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of NEC.
2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.
3. Regulations: Comply with governing regulations, and requests of electrical work.

B. Conduit Identification:

1. General: Where electrical conduit is exposed in spaces apply color-coded identification on electrical conduit in manner similar to piping identification. Except as otherwise indicated, use white as coded-color for conduit.

C. Junction Pullbox Identification:

1. Junction boxes, pullboxes and their covers shall be distinctively painted to identify their service. (A convenient way to facilitate this is to spray-paint the boxes and covers in groups before installation).

2. Boxes shall be color coded as follows:

Blue	-	Normal Power
Black	-	Normal Lighting
Red	-	Emergency Power/Lighting
Orange	-	Fire Alarm
Yellow	-	Telephone/Data System

D. Operational Identifications and Warnings:

1. General: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent

identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosure. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

E. Danger Signs:

1. General: In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about project.
2. High Voltage: Install danger signs wherever it is possible, under any circumstance, for persons to come into contact with electrical power of voltages higher than 110-120 volts.
3. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

F. Equipment/System Identification:

1. General: Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering, on 1-1/2" high sign (2" high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:

    a. Panelboards, electrical cabinets and enclosures, disconnect switches, starters and controllers, VFD units.
    b. Access panel/doors to electrical facilities
    c. Transformers
    d. Telephone equipment
    e. Fire Alarm master station or control panel

2. Install signs at location indicated or, where not otherwise indicated, at location for best convenience or viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate.

END OF SECTION

SECTION 26 05 83

ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. This section is a Division-26 Basic Electrical Materials and Methods section, and is part of each Division -23 and -26 section making reference to electrical connections for equipment specified herein.

1.02 DESCRIPTION OF WORK

A. Provide all required electrical connections for equipment as required and/or indicated by drawings and schedules. Electrical connections are hereby defined to include 120/240V electrical power, raceways, wiring, connections and ancillary equipment such as low voltage transformers, relays, etc. used for providing electrical power to equipment.

B. Applications of electrical power connections specified in this section include the following:

1. To resistive heaters.
2. From electrical source to motor starters.
3. From motor starters to motors.
4. From motor starters to variable frequently drives to motors.
5. To lighting fixtures.
6. To converters, rectifiers, step-down transformers, inverters, rheostats, relays, remote control units, and similar current adjustment features of equipment.
7. To VAV box control actuators.
8. To grounds including earthing connections.
9. To master units of communication, signal, alarm, public address, and sound systems.
10. To control system processor panels.
11. To motorized dampers.

C. Electrical connections for related equipment, not furnished as an integral part of equipment, are specified in Division-23 and other Division-26 sections, and are work of this section.

D. Motor starters and controllers, not furnished as an integral part of equipment, are specified in applicable Division-26 sections, and are work of this section.

E. Refer to Division-23 sections for motor starters and controllers furnished integrally with equipment; not work of this section.

F. Junction boxes and disconnect switches required for connecting motors and other electrical units of equipment are specified in applicable Division-26 sections, and are work of this section.

G. Electrical identification for wire/cable conductors is specified in Division-26 section, "Electrical Identification", and is work of this section.

H. Raceways and wires/cables required for connecting motors and other electrical units of equipment are specified in applicable Division-26 sections, and are work of this section.

I. Refer to other Division-26 sections for junction boxes and disconnect switches required for connecting motors and other electrical units of equipment; not work of this section.

J. Refer to Division-23 sections for control system wiring; not work of this section.

K. Refer to sections of other Divisions for specific individual equipment power requirements, not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors and terminals, of types and ratings required, and ancillary connection materials, including electrical insulating tape, soldering fluxes, and cable ties, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with at least 5 years of successful installation experience with projects utilizing electrical connections for equipment similar to that required for this project.

C. NEC Compliance: Comply with applicable requirements of NEC as to type products used and installation of electrical power connections (terminals and splices), for junction boxes, motor starters, and disconnect switches.

D. UL Compliance: Comply with UL Std 486A, "Wire Connectors and Soldering Lugs for Use With Copper Conductors" including, but not limited to, tightening of electrical connectors to torque values indicated. Provide electrical connection products and materials which are UL-listed and -labeled.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of product):

1. Adalet-PLM Div, Scott and Fetzer Co.
2. Appleton Electric Co.
3. Arrow-Hart Div, Crouse-Hinds Co.
4. Burndy Corporation.
5. Gould, Inc.
6. Harvey Hubbell Inc.
7. Square D Company.
8. Thomas and Betts Corp.

2.02 MATERIALS AND COMPONENTS

A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminal lugs, electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.

B. Metal Conduit, Tubing and Fittings:

1. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights required for each type service. Provide products complying with Division-26 Section 26 05 33.13 - "Raceways".

C. Wires, Cables, and Connectors:

1. General: Provide wires, cables, and connectors complying with Division-26 Section - "Wire and Cable".
2. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 20 deg. C (68 deg. F).
3. Connectors and Terminals: Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.
4. Electrical Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, electrical solder, electrical soldering flux, wire nuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect area and conditions under which electrical connections for equipment are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF ELECTRICAL COMPONENTS

A. Install electrical connections as indicated; in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.

B. Coordinate with other work, including wires/cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.

C. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

D. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced.

E. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning wire.

F. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

H. Provide flexible conduit for motor connections, and other electrical equipment connections, where subject to movement and vibration.

I. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following conditions:

1. Exterior location.
2. Moist or humid atmosphere where condensate can be expected to accumulate.
3. Water spray.
4. Dripping oil, grease, or water.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 26 05 19 - Wire and Cable.
2. 26 28 16 - Overcurrent Protective Devices.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriter Laboratories (UL) labels.

B. Panelboards used as service entrance equipment shall be UL labeled.

1.03 SUBMITTALS

A. Submit manufacturer's literature and technical data before starting work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Panelboards:

1. General Electric.
2. Siemens.
3. Square D.

2.02 EQUIPMENT

A. Panelboards:

1. Interiors shall be factory assembled and designed to allow switching and protective devices to be replaced without disturbing adjacent units, without removing the main bus connectors, and allowing circuits to change without machining, drilling, or tapping.
2. Branch circuits shall be arranged using double row construction unless narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings. Circuit breakers shall be bolt-on type.
3. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. A ground bus shall be included in all panels.

B. Boxes and Trim:

1. Boxes shall be at least 20 inches wide made from code gage galvanized sheet steel.

    a. Provide minimum gutter space according to NEC.
    b. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space.
    c. At least 4 interior mounting studs with adjustable nuts shall be provided.

2. Switching device handles shall be accessible.

    a. Doors and panelboard trims shall not uncover any live parts.
    b. Doors shall have flush chrome plated handle with cylinder lock and catch, except doors over 48 inches in height shall have auxiliary fasteners top and bottom of door in addition to the flush type cylinder lock and catch.
    c. Panelboard switching devices with individual dead front doors shall be acceptable instead of standard door in trim design.
    d. Panelboard trim clamps shall be of the indicating type.

3. Door hinges shall be concealed. Locks shall be keyed alike. Furnish directory frame and card having a transparent cover with each door.
4. Exterior and interior steel surfaces of the trim shall be properly cleaned, primed with rust inhibiting phosphatic coating, and finished with manufacturer's standard gray paint.

    a. Exposed flush panels in kitchens shall have stainless steel front.
    b. Trims for flush panels shall overlap the box for at least 3/4" all around.
    c. Surface trims shall have the same width and height as the box.
    d. Trims shall be mountable by a screwdriver without the need for special tools.
    e. After installation, trim clamps shall not be accessible when the panel door is closed and locked.

5. Panelboards exposed to the weather shall have NEMA Type 3R raintight enclosure or NEMA 4X in corrosive environments.

C. Electrical Components:

1. Main bus bars shall be copper sized according to UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C. above an ambient of 40 degrees C. maximum. Provide main circuit breakers, main lugs, or sub-feed lugs as required.

2. Each panelboard shall incorporate breakers as shown with AIC or higher, at the application voltage, than the available fault at its location along the electrical distribution system, as determined by short circuit study. Minimum rating of breakers shall be:

a. Lighting and power panels for use at 120/240 volts: 225 amp maximum with circuit breakers rated at 10K AIC symmetrical at 240 volts. Type B10B by Westinghouse or accepted equivalent.
b. Distribution panels for use at 120/240 volts: UL listed with minimum integrated assembly rating of 22K AIC. Type Q22B by Westinghouse or accepted equivalent.

3. Panels tested and listed according to UL 67 and bearing an integrated short circuit rating shall be determined by the short circuit study on the electrical system with 10,000 AIC minimum.
4. Any 2 single pole circuit breaker shall be replaceable by 1 two-pole circuit breaker and any 3 single-pole breaker shall be replaceable by 1 three-pole circuit breaker.
5. Where new circuit breakers are specified to be installed within existing panelboards, they shall be compatible in terms of manufacture, type, and AIC.
6. Distribution panelboards, 400 amperes and over, shall be provided with molded case circuit breakers tested and UL labeled according to UL 489.
7. Breakers 100 ampere through 400 ampere frame sizes shall be thermal-magnetic trip with inverse time current characteristics, unless otherwise noted.
8. Provide ground fault circuit interrupter circuit breakers where indicated.
9. Emergency Panelboards Identification: Paint door red and stencil in 1 inch high yellow letters “EMERGENCY PANEL” in addition to appropriate individual panel identification as shown on drawings.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install according to manufacturer's recommendations and applicable codes and regulations.

B. Panelboards shall be installed where indicated and with top of cabinet 6'-6" above floor, and shall be rigidly and securely attached to building construction and shall not depend upon conduit for support. Allow at least 1/2" air space behind wall mounted panelboards.

C. Install panelboards according to manufacturer's recommended data. Maintain clearances required by the National Electric Code, with particular attention to working space around panelboards. Maintain clear space above panelboards, coordinate with other trades to avoid placement of panelboards below piping, ductwork, or other foreign appurtenances. Relocate panels at no additional cost should such interference occur.

D. Supply panelboards with phenolic nameplate 1 inch x 3 inch on exterior of panels and engraved with panel designation and voltage rating. Lighting and power panelboards shall be provided with a clear plastic enclosed typewritten directory inside. Circuit identification shall

include load type (lighting, receptacles, etc.) and rooms served.

E. Where flush type panelboards are indicated, provide one 3/4" empty conduit terminated in accessible ceiling above for each 3 spare circuit breakers provided in the panelboard.

F. Install circuit breakers in existing panelboards according to manufacturer's recommendation. Verify tightness of connections including mains. Identify new circuits on the panel directory. If none exists, provide one.

G. Clean and touch up panelboard as required at completion of the project.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Requirements of the following Division 26 Sections apply to this section:

1. Basic Electrical Requirements.

1.02 SUMMARY

A. This Section includes the following:

1. Receptacles
2. Ground Fault Circuit Interrupter Receptacles
3. Snap Switches
4. Wall Plates.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 26 Section "Circuit and Motor Disconnects" for devices other than snap switches and plug/receptacle sets used as disconnects for motors.

1.03 SUBMITTALS

A. Product data for each type of product specified.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following codes.

B. NFPA 70 "National Electrical Code", 2011 Edition.

1. UL and NEMA Compliance: Provide wiring devices which are listed and labeled by UL and comply with applicable UL and NEMA standards.

1.05 SEQUENCE AND SCHEDULING

A. Schedule installation of finish plates after the surface upon which they are installed has received final finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bryant Electric Co.
2. Leviton
3. Hubbell Inc.
4. Square D Co.
5. Pass and Seymour
6. Slater.

2.02 WIRING DEVICES

A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Provide ivory color devices and wall plates except as otherwise indicated. Verify color selections with Architect.

B. Receptacles: As scheduled in Table 1 in Part 3 below. Comply with UL 498 and NEMA WD 1.

C. Receptacles, Industrial Heavy Duty: Provide pin and sleeve design receptacles conforming to UL 498. Comply with UL 1010 where installed in hazardous locations. Provide features indicated.

D. Ground-Fault Interrupter (GFI) Receptacles: as indicated in Table 1 in Part 3 below; provide "feed-thru" type ground-fault circuit interrupter, with integral heavy-duty NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2-3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 94.3.

E. Snap Switches: quiet type AC switches as indicated in Table 2 in Part 3 below. Comply with UL 20 and NEMA WD1.

2.03 WIRING DEVICE ACCESSORIES

A. Wall plates: single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plate color to match wiring devices except as otherwise indicated. Provide wall plates with engraved legend where indicated. Conform to requirements of Section "Electrical Identification@. Provide plates possessing the following additional construction features:

1. Material and Finish: steel plate with wrinkled finish, baked-on white insulating enamel. (Unfinished spaces).
2. Material and Finish: plastic, smooth. (Finished spaces).

PART 3 EXECUTION

3.01 INSTALLATION OF WIRING DEVICES AND ACCESSORIES

A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work.

C. Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris.

D. Install wiring devices after wiring work is completed.

E. Install wiring devices after painting work is completed.

F. Install wall plates after painting work is completed.

G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Use properly scaled torque indicating hand tool.

H. All convenience receptacle outlets installed within six (6) feet of water supplies, wet locations, toilet rooms and the exterior of the Building shall have an integral ground fault circuit interruptor (GFCI) protection device.

3.02 PROTECTION

A. Protect installed components from damage. Replace damaged items prior to final acceptance.

3.03 FIELD QUALITY CONTROL

A. Testing: Prior to energizing circuits, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times.

B. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations:

TABLE 1

RECEPTACLES

DESIG-NATION (1)	CURRENT RATING AMPS	VOLTAGE RATING	SINGLE/ DUPLEX	NEMA CONFIG-URATION	UL GRADE	NOTES
-	20	125	DUPLEX	5-20R	HEAVY DUTY	
WP	20	125	DUPLEX	5-20R	HEAVY DUTY	WEATHERPROOF
GFI	20	125	DUPLEX	5-20R	HEAVY DUTY	INTEGRAL GFI

TABLE 2

SNAP SWITCHES

DESIG-NATION (1)	TYPICAL APPLICATION	LOAD RATING	VOLTAGE RATING (AC)	POLES	UL GRADE	NOTES
S	CONTROL LIGHTS	20A	120	1	HEAVY DUTY	
S3	CONTROL LIGHTS	20A	120	3-WAY	HEAVY DUTY	
SM	DISCONN. MOTOR	HP RATED	120/240	1	HEAVY DUTY	(2)
SD	DIMMER SWITCH	1000W	120	1	HEAVY DUTY	(3)

NOTES

(1) For snap switches, designation is the same as the symbol used on plans for the device. Type of switch is determined from plan context including type of device or circuit being controlled.
(2) No overload element in switch.
(3) Derate dimmer switch and increase required rating per manufacturer's recommendations where dimmers are ganged together.

END OF SECTION

SECTION 26 28 00

CIRCUIT AND MOTOR DISCONNECTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Requirements of the following Division 26 Sections apply to this section:

1. Basic Electrical Requirements
2. Fuses.

1.02 SUMMARY

A. This Section includes circuit and motor disconnects.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 26 Section "Wiring Devices" for snap switches used as motor disconnects.

1.03 SUBMITTALS

A. Product data for each type of product specified.

B. Maintenance data for circuit and motor disconnects, for inclusion in Operation and Maintenance Manual specified in Division 01 and Division 26 Section “Basic Electrical Requirements”.

1.04 QUALITY ASSURANCE

A. Electrical Component Standards: Provide components complying with NFPA 70 "National Electrical Code" and which are listed and labeled by UL. Comply with UL Standard 98 and NEMA Standard KS 1.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Electric
2. Siemens ITE
3. Square D Company.

2.02 CIRCUIT AND MOTOR DISCONNECT SWITCHES

A. General: Provide heavy duty circuit and motor disconnect switches in types, sizes, duties, features, ratings, and enclosures as required. Provide NEMA 1 enclosure except for outdoor switches, and other indicated locations provide NEMA 3R enclosures with raintight hubs. For motor and motor starter disconnects, provide units with horsepower ratings suitable to the loads.

B. Fusible Switches: Heavy duty switches, with fuses of classes and current ratings indicated. See Section "FUSES" for specifications. Where current limiting fuses are indicated, provide switches with non- interchangeable feature suitable only for current limiting type fuses.

C. Non-fusible Disconnects: Heavy duty switches of classes and current ratings as indicated.

D. Service Switches: Heavy duty fusible switches. UL listed for use as service equipment under UL Standard 98 or 869.

2.03 ACCESSORIES

A. Electrical Contacts and Interlocks: Provide number and arrangement of interlocks and contacts in switches as required.

B. Captive Fuse Pullers: Provide built-in fuse pullers arranged to facilitate fuse removal.

C. Rejection Clips: Provide rejection clips for elevator motor/controller disconnect as required.

PART 3 EXECUTION

3.01 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECTS

A. General: Provide circuit and motor disconnect switches as indicated and where required by the Code. Comply with switch manufacturers' printed installation instructions.

3.02 FIELD QUALITY CONTROL

A. Testing: Subsequent to completion of installation of electrical disconnect switches, energize circuits and demonstrate capability and compliance with requirements. Except as otherwise indicated, do not test switches by operating them under load. However, demonstrate switch operation through six opening/closing cycles with circuit unloaded. Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

END OF SECTION

SECTION 26 28 13

FUSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Division-26 Basic Electrical Materials and Methods sections apply to work of this section.

1.02 SUMMARY

A. Extent of fuse work required by this section is indicated by drawings, and by requirements of this section.

B. Refer to other Division-26 sections for the following items; not work of this section:

1. Circuit and Motor Disconnects.

1.03 SYSTEM DESCRIPTION

A. Types of fuses specified in this section include the following:

1. Class RK1 and Class J current-limiting.
2. Class RK 5 time-delay.
3. Class T current-limiting.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data on fuses, including specifications, electrical characteristics, installation instructions, furnished specialties and accessories. In addition, include voltages and current ratings, interrupting ratings, current limitation ratings, time-current trip characteristic curves, and mounting requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fuses of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. UL Compliance and Labeling: Comply with applicable provisions of UL 198D, "High-Interrupting-Capacity Class K Fuses". Provide overcurrent protective devices which are UL-listed and labeled.
2. NEC Compliance: Comply with NEC as applicable to construction and installation of fuseable devices.

3. ANSI Compliance: Comply with applicable requirements of ANSI C97.1 "Low-Voltage Cartridge Fuses 600 Volts or Less".

1.06 MAINTENANCE

A. Maintenance Stock Fuses: For types and ratings required, furnish additional fuses, amounting to one unit for every 5 installed units, but not less than one set of 3 of each kind.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fuseable devices which may be incorporated in the work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide fuses of one of the following:

1. Littlefuse
2. Bussmann Div; Cooper Industries.
3. General Electric Co.

2.02 FUSES

A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings, and average time-current and peak let-through current characteristics indicated, which comply with manufacturer's standard design, materials, and constructed in accordance with published product information, and with industry standards and configurations.

B. All fuses shall be provided indicator windows, "Littlefuse" IDSR or equal, to allow for instantaneous verification of operational status.

C. Class RK1 Current-Limiting Fuses: Provide UL Class RK1 current-limiting fuses rated 250-volts, 60 Hz, ampere rating indicated, with 200,000 RMS symmetrical interrupting current rating for protecting circuit- breakers.

D. Class J Current-Limiting Fuses: Provide UL Class J current-limiting fuses rated 600-volts, 60 Hz, ampere rating indicated, with 200,000 RMS symmetrical interrupting current rating.

E. Class RK5 Time-Delay Fuses: Provide UL Class RK5 time-delay fuses rated 600-volts, 60 Hz, ampere rating indicated, with 200,000 RMS symmetrical interrupting current rating for protecting motors.

F. Class T Fuses: Provide UL Class T fuses rated 600-volts, 60 Hz, ampere rating indicated, with 200,000 RMS symmetrical interrupting current rating for protection of physically small devices.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which fuses are to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF FUSES

A. Install fuses as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC, and NEMA standards for installation of fuses.

B. Coordinate with other work, including electrical wiring, as necessary, to interface installation of fuses with other work.

3.03 FIELD QUALITY CONTROL

A. Prior to energization of fuseable devices, test devices for continuity of circuitry and for short-circuits. Replace malfunctioning units with new units, and then demonstrate compliance with requirements.

END OF SECTION

SECTION 26 28 16

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 26 24 16 - Panelboards.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriters Laboratories (UL) labels.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature and technical data before starting work.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Fuses shall comply with NEMA FUI and ANSI C33.42.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Circuit Breakers:
1. GE.
2. Square D.
3. Siemens.

B. Fuses:
1. Bussman.
2. Cefco.
3. Littelfuse, Inc.

2.02 EQUIPMENT

A. Circuit Breakers:

1. Circuit breakers shall be a circuit interrupting device operating both manually for normal switching functions and automatically under overload and short circuit conditions, while providing circuit and self protection when applied in its ratings. Provide at voltage, phase, and amps indicated, with symmetrical amperes interrupting rating to be equal or larger than that shown on drawings. Control and signaling function may be incorporated by use of accessories.

2. Operating mechanism shall be entirely trip-free so contacts cannot be held close against an abnormal over-current or short circuit condition.
3. Operating handle of circuit breaker shall open and close all poles of a multi-pole breaker simultaneously. Circuit breakers shall meet applicable NEMA AB-1 and have UL label. Each circuit breaker shall have a trip unit to provide overload and short circuit protection. Trip element shall operate a common trip bar that shall open all poles in case of an overload or short circuit through any 1 pole.
4. Ampere rating shall be clearly visible. Contacts shall be of non-welding silver alloy. Circuit breakers to be used in switchboards, lighting and power panelboards, distribution panelboards and individually enclosed shall be 1, 2, or 3 poles as indicated on drawings.

B. Molded Case:

1. Molded case circuit breakers shall be bolt-on type, mounted in lighting and power panelboards and individually enclosed units.
2. Molded case circuit breakers shall be quick-make, quick-break action.
3. Molded case circuit breakers for panelboards shall have the following minimum ampere interrupting capacities (RMS):

    a. 120 volts: 10,000 AIC power panelboards.

4. Each molded case circuit breaker shall have a thermal magnetic trip device with trip ratings as shown on drawings.

C. Combination Molded Case and Current Limiting Fuse:

1. Bolt-on type mounted in switchboard.
2. Circuit breaker section shall be molded case and shall have the features previously mentioned for molded case breakers.
3. Fuse compartment located within molded case enclosure with accessibility for fuse replacing.
4. Unit circuit breaker shall trip as any of its fuses blows.
5. Unit shall be rated at 100,000 AIC RMS minimum.
6. Current limiting fuses provided as specified in this section.

D. Fuses:

1. Provide fuses for fusible equipment regardless of which trade has furnished such equipment.
2. The time-current characteristic and ratings shall assure positive selective coordination.
3. Fuses, 601 amperes and larger, shall comply with UL Class L standard and be Shawmut Form 480 “Amp-Trap” or Bussman “Hi Cap”.
4. Fuses, 600 amperes and lower, where applied to general feeder and branch circuit protection, shall comply with UL Class RKl standards and be Shawmut dual element “Amp- Trap” or Bussman “Low Peak” Limitron.
5. Dual element fuses shall have low resistance and relatively low operating temperatures. Fuses shall be provided with thermal protection against damage from poor contact. Fuse shall open when temperature at thermal cutout reaches 280 degrees F., preventing damage to clips and switches before fuse opens. They shall combine

high interrupting capacity (200,000 ampere RMS symmetrical) with time delay, holding 500 percent load for a minimum of 10 seconds.

6. Current limiting fuses shall be designed to provide high interrupting capacity (200,000 AIC SYM RMS) plus fast clearing time restricting let-thru current and energy to very low values. Clearing time on a severe short circuit shall be limited to less than 1/4 cycle.
7. Individual motor circuit fuses shall be sized at approximately 150 percent of motor full load current. Fuses, below 600 amperes shall comply with UL Class RK5 standards and be Shawmut dual element "Amp-Trap" or Bussman Fusetron. Fuses 60l amperes and larger, shall comply with UL Class L standards and be Shawmut Form 480 "Amp-Trap" or Bussman "Hi Cap" KTU.
8. Fuses, where required for circuit breaker backup protection shall comply with UL Class RKl standards and be Chase-Shawmut Class RK1 "Amp-Trap" or Bussman "Limitron".
9. Provide 10 percent spares (minimum of three) of each size and type of fuses furnished. Spare fuses shall be placed in a wall-mounted cabinet located in the main electric room.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install according to manufacturer's recommendations applicable codes and regulations and accepted submittals.

B. Two and three pole breakers must be true two and three pole breakers.

1. Do not combine single pole breakers with common handle connection to meet multiple pole breaker requirements.

C. Label circuit breaker enclosures with 1 inch high stenciled letters showing equipment served.

END OF SECTION

SECTION 26 29 13

MOTOR STARTERS/CONTROLLERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to work of this section.

B. Division-23 Electrical Requirements for Mechanical Equipment.

C. Division-26 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

A. Extent of motor starters/controllers work is indicated by drawings and schedules.

B. Types of motor starters/controllers specified in this section include the following:

1. Combination.
2. Fractional HP manual.
3. Solid-state reduced voltage.
4. Autotransformer reduced voltage.
5. Wye-delta.
6. Part winding.

C. Work of this section includes wires/cables, raceways, electrical boxes and fittings, as specified in Division-26 Basic Electrical Materials and Methods sections, and used in conjunction with motor controllers.

D. Refer to applicable Division-26 Basic Electrical Materials and Methods sections for wires/cables, electrical raceways, and boxes and fittings required in connection with motor controllers.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data and installation instructions on motor starters/ controllers.

B. Shop Drawings: Submit shop drawings of motor starters/controllers showing accurately scaled equipment locations and spatial relationships to associated motors and equipment.

C. Wiring Diagrams: Submit power and control wiring diagrams for motor starters/controllers showing connections to electrical power panels, feeders, and equipment. Differentiate between portions of wiring which are manufacturer-installed and portions which are field-installed.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of motor controllers of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 5 years of successful installation experience with projects utilizing motor controller work similar to that required for this project.

C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction and NEC Articles 220, 250, and 430, as applicable to installation, and construction of motor controllers.
2. NFPA Compliance: Comply with applicable requirements of NFPA 70E "Standard for Electrical Safety Requirements for Employee Workplaces."
3. UL Compliance: Comply with applicable requirements of UL 486A and UL 486B, and UL 508, pertaining to installation of motor controllers. Provide controllers and components which are UL-listed and labeled.
4. IEEE Compliance: Comply with recommended practices contained in IEEE 241 "Recommended Practice for Electric Power Systems in Commercial Buildings", pertaining to motor controllers.
5. NEMA Compliance: Comply with applicable requirements of NEMA ICS 2 "Industrial Control Devices, Controllers and Assemblies", and NEMA Standard 250 "Enclosures for Electrical Equipment (1000 Volts Maximum)", pertaining to motor controllers and enclosures.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver motor starters/controllers and components properly packaged in factory-fabricated type containers.

B. Store motor starters/controllers and components in original packaging and in a clean dry space; protect from weather and construction traffic.

C. Handle motor starters/controllers and components carefully to avoid breakages, impacts, denting and scoring finishes. Do not install damaged equipment; replace and return damaged units to equipment manufacturer.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate with other electrical work including wires/ cables, electrical boxes and fittings, and raceways, to properly interface installation of motor starters/ controllers with other work.

B. Sequence motor starters/controllers installation work with other work to minimize possibility of damage and soiling during remainder of construction period.

1.7 MAINTENANCE

A. Maintenance Data: Submit maintenance data and parts list for each motor starters/controllers and

component; including "trouble shooting" maintenance guide. Include that data, product data and shop drawings in a maintenance manual.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide motor controllers of one of the following (for each type and rating of motor starter/controller):

1. Siemens ITE
2. General Electric
3. Square D Co.
4. Eaton

2.2 MOTOR STARTERS/CONTROLLERS

A. General: Provide motor starters/controllers and ancillary components not included as integral part of mechanical equipment. Comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation.

B. Reversing Drum Switches: Provide reversing-drum switches capable of starting and reversing squirrel cage, and single-phase motors which are designed for reversing service, and direct-current shunt and compound wound motors, of types, sizes, ratings, and NEMA size drums indicated. Equip with non-spring return (non-self centering) construction, and with type interlock which provides low-voltage protection, and requires that drum return to OFF position after voltage failures. Equip switches with ball lever operating handles, and with NEMA Type 1 enclosure; coat with manufacturer's standard color finish.

C. Combination Reversing Starters/Controllers: Provide full-voltage alternating-current combination reversing controllers, consisting of controller and disconnect switch mounted in common enclosure, of types, sizes, ratings, and NEMA sizes indicated. Equip controllers with electrical and mechanical interlocks to prevent both forward and reverse contactors closing simultaneously. Equip controllers with block type manual reset overload relays and with non-fusible disconnect switches. Provide operating handle for disconnect switch mechanism with indication and control of switch position, with enclosure door either opened or closed, and capable of being locked in OFF position with three padlocks. Construct and mount controllers and disconnect switches in single NEMA Type 1 enclosure; coat with manufacturer's standard color finish.

D. Fractional HP Manual Starters/Controllers: Provide sing-phase fractional HP manual motor controllers, of sizes and ratings indicated. Equip with manually operated quick-make, quick-break toggle mechanisms; and with one-piece melting alloy type thermal units. Controller to become inoperative when thermal unit is removed. Provide controllers with double break silver alloy contacts, visible from both sides of controller; green pilot lights, and switch capable of being padlocked-OFF. Enclose controller unit in NEMA Type 1 general purpose enclosure suitable for flush mounting; coat with manufacturer's standard color finish.

E. Solid-State Reduced Voltage Starters/Controllers: Provide solid-state reduced voltage controllers for use with 3-phase squirrel cage induction motors, of types, sizes, ratings and electrical characteristics indicated; construct with silicon-controlled rectifiers (SCR's) for controlling motor voltages during acceleration. Equip controllers with circuit breakers and with closed-loop feedback system to maintain motor acceleration at constant rate. Enclose controller in NEMA Type 1 enclosure; and coat with manufacturer's standard color finish.

F. Autotransformer Reduced Voltage Starters/Controllers: Provide autotransformer type reduced voltage controllers, of sizes, ratings, electrical characteristics and NEMA sizes indicated, with closed-circuit transition feature. Construct controllers with 3-pole contactors, 3-phase starting autotransformer, adjustable pneumatic timer, and 3-pole block type overload relay. Construct auto-transformer with voltage taps at 65 percent and 80 percent of full line voltage, and with thermal overload protection device on each phase to protect against overheating. Provide duty cycle of 15 second operation out of each 4 minutes for one hour followed by rest period of two hours. Construct controller with NEMA Type 1 enclosure; coat with manufacturer's standard color finish.

G. Wye-Delta Starters/Controllers: Provide wye-delta controllers, of sizes, ratings, electrical characteristics and NEMA sizes indicated. Construct controllers with open-circuit transition type wiring, including three 3-pole contactors, adjustable pneumatic timer, and 3-pole overload protection relay. Equip with START-STOP push button for control. Construct controller with NEMA Type 1 enclosure; coat with manufacturer's standard color finish.

H. Part Winding Starters/Controllers: Provide part-winding, alternating-current controllers, of NEMA sizes, ratings, and electrical characteristics indicated, suitable for use with motors with wye-connected windings. Select controller with 2-point construction consisting of two 3-pole contactors, heater unit, pneumatic timer, and six manual reset motor overload relays. Equip controller with external start buttons for closing contactors. Enclose controller unit in NEMA Type 1 general purpose enclosure suitable for recessed mounting; coat enclosure with manufacturer's standard color finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which motor starters/controllers are to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF MOTOR STARTERS/CONTROLLERS

A. Install motor starters/controllers where required, in accordance with equipment manufacturer's written instructions and with recognized industry practices; complying with applicable requirements of NEC, UL and NEMA standards, to insure that products fulfill requirements.

B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to

comply with tightening torques specified in UL 486A and UL 486B, and NFPA 70 “National Electrical Code”.

C. Install fuses, of sizes indicated, in each fusible disconnect switch, if any.

3.3 FIELD QUALITY CONTROL

A. Prior to energization of motor controller equipment, check with ground resistance tester, phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

B. Prior to energization, check circuitry for electrical continuity, and for short-circuits.

C. Ensure that direction of rotation of each motor fulfills requirements.

3.4 GROUNDING

A. Provide equipment grounding connections for motor controller equipment as indicated. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounding.

3.5 ADJUSTING AND CLEANING

A. Adjust operating mechanisms, where necessary, for free mechanical movement.

B. Touch-up scratched or marred enclosure surfaces to match original finishes.

3.6 DEMONSTRATION

A. Upon completion of installation of motor controller equipment and electrical circuitry, energize controller circuitry and demonstrate functioning of equipment in accordance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and retest to demonstrate compliance.

END OF SECTION

SECTION 26 43 00

TRANSIENT VOLTAGE SURGE SUPPRESSION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Transient Voltage Surge Suppression TVSS) devices, also known as Surge Protective Devices (SPD's), for the protection of AC electrical circuits and electronic equipment from the effects of lightning induced transients, other externally generated transients, and internally generated transients.

1.02 REFERENCES

A. ANSI/IEEE:

C62.33-82(89)	Standard Test Specifications for Varistor Surge-Protective Devices.
C62.41-91	Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
C62.45-87	Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
142-82	Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book).

B. Underwriters Laboratories (UL):

UL 1449	Standard for Safety, Transient Voltage Surge Suppressors.
UL 1283	Electromagnetic Interference Filters.

C. National Fire Protection Association (NFPA):

NFPA 70	National Electrical Code.
NFPA 75	Standard for the Protection of Electronic Computer/Data Producing Equipment.
NFPA 780	Lightning Protection Standard.

D. Federal Information Processing Standards 94 (FIPS PUB 94).

E. National Electrical Manufacturer's Association LS-1, 1992 (NEMA LS-1).

1.03 QUALITY ASSURANCE

A. The manufacturer shall submit a written statement indicating that a factory authorized representative inspected the installation. The installing contractor shall submit a checkout memorandum to the manufacturer indicating the date the equipment was placed into service and the actual method of installation. Submit three copies to the specifying engineer.

B. All SPD's for service entrance, distribution, and branch circuit protection within a facility shall be provided by a single manufacturer.

1.04 WARRANTY

A. The SPD and supporting components shall be guaranteed by the manufacturer to be free of defects in material and workmanship for a period of 5 years from the date of substantial completion of service and activation of the system to which the suppressor is attached.

B. An SPD that shows evidence of failure or incorrect operation during the warranty period shall be repaired or replaced at no expense to the Board including labor and materials. Since "Acts of Nature" or similar statements typically include the threat of lightning to which the SPD shall be exposed, any such clause limiting warranty responsibility in the general conditions of this specification shall not apply to this section. The warranty shall cover the entire device, not just the modules.

C. The installation of SPD's in or on electrical distribution equipment shall in no way compromise or violate equipment listing, labeling, or warranty of the distribution equipment.

1.05 SUBMITTALS

A. The transient voltage surge suppression submittals shall include, but not be limited to, the following information:

1. Data for each suppressor type indicating conductor sizes, conductor types, and connection configuration and lead lengths.
2. Manufacturer's certified test data indicating the ability of the product to meet or exceed requirements of this specification.
3. Drawings, with dimensions, indicating SPD mounting arrangement and lead length configuration, and mounting arrangement of any optional remote diagnostic equipment and assemblies.
4. List and detail protection systems such as fuses, disconnecting means, and protective materials.
5. SPD wiring, bonding, and grounding connections shall be indicated on the wiring diagrams for each system. Include installation details demonstrating mechanical and electrical connections to equipment to be protected.
6. If requested, a sample of each suppressor type shall be submitted for use in testing and evaluation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Transient Voltage Surge Suppression:

1. Advanced Protection Technologies, Clearwater, FL.
2. Atlantic Scientific.
3. Diversified Technology Group (DITEK).
4. EDCO.
5. Hubbell-Kellems, Milford, CT.
6. LEA International by Power Logics, Apollo Beach, FL.

2.02 PERFORMANCE

A. General:

1. SPD's shall be listed according to UL 1449 Standard for Safety, Transient Voltage Surge Suppressors, and UL 1283, Electromagnetic Interference Filters.
2. There shall be 7 modes of protection: 3-modes (Line-to-Ground), 3-modes (Line-to-Neutral), and 1-mode (Neutral-to-Ground) for a 3-phase, 4-Wire plus ground voltage system. (Line-to-Neutral-to-Ground is not an acceptable substitute for Line-to-Ground).
3. The UL 1449 Clamping Voltage for the following configurations shall not exceed the following:

VOLTAGE CONFIGURATION	L-G	L-N	N-G
120/240V	400V	400V	400V

4. The unit shall be UL 1283 Listed as an electromagnetic interference filter. Standardized insertion loss data shall be obtained utilizing MIL-STD E220A 50W insertion loss methodology. Minimum insertion loss shall be as follows:

FREQUENCY [MHz]	INSERTION LOSS [dB]
34	
51	
54	
48	

5. SPD's shall use a separate path to building ground; the equipment safety ground is not to be used as a transient ground path.
6. SPD's shall be constructed using MOV based modules. The SPD shall have a response time of less than one nanosecond with 6 inches or less of connected lead length for any individual protection mode.
7. Each MOV contained within a current diversion module shall be individually fused (component level safety fusing). For the assurance of safety purposes, this feature shall be a standard design feature and not an optional feature of the product. The individual component level fusing shall allow a reduction of protection rather than an automatic complete loss of protection.
8. The maximum continuous operating voltage (MCOV) of all components shall not be less than 125 percent for a 120V system and 115 percent for 240 systems.

B. Service Entrance Protection:

1. The SPD for this location shall be referred to as TVSS Type 1 on project drawings.

2. The service entrance TVSS equipment shall meet or exceed the minimum performance criteria as follows:

   a. The SPD shall be by APT, Model TE/4XLHP/SC, or accepted equivalent.
   b. The single-impulse surge-current rating shall be a minimum of 240K amps/phase.

c. SPD shall be provided with an integral fused disconnect. Switches shall have a fault withstand rating equal or greater than the AIC rating of the equipment being protected. The disconnect switch shall have an interlocking rotary type safety switch that turns power off to the device upon opening the enclosure for safe inspection and/or module replacement.

d. Visual Indication of proper SPD connection and operation shall be provided both on the modules and redundant on the front door of the enclosure. The indicator lights shall indicate which phase as well as which module is operational. SPD that require a separate diagnostic test kit to determine proper module operation must be provided.

e. SPD shall incorporate copper bus bars for the surge current path. Small round wiring or plug-in modules are not acceptable. Field-replaceable surge-current diversion modules shall be bolted to the bus bars for reliable low impedance connections.

f. The enclosure type shall be rated NEMA 12.

PART 3 EXECUTION

3.01 INSTALLATION

A. The installing contractor shall install the parallel SPD with short and straight conductors as practically possible.

B. The contractor shall follow the SPD manufacturer's recommended installation practice as found in the equipment installation manual.

C. The installation shall apply to all applicable codes.

END OF SECTION

SECTION 26 51 00

LIGHTING FIXTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Division-26 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.02 SUMMARY

A. Extent, location, and details of interior lighting fixture work are indicated on drawings and in schedules.

B. Types of interior lighting fixtures in this section include the following:

1. Light Emitting Diode (LED)

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions on each type interior building lighting fixture and component.

B. Certificate of compliance: Prior to ordering of materials the contractor shall submit a letter indicating that the specified electrical fixtures are compatible with and will fit into the specified and approved ceiling grid system.

C. Shop Drawings: Submit layout drawings of interior lighting fixtures and their spatial relationship to each other. In addition, submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet. Submit details indicating compatibility with ceiling grid system.

D. Wiring Diagrams: Submit wiring diagrams for interior lighting fixtures showing connections to electrical power panels, switches, dimmers, controllers, and feeders. Differentiate between portions of wiring which are manufacturer-installed and portions which are field-installed.

E. Maintenance Data: Submit maintenance data and parts list for each interior lighting fixture and accessory; including "troubleshooting" maintenance guide. Include that data, product data, and shop drawings in a maintenance manual; in accordance with general requirements.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of interior lighting fixtures of sizes, types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with at least 5 years of successful installation experience on projects with interior lighting fixture work similar to that required for this project.

C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 220, 410, and 510 as applicable to installation, and construction of interior building lighting fixtures.
2. NEMA Compliance: Comply with applicable requirements of NEMA Standards Pub/No.'s LE 1 and LE 2 pertaining to lighting equipment.
3. UL Compliance: Comply with UL Standards, including UL 486A and B, pertaining to interior lighting fixtures. Provide interior lighting fixtures and components which are UL-listed and labeled.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver interior lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage.

B. Store interior lighting fixtures in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle interior lighting fixtures carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

1.06 SEQUENCING AND SCHEDULING

A. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of interior lighting fixtures with other work.

B. Sequence interior lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products as listed on the lighting fixture schedule noted on the drawings.

2.02 FIXTURES

A. General: Provide lighting fixtures, of sizes, types and ratings indicated; complete with, but not limited to, housings, energy-efficient lamps, lamp holders, reflectors, and wiring. Ship fixtures factory-assembled, with those components required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated noise.

B. Wiring: Provide electrical wiring within fixture suitable for connecting to branch circuit wiring as follows:

1. NEC Type AF for 120 volt, minimum No. 18 AWG.

C. Lamps:

1. Provide LED lamps as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which lighting fixtures are to be installed, and substrate for supporting lighting fixtures. Notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF INTERIOR LIGHTING FIXTURES

A. Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Provide fixtures and/or fixture outlet boxes with hangers to properly support fixture weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Architect.

C. Install flush mounted fixtures properly to eliminate light leakage between fixture frame and finished surface.

D. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.

E. Fasten fixtures securely to indicated structural supports; and ensure that pendant fixtures are plumb and level. Provide individually mounted pendant fixtures longer than 2 feet with twin stem hangers. Provide stem hanger with ball aligners and provisions for minimum one inch vertical adjustment. Mount continuous rows of fixtures with an additional stem hanger greater than number of fixtures in the row.

F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B, and the National Electrical Code.

G. Support surface mounted fixtures greater than 2 feet in length at a point in addition to the outlet box fixture stud.

3.03 FIELD QUALITY CONTROL

A. At Date of Substantial Completion, replace lamps in interior lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Architect.

1. Refer to sections for the replacement/restoration of lamps in interior lighting fixtures, where used for temporary lighting prior to Date of Substantial Completion.

B. Furnish stock or replacement lamps amounting to 15%, but not less than 4 lamps in each case, of each type and size lamp used in each type fixture. Deliver replacement stock as directed to Owner's storage space.

3.04 ADJUSTING AND CLEANING

A. Clean interior lighting fixtures of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.

B. Protect installed fixtures from damage during remainder of construction period.

3.05 GROUNDING

A. Provide equipment grounding connections for interior lighting fixtures as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

3.06 DEMONSTRATION

A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

END OF SECTION

SECTION 27 00 00

TELECOMMUNICATION SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to work of this section.

B. Division-16 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

A. Extent of telephone and data system work is indicated by drawings and schedules, and is hereby defined to include, telephone and data conduits (with pull strings), boxes and blank faceplates to accommodate a telephone wiring system to be provided by others.

B. Installation of telephone and data communications facilities shall include individual end user locations as indicated on plans.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data on telephone systems and components.

B. Submit any deviations from stated fabrications, for approval.

C. Submit changes to stated materials or installation methods, for approval.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of telephone systems and ancillary equipment, of types, ratings and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with at least 5 years of successful installation experience with projects utilizing telephone systems and equipment similar to that required for this project.

C. Codes and Standards:

1. National Electrical Code 2011 Edition
2. State Fire Marshall, NFPA 101, The Life Safety Code.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment and components in factory-fabricated containers or wrappings, which properly protect equipment from damage.

B. Store equipment and components in original packaging. Store inside in a well-ventilated space

protected from weather, moisture, soiling, humidity, and extreme temperatures.

C. Handle equipment and components carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate with other electrical work including wires/ cables, electrical boxes and fittings, and raceways, to properly interface installation of telephone system with other work.

B. Sequence installation of telephone system with other work to minimize possibility of damage and soiling during remainder of construction.

PART 2 PRODUCTS

2.1 TELEPHONE SYSTEMS

A. General: Except as otherwise indicated, provide telephone systems conduit infrastructure as required to allow for a complete wiring installation by the Owner.

PART 3 EXECUTION

3. 1 EXAMINATION

A. Examine areas and conditions under which telephone systems are to be installed. Notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF TELEPHONE SYSTEMS

A. Install telephone systems as indicated, in accordance with manufacturer's written instructions and with recognized industry practices; ensure systems comply with installation and operational requirements of EIA, NEC and the Federal Communications Commission.

B. Interface building telephone system with the operating telephone company's network, after the installation work has been completed.

C. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B, and the NFPA 70 “National Electrical Code”.

END OF SECTION

SECTION 28 30 05

INTRUSION DETECTION SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: A complete, operable, tested intrusion detection system, bearing Underwriters Laboratories (UL) mercantile listing and including raceway system and cables. All programming shall be by the Contractor.

B. Related Sections:

1. 09 91 00 Painting.
2. 26 05 33.13 Raceways.
3. 26 05 00 Basic Electrical Materials and Methods.

1.02 SYSTEM DESCRIPTION

A. Significant System Components and Procedures:

1. Contacts for every exterior door including roof accesses.
2. Motion detectors.
3. Intrusion control panels.
4. Power supply.
5. Extended zone modules.
6. Keypads.
7. Raceway and junction box system.
8. Testing.
9. Record drawings.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature and technical data before starting work.

B. Shop Drawings: Include manufacturer's catalog cuts, data sheets, and riser and wiring diagrams with standard symbols for each component used.

C. Quality Assurance Submittals: Submit the following with the required shop drawings and manufacturer's literature and data.

1. Load calculations for battery backup and system components.
2. Programming schedule sheet with zone descriptions.
3. Warranty:
   a. Letter from authorized manufacturer's representative addressed to the Board, stating compliance to warranty requirements.
   b. Submit 5 copies of warranty to be provided.

D. Closeout Submittals: Record drawings and warranties.

1.04 QUALITY ASSURANCE

A. Items and Components: UL listed meeting the latest editions of standards 603, 609, 634, 639, 1076, and 1610.

B. Install wiring according to National Electrical Code - 2011 (NEC).

C. Shunt switches are not allowed.

D. System shall be hardwired in its entirety.

E. In terminal cabinets, use screw-on terminal strips for power and signal cable splices.

1.05 WARRANTY

A. Provide full manufacturer's published standard warranty for parts and components.

B. Provide 1 year full maintenance (parts, wiring, and labor) provided by Contractor or manufacturer's authorized representative from date of substantial completion.

C. Provide warranty response information inside alarm system control panel.

D. Warranty shall allow the Board to repair vandalized areas without voiding the total system warranty

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Door Contacts:

1. Side Hinged Doors: Recessed magnetic switch, Model 1078W as manufactured by Sentrol, Inc. or approved equivalent manufacturer, complete with necessary mounting accessories for installation in closed circuit alarm systems.

2. Roll-Up Overhead Doors: Magnetic switch, No.[2205A] [2505A] [2515A] by Sentrol or approved equivalent manufacturer, complete with necessary mounting accessories for installation in closed circuit alarm systems.

B. Cable: Belden No.8740 (2 conductor), No.8443 (3 conductor), No.9794 (4 conductor), or accepted equivalent.

1. Conductors for Monitoring Devices: Minimum 22 gage AWG stranded, unshielded cable with vinyl plastic insulation, color-coded.
2. UL listed, NEC type CM or CL3, UL standard 13 and 444.
3. Comply with UL 1581 flame test.

4. Power Conductor for Motion Detectors, EZMs, and Keypads: CL-2 or CL-3, jacketed, minimum 18 gage stranded wire.
5. Power Conductor for Battery: Minimum 18 gage stranded wire.
6. Underground cable shall be for wet locations according to NEC.

C. Motion Detectors: Dual technology (PIR/microwave) motion detector sensors.

1. Recessed Ceiling Mount:
   a. Model 2T360 by Sentrol Inc., Tualatin, OR.
   b. Model DS9360 by Simplex.
   c. Or approved equivalent manufacturer

2. Wall Mount:
   a. Models 2T40, 2T70, or 2T100 by Sentrol.
   b. Models DS720, DS860, DS950, RDS97 by Simplex.
   c. Or approved equivalent manufacturer

D. Intrusion Control Panels:

1. Manufacturers:
   a. NAPCO MA 3000 (96 zones).
   b. Simplex DS7400Xi.
   c. Or approved equivalent manufacturer

2. Provide mandatory UL Mercantile listing with tamperproof provisions.
3. Indicate location on riser diagram.
4. Install panels with centerline at 5'-0" above finish floor.

E. Panel Batteries:

1. Provide two 7 amp batteries in parallel in the panel.

F. Remote Power Supplies:

1. Supervised for low battery failure and power supply failure.
2. Show locations on riser diagram.
3. These indications shall report through a dedicated zone of the intrusion detection system to M-DCPS DCOM as a priority trouble.

G. Zone Expansion Modules/Expansion Zone Modules (EZM):

1. Remotely located in a distributed fashion to minimize raceway and wiring.
2. Powered from the intrusion control panel.
3. Power supply load shall not exceed 85 percent of the maximum load.
4. Mount EZM's in a hinged door junction box with a fire retardant painted plywood backboard inside the box, 10" x 10" x 4" minimum size.
5. Install EZM cabinets with centerline at 5'-0" above finish floor.
6. Install power supplies between 6"-0" to 8'-0" above finish floor.
7. List EZM's location numbers inside and outside the junction boxes and on riser diagram.

8. Do not use the keypad as a zone expander.

H. Miscellaneous: Refer to Division 20 -Electrical Identification and Division 26- Electrical for products also required for installation under this section.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the Work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install wiring, conduit, boxes, and the like required for a complete system according to manufacturer's instructions and approved submittals.

B. System equipment and wiring installation shall be by the properly licensed company, either the original equipment manufacturer or the factory distributor for the brand of equipment used. Furnish wiring diagrams and wire runs for the raceway system installed by the licensed electrical contractor, under Division 26.

C. Provide door contacts and related devices at exterior doors, roof scuttles, and interior doors to high security spaces including, but not limited to, audiovisual equipment, TV equipment, computer equipment, facility operation and management equipment, and other similar valuable goods.

1. Hinged Door Contacts: A maximum of 4 associated door contacts may be grouped in a zone. Provide independent wiring to each switch from a junction box located next to the expansion zone module (E.M.) before converting to a zone.

    a. Side Hinged Doors:
        1) Install recessed switch components in spaces in both door and head jamb prepared by the door and frame manufacturer.
        2) Set magnet into top of door with accepted silicone sealant.

2. Motion Detectors:

    a. Provide motion detectors in each area with windows, fixed glass, or glass block to the exterior and any room with vision panels, regardless of the location or function.
    b. Provide motion detectors at exterior accessed storage rooms.
    c. Provide individual zones for each motion detector.
    d. Motion detectors shall have their own power supply and not fed from the security panel.
    e. Locate ceiling mounted motion detectors at least 5 feet away from A/C supply registers and at least 10 feet from windows.

3. Wiring:

a. Install concealed wiring in metallic conduit from door head switch through door lintel construction to adjacent junction box.
b. Connection between top of sheet metal sleeve in head jamb section and conduit in door lintel construction to adjacent junction box need not be solid but sheet metal sleeve and conduit shall be in alignment with each other.
c. Provide EOL resistor and indicate location on drawings
d. A maximum of 4 associated door switches may be grouped in a zone. Provide independent wiring to each switch from a junction box located next to the expansion zone module (E.M.) before converting to a zone.
e. Splices in main cabinets and sub panels shall be on terminal strips.

4. Bonding and Grounding: Provide as required by the latest edition of the NEC.

5. Conductor Identification: Identify each pair of conductors, each contact in each panel, and at loose wire terminations.
6. Cable Slack:
   a. Terminate cables with enough slack, each duly tagged for future connections by the Board, on terminal strips in junction box in electrical room as shown on Drawings, extending 1 inch empty conduit from this box underground to pull box as shown Drawings (site plan).

D. At security cabinets, provide 3/4" plywood backboard with fire retardant paint.

E. Provide patch cord from intrusion detection circuit board to telephone outlet provided by MDT in the intrusion detection panel.
F. Connect intrusion alarm system to a separate dedicated active telephone line.

3.03 FIELD QUALITY CONTROL

A. Before testing the intrusion detection system transmission from the project site to the central control station, verify a successful and trouble free transmission signal.

B. Site Test:

1. Check and test installation for shorts, grounds, circuit continuity, and minimum 12 volts readings at all motion detectors.
2. Cables: Test free from opens, grounds, or crosses (shorts) between conductors.
3. Walk-test doors and motion detectors for proper function and operation. Ensure proper zoning of devices.
4. Test all functions on intrusion control panels for proper functions and operations.
5. Verify signals are properly received at the MDT Control Station.
6. Check for proper standby battery backup in intrusion panels and remote power supplies.
7. Verify remote power supplies are UL 603 listed for burglary systems.
8. Inspect and test cabinet tampers on intrusion cabinets.
9. Verify raceway cover is properly painted blue.

END OF SECTION

SECTION 28 31 00

FIRE ALARM DETECTION SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Complete, operable, tested and certified, addressable, non-coded, electrically supervised fire alarm detection system including necessary controls and accessories.

B. Related Sections:

1. 26 05 19 - Wire and Cable.
2. 26 05 33.13 - Raceways

1.02 REFERENCES

A. Florida Building Code, 2014 Edition.

B. Department of Insurance, Division of State Fire Marshall (SFM), Uniform Fire Safety Rules and Standards, Chapter 4A-48, Fire Alarm Systems, latest edition.

C. National Fire Protection Association, Inc. (NFPA):

1.	NFPA 70	National Electric Code (NEC), 2011 Edition.
2.	NFPA 72	National Fire Alarm Code, Latest Adopted Edition.
3.	NFPA 90A	Installation of Air-Conditioning and Ventilating Systems, Latest Adopted Edition.

D. Underwriters Laboratories (UL), latest edition.

1.	UL 38	Manually Activated Signaling boxes for Use with Fire Protective Signaling Systems.
2.	UL 268	Smoke Detectors for Fire Protective Signaling Systems.
3.	UL 268A	Smoke detectors for Duct Application.
4.	UL 346	Water Flow Indicators for Fire Protective Signaling Systems.
5.	UL 464	Audible Signal Appliances.
6.	UL 497B	Protectors for Data Communication and Fire Alarm Circuits.
7.	UL 521	Heat Detectors for Fire Protective Signaling Systems.
8.	UL 864	Control Units for Fire Protective Signaling Systems.
9.	UL 1424	Cables for Power Limited Fire Protective Signaling Circuits.
10.	UL 1481	Power Supplies for Fire Protective Signaling Systems.
11.	UL 1635	Digital Alarm Communication Systems Units.
12.	UL 1971	Signaling Devices for the Hearing Impaired.

1.03 SYSTEM DESCRIPTION

A. Provide an addressable system to meet the requirements of NFPA 70 (NEC), NFPA 72, and UL.

1.01 SUBMITTALS

A. Before starting the work, the manufacturer’s authorized representative shall submit one of the following:

1. A signed document committing the manufacturer to provide the Owner or its authorized maintenance contractor with all the special tools, hardware, software, any proprietary items or products, and instruction or training programs necessary to service and maintain the system installed under this contract.

2. A signed document stipulating that service and maintenance of the system installed under this contract does not require special tools, hardware, software, any proprietary items or products, or instruction or training programs.

B. Before starting the work, submit shop drawings and product data on all equipment including the following:

1. Dimensioned outline drawings and technical data sheets for all equipment.
2. Riser diagrams indicating wiring and conduits.
3. Indicate cabinet elevations with each item on the face of the cabinet identified.
4. Functional description of the complete fire alarm system and subsystem.
5. Operation and maintenance manuals.
6. Parts list.
7. Name, address, and telephone numbers of local supplier and local factory trained Technical Representative (TR). Provide 3 copies of TR's certificate verifying factory training on the submitted system.
8. Delineate the fire zones and the device identifications for the entire project.

C. Operating Instructions: Furnish 3 sets of detailed written operating instructions to the Owner.

D. Quality Control Submittals:

1. Submit a signed NFPA 72 - CERTIFICATE OF COMPLETION form with Parts 1 and 3 through 9 completed at least 5 working days before the Owner first formal inspection of the installed fire alarm detection system.
2. Part 2 shall be completed, notarized, and 5 original copies submitted after the Owner's acceptance.

E. Substantial Completion Submittal Requirements:

1. Provide 3 complete sets of operating and maintenance instructions, literature, and information concerning equipment, indexed and bound in accepted loose leaf binders.
2. Furnish 3 sets of Record Drawings to the A/E indicating accurate plan layout, conduit runs, and wiring diagrams as actually installed. One of the 3 sets shall be in reproducible sepia.
3. Provide and maintain 3 sets of record drawings for the complete system. Show connections, numbering system of every device including wiring and cabling identification, raceways, and junction and terminal cabinets. Update the record drawings daily and make available at all times for review by the Owner. Typical wiring diagrams

are not allowed.

1.02 QUALITY ASSURANCE

A. The equipment manufacturer shall have a local branch office or authorized distributor staffed with factory trained, full-time employees capable of performing installation, testing, inspection, repair, and maintenance services for the life of the fire alarm detection system.

B. Any equipment, device, system component, or part provided or installed by contractor containing or using date processing shall be Year 2000 (Y2K) compliant. Before substantial completion, contractor shall provide a manufacturer's statement of Year 2000 compliance and manufacturer's and contractor's warranty against date-related failures.

C. Fire alarm system, devices, and wiring installation shall be by the certifying company, either the original equipment manufacturer or the factory distributor for the brand of equipment used. Furnish wiring diagrams and wire runs for the raceway system installed by the licensed electrical contractor, under Division 26.

D. Installer Qualifications:

1. The installing contractor for the Fire Alarm Detection System shall be properly licensed by the State of Florida Department of Business and Professional Regulation under Section 489, Part II of the Florida Statue as an EC-Unlimited electrical contractor or an EF-Alarm contractor I. The installing contractor shall possess a valid occupational license, and a current certificate of insurance.

2. The installing contractor shall ensure that a qualified representative of the fire alarm detection system manufacturer monitors and coordinates the installation and is present at the Acceptance Inspection to test and instruct the Board as to the use of the system.

3. Employees installing the fire alarm detection system shall possess, or be directly supervised by a person with a Certificate of Competency as an Electrical Master, Electrical Journeyman, Master Speciality or Journeyman Speciality in the fire alarm trade as issued by the Miami-Dade County Construction Trades Qualifying Board, Division B or the equivalent construction trades qualifying licensing boards of Broward, Collier, Monroe, or Palm Beach counties.

    a. Provide a minimum of 1 Electrical Master, Electrical Journeyman, Master Speciality or Journeyman Speciality in the fire alarm trade for every 3 apprentices performing the installation of the fire alarm detection system.

E. Fire Alarm Detection System:

1. Listed and labeled by Underwriters Laboratories.
2. Listed and labeled for commercial use. Residential devices are not allowed.

F. Components, Parts, and Assemblies: Furnished by the same manufacturer and compatible throughout the system, one-to-the-other, without exception.

1.03 WARRANTY

A. Components, parts, raceways, wiring, and assemblies furnished and installed by the manufacturer's representative or distributor shall be warranted for 1 year after substantial completion, in writing, against defects in labor and materials.

1. Written Warranty:

a. Extend the requirements of General Conditions, to include a signed manufacturer's 1 year written warranty against defects in materials and labor quality.
b. Provide 5 notarized copies signed by authorized manufacturer's representative, giving details of warranty being provided, listing components included and not included in the warranty, number of hours per days for warranted service, and billable rates for services not covered by warranty.
c. Provide 5 original copies of:

1) A notarized and properly completed NFPA 72-2007 CERTIFICATE OF COMPLETION form signed by the EF or EC license holder. License holder shall be employed by the manufacturer and/or Contractor.
2) Valid electrical license of the installing contractor.

B. Warranty service shall be performed by a certified factory trained and approved fire alarm technician of the equipment manufacturer's representative or distributor.

1. The Contractor shall respond to routine warranty service requests by completing repairs within 24 hours of service request by the Owner.
2. The Contractor shall respond to emergency warranty service requests with the arrival of service technician at affected site within 4 hours of notification of emergency. Repairs shall be expedited to bring system online as soon as possible. Emergencies include, but are not limited to, the following:

a. Total system failure.
b. Inability to acknowledge, silence, or reset audibles or panel troubles.
c. Failure of air-conditioning to reset after an alarm.
d. Failure of any gas system to reset after an alarm.
e. Loss of battery power.
f. Damage caused to system due to transients and power surges.
g. Complete zone or loop failure.
h. Fire at a facility.

3. If problem is not correctable within specified time frames, the Contractor shall provide in writing an expected completion date to the Owner.

C. Inspections at End of Warranty:

1. At the end of the 1 year general warranty period, the Owner will decide if the warranty items cited during the course of the warranty period have been completed to the satisfaction of the Owner.
2. Meet on-site with City of Miami Warranty Section to establish the end of the 1 year warranty period and address unresolved warranty items to the satisfaction of the Owner.

D. Equipment and systems shall be warranted by the Contractor for 1 year following acceptance. The warranty shall include parts, labor, prompt field service, pickup, and delivery.

E. Required inspections according to NFPA 72 will be performed. Deficiencies will be forwarded to MDC Project Manager for corrections by the warranty provider.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Detection System:

1. Simplex.
2. Notifier
3. Siemens
4. Honeywell
5. Edwards Systems Technology

B. Lightning Protection and Transient Voltage and Surge Suppression:

1. Atlantic Scientific.
2. Diversified Technology Group (DITEK).
3. EDCO.
4. PowerLogics, Apollo Beach, FL.

2.02 COMPONENTS

A. System Types:

1. New Facilities:

a. Provide an addressable, single standalone panel network type system for the entire facility. The system shall be:

1) A 24-Volts Direct Current (VDC), fully analog addressable, using multiple Signaling Line Circuits (SLC) Style 4 (Class B) and multiple Style Y (Class B), fully addressable, Notification Appliance Circuits (NAC) zones.

b. System shall be wired in exclusive conduits, electrically supervised and power limited.

B. Addressable Systems:

1. The fire alarm detection system shall consist of a UL 864 listed intelligent microprocessor based main control panel, automatic detection devices, manual stations, and notification appliance devices wired according to the schedule on the Drawings and function as specified.

a. Equipment shall allow a one-person walk-through test of either the complete system or each individual SLC while maintaining full functionality of SLC not being tested. If no test activity occurs for a specified period, as determined by the manufacturer, the

system shall automatically return to the normal operating mode.

b. System shall be capable of being programmed in the field, by a laptop computer. Store programmed information in non-volatile memory. System programming shall be password protected by fire alarm detection manufacturer and include full upload and download capability.

c. System shall be capable of monitoring intelligent/analog and non-addressable ionization, manual stations, thermal and photoelectric detection devices, and interface modules for water flow and tamper switches.

d. As a minimum, the panel shall have behind a locked door the following switches:

1) Audible silence.
2) Trouble silence.
3) Supervisory silence.
4) Panel reset.
5) Occupancy recall.

e. System shall have a real time history log, stored in non-volatile memory, capable of containing a minimum of 400 events.

f. The input AC power to the fire alarm detection system shall be from a dedicated branch circuit of the facility emergency backup system. AC breaker shall be marked "WARNING - AC POWER TO FIRE ALARM DETECTION SYSTEM - DO NOT TURN OFF OR DISCONNECT".

g. Provide 1 dry form C relay contacts for central monitoring for each of the following:

1) System alarm.
2) System trouble.

h. Provide battery backup capable of operating the fire alarm system under maximum normal load for 24 hours and then operating in the alarm mode for 5 minutes after loss of input power. Include remote power supplies.

2. Detection devices shall contain an integral alarm LED. Intelligent/Analog detectors shall be individually identifiable from the control panel.

a. The intelligent smoke detector shall be UL 268 listed.
b. The intelligent detector type thermal detector shall be UL 521 listed.
c. The intelligent detector sensitivity shall be individually adjustable from the control panel. It shall also be possible to accurately measure the intelligent detector's sensitivity from the control panel.

3. The intelligent monitoring module shall incorporate a custom microprocessor based integrated circuit, supervised and uniquely identifiable by the control panel. The intelligent interface module shall be used to uniquely identify water flow switches, tamper switches, OS & Y valves.

4. The intelligent manual fire station shall be non-coded, single action, and operate on any SLC. The intelligent manual fire station shall be individually annunciated on the control panel.

    a. Intelligent Manual Fire Station: UL 38 listed.
    b. Manual Stations: Mount semi-flush where possible.
    c. If it is not possible to mount a semi-flush station, the supplier shall provide the proper manufacturer's surface mounted box.
    d. Provide 10 keys or wrenches to the Owner.

5. The air duct detector shall operate on a cross-sectional air sampling principal to overcome stratification and the skin effect. The air duct detector shall consist of a standard intelligent ionization detector mounted in an air duct sampling assembly and sampling tube that protrudes across the duct of the ventilating system. The air duct detector shall retain the features of the (intelligent addressable) ionization detector, and be installed in the ventilating duct as indicated in the devices if both are required.

    a. Intelligent air duct detector shall be UL 268A listed.
    b. When used for air handling control, the relay within the base of the duct detector shall be capable of operating from general alarm.

6. Horn/Strobes: Polarized 24VDC type and meeting ADA requirements. The audio portion shall be used for alarm audibility and occupancy recall. The recall signal shall be separate and distinct from any other signal. Each unit shall have separate terminals associated with the speakers and the strobes so the strobes may remain on during the alarm condition.

    a. Horn/Strobes: UL 1480 and UL 1971 listed respectively.
    b. Provide speakers of the same type and sound throughout the facility.
    c. Locate speakers/strobes at heights according to NFPA 72 6-4.4 and ADA.

7. Strobes: Polarized 24VDC type meeting ADA requirements. The strobes shall remain on during any alarm condition and until the system is reset.

    a. Strobes: UL 1971 listed, 110 candela rated.
    b. Install at heights according to NFPA 72 6-4.4.

8. The Fire Alarm Detection System Annunciator shall be of an LCD type and display the exact origin of the alarmed device with a custom user defined message. Locate as shown on the Drawings. The annunciator shall duplicate the information available at the main panel.

    a. Locate an area zone map with device types and locations next to the fire alarm system annunciator panel.
    b. Orient the map so when facing the mounting wall, the “YOU ARE HERE” arrow will point up.

9. Wiring shall be power limited and meet the intent of NFPA 70, article 760. The systems shall be wired Style 4(Class B) and Style Y (Class B).

    a. Wiring shall be UL 1424 listed.

10. Fire Alarm Cables for Wet Locations: Cables shall be suitable for use in raceways and in wet locations, comply with NEC 70, articles 725 and 760, meet the minimum 70,000 BTU vertical tray flame test, have sequential footage markers applied to the outer jacket, and be UL rated for use at 300V and having an operating temperature of 75 degrees C.

    a. Horn/Strobes:

        1) Cable Description: 4 conductor non-shielded cable manufactured according to UL 1424 and NEC 70, Articles 725 and 760 Type Fire Power Limited (FPL).
        2) AWG of Conductors: 14 solid bare copper.
        3) Number of Conductors: Four.
        4) Conductor Insulation: 0.010 tri-rated semi-rigid PVC rated for 105C.
        5) Cable Jacket: 0.015 Red PVC.
        6) Nominal Cable Diameter: 0.225 inches.
        7) Applicable UL Designation: Type FPL, 75C.
        8) Meet the low capacitance requirements for the manufacture of the fire alarm system being installed.

    b. Initiating Circuits:

        1) Cable Description: 2 conductor shielded or non-shielded cable according to manufacturer’s requirements and UL 1424 and NEC, Articles 725 and 760-type fire power limited.
        2) AWG of Conductors: 16 or 18 solid bare copper.
        3) Number of Conductors: Two.
        4) Conductor Insulation: 0.020 PVC rated for 105C.
        5) Cable Shield: Overall aluminum backed polyester tape shield, aluminum facing outward, and 100 percent shield coverage.
        6) Cable Drain: 20 AWG stranded tinned copper.
        7) Cable Jacket: 0.015 Red PVC.
        8) Nominal Cable Diameter: 0.225 inches.
        9) Applicable UL Designation: Type FPL, 75C.
        10) Meet the manufacturer's low capacitance requirements for the fire alarm system being installed.

11. Provide lightning protection and transient voltage and surge suppression for the input AC power and all load side circuits.

    a. Lightning protection and transient voltage and surge suppression for load side circuits shall be UL 497B listed.
    b. Furnish lightning/surge protection integral with panel. Provide additional surge protection at 120 VAC disconnect breaker.
    c. Furnish and install additional transient suppression Isolated Loop Circuit Protector devices (ILCP) on fire alarm wiring, (including shield), extending beyond the main building by either aerial, underground, or other methods (walkways, bridges, or other aboveground connectors). The ILCP shall be located as close as practicable to the point the circuits leave or enter the building containing the fire alarm control panel.

1) The ILCP grounding conductor shall be a No.12 AWG minimum wire having a maximum length of 28 feet to be run in as straight a line as practicable and connected to the building grounding electrode system (unified ground) according to Article 800-31 of the National Electrical Code - 1996. The ILCP shall have a line to line response time of less than one nano-second capable of accepting 2,000 amps (10 x 50uS pulse). Line to earth response time shall be less than 25 nano-seconds with maximum current of 2,000 amps (8 x 20uS pulse) to earth Shield to earth current shall be 5,000 amps maximum.
2) The ILCP shall be protected by a high dielectric insulating material and be of small enough size to mount in a standard 4-11/16" square by 2-1/8" deep electrical box. Spark gap devices or devices incorporated in or installed within the fire alarm control panel in lieu of the specified ILCP are not acceptable.

C. Sequence of Operation/Alarm Activation:

1. The system shall function as follows when an area or duct detector or manual station operates:

   a. Sound required audible in a march time mode and activate devices and strobes throughout the building.
   b. Display individual detector or zone number on alphanumeric display with user defined message.
   c. Light an indicating LED on the device initiating the alarm. Smoke detectors and monitor modules only.
   d. Shut down the HVAC system and operate selected dampers.
   e. There shall be no limit, other than maximum system capacity, as to the number of intelligent/analog devices that may be in alarm simultaneously.

2. When an alarm has been acknowledged and silenced, the audible devices shall cease to operate but the strobes shall remain on.

   a. The block acknowledge feature of addressable system is not allowed and shall be disabled except for system start-up and maintenance.

3. After the alarm has been investigated, it shall be possible to press the recall button in the control panel to emit a steady sound throughout the facility as a recall signal.

   a. It shall not be possible to activate the recall before the alarm signal is silenced.
   b. The recall button shall be used as a signal to reoccupy the building after a fire and not be for any other purpose.

4. Fire Alarm System Special Requirements:

   a. Provide the fire alarm panel with 3 form C (open, common, close) auxiliary contacts to close/open on:

      1) System alarm.
      2) System trouble.

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount control and other panels with sufficient clearance for observation and testing of the display and panel controls to comply with ADA and Florida Accessibility Code for Building Construction, Article 4.27 - Controls and Operating Mechanisms. Provide decal with telephone contact number for warranty work at the inside face of the panel door.

B. Clearly mark fire alarm junction boxes for easy identification according to established color codes. Wiring shall be in conduit, EMT thin-wall or other approved methods. Use flexible metal raceway for devices mounted in suspend ceiling panels. Conduit, mounting boxes, junction boxes, and panels shall be securely hung and fastened with appropriate fittings to insure positive grounding throughout the system.

C. No wiring other than that directly associated with fire alarm detection, alarm, or auxiliary fire protection functions shall be allowed in fire alarm conduits.

1. Avoid wiring splices to the extent possible and, if needed, splices shall be made only in junction boxes and be by NEC approved methods.
2. Transposing or changing color coding of wires is not allowed.
3. Conductors in conduit containing more than 1 wire shall be labeled on each end with “E-Z markers” or accepted equivalent.
4. Conductors in cabinets shall be carefully formed and harnessed so that each drop off directly opposite to its terminal.
5. Cabinet terminals shall be numbered and coded.
6. Provide clearly labeled controls, function switches, etc., on equipment panels.
7. In junction or pull boxes with splices, provide:

    a. Minimum dimension of junction or pull boxes according to NEC Articles 370-18a.1.a. and 370-18a.2, the conductor size not withstanding.
    b. Terminal strips.

8. Color Codes:

    a. Signaling Line Circuits: Red jacket with red and black conductors.
    b. Initiating Device Circuits: Red and black.
    c. Notification Appliance Circuit Horns: Brown and orange.
    d. Notification Appliance Circuit Strobes: White and yellow.
    e. Control Circuits for Door Holders and Relays: White and orange.

D. Check and test wiring to insure grounds, opens, or shorts are not present.

E. Manual Pull Stations: Where manual pull stations are indicated on the Drawings, install 4'-0" AFF, with a minimum of 3 inches of clear, flat, wall space all around the devices from door or window trim, wall outlets, wall openings, thermostats, cabinets, shelving, or any other adjacent obstruction.

F. Audible Alarms: Mount on walls at least 6 inches below the adjacent surface or at 7'-6" AFF to top of unit, whichever is lower unless otherwise directed by the A/E.

G. Visual Alarms and Combination Horn/Strobes: Mount on walls 80 inches AFF or 6 inches below ceiling whichever is lower.

H. Conduit: Run concealed, unless written approval from the Owner has been received to do otherwise. Refer to Section 26 05 33.13 - Raceways.

3.02 FIELD QUALITY CONTROL

A. Tests and Reports: Perform electrical and mechanical tests required by NFPA 72 inspection and test form. Test and report costs shall be in the contract price. Submit a check out report in triplicate, one copy of which will be registered with the equipment manufacturer. The report shall include, but not be limited to:

1. A complete list of equipment installed and wired.
2. Indication that equipment is properly installed and functions and conforms with these specifications.
3. Test of individual zones as applicable.
4. Test of all manual stations and detectors that can be reset.
5. Verification of line supervision of each initiating and indicating circuit.
6. Verification of the Class B operation of each initiating circuit as specified.
7. Verifying the operation of all alarm initiated functions, including, but not limited to, smoke control, and elevator capture features if used.
8. Written report indicating all area smoke detector sensitivity readings.
9. Written report indicating all AHU duct smoke detector air velocity and sensitivity readings.
10. Technician's name and date.

3.03 DEMONSTRATION

A. Manufacturer's Training:

1. Upon Owner Request and at no cost to Owner, provide factory level instructional training in the operation, maintenance and programming of the system for designated personnel from City of Miami Facilities Department.

2. At end of training provide:

   a. Training certificates to each trainee.
   b. Installation/User manual to each trainee.

3. System operation training for school staff, to include but not limited to the principal, assistant principals, office personnel, and zone mechanic. Training shall be a minimum of 2 classes, at 2 hours minimum for each class.

   a. Provide to each trainee, an operators manual incorporating a quick reference operating instructions sheet.

END OF SECTION

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 024100 - Demolition: Removal of built elements and utilities.

B. Section 312200 - Grading: Topsoil removal.

C. Section 312323 - Fill:

1. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and utilities within the building.

2. Backfilling and compacting for utilities outside the building to utility main connections.

3. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

D. Section 329300 - Plants: Preparation of subsoil and topsoil; testing and analysis of imported topsoil; soil amendment materials; planting soil mixtures.

1.03 QUALITY ASSURANCE

A. Clearing Firm Qualifications: Company specializing in the type of work required, with at least three years experience.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 312323 - Fill.

B. Soil Amendment Materials for Planting and Turf Areas: As specified in Section 329300 - Plants.

PART 3 - EXECUTION

3.01 SITE CLEARING

A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Do not remove or damage vegetation beyond the limits indicated on drawings.

1. Exception: Specific trees and vegetation indicated on drawings to be removed.

B. Install substantial, highly visible fences to prevent inadvertent damage to vegetation to remain:

1. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.

C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.

1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).

E. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

F. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 312200

GRADING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rough grading the site for site structures.

B. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 312316 - Excavation.

C. Section 312323 - Fill: Filling and compaction.

D. Section 329300 - Plants: Topsoil in beds and pits.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil: See Section 312323 - Fill.

B. Other Fill Materials: See Section 312323 - Fill.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

F. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

3.03 ROUGH GRADING

A. For filling procedures, see Section 312323 - Fill.

3.04 FINISH GRADING

A. Before Finish Grading:

1. Verify building and trench backfilling have been inspected.
2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches (75 mm).

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches (75 mm).

E. Place topsoil in areas where sodding and planting are indicated.

F. Place topsoil where required to level finish grade.

G. Place topsoil to the following compacted thicknesses:

1. Areas to be Sodded: 4 inches (100 mm).
2. Shrub Beds: 18 inches (450 mm).

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and foreign material while spreading.

J. Near plants and buildings spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

L. Lightly compact placed topsoil.

3.05 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) (30 mm) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch) (13 mm).

3.06 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.

3.07 FIELD QUALITY CONTROL

A. For compaction density testing, see Section 312323 - Fill.

3.08CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 312316

EXCAVATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, slabs-on-grade, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 003119 - Available Project Information.

1. Attachment A - Geotechnical Report.

B. Section 311000 - Site Clearing: Clearing and protection of vegetation; removal of existing debris.

C. Section 312200 - Grading: Site grading.

D. Section 328400 - Planting Irrigation: Underground irrigation piping.

E. Section 337119 - Electrical Site Utilities: Underground electrical ducts and structures for power, telephone and cable TV service.

1.03 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. For additional requirements, see Section 312200 - Grading.

3.03 EXCAVATING

A. Underpin adjacent structures that could be damaged by excavating work.

B. Excavate to accommodate new structures and construction operations.

C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Cut utility trenches wide enough to allow inspection of installed utilities.

G. Hand trim excavations. Remove loose matter.

H. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd (0.25 cu m) measured by volume.

I. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 312323 - Fill.

J. Grade top perimeter of excavation to prevent surface water from draining into excavation.

K. Remove excavated material that is unsuitable for re-use from site.

L. Remove excess excavated material from site.

3.04 FIELD QUALITY CONTROL

A. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.05 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 312323

FILL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Filling , backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 003119 - Available Project Information.

1. Attachment A - Geotechnical Report.

B. Section 311000 - Site Clearing: Clearing and protection of vegetation; removal of existing debris.

C. Section 312200 - Grading: Site grading.

D. Section 312316 - Excavation: Removal and handling of soil to be re-used.

E. Section 328400 - Planting Irrigation: Backfilling and compaction of fill for irrigation piping.

F. Section 329300 - Plants: Preparation of subsoil and topsoil; testing and analysis of imported topsoil; soil amendment materials; planting soil mixtures.

1.03 REFERENCE STANARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM D1556 -- Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

2. ASTM D1557 -- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2007.

3. ASTM D2487 -- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2006e1.

4. ASTM D2922 -- Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

C. Florida Building Code, 5th edition - 2014 (FBC):

1. FBC-B -- Florida Building Code, Building.
2. FBC-EB -- Florida Building Code, Existing Building.
3. FBC-P -- Florida Building Code, Plumbing.

D. Florida Statutes (FS):

1. FS Chapter 553 -- Building Construction Standards.
    a. FS 553.60 - 553.64 -- Trench Safety Act.

E. U.S. Code of Federal Regulations (CFR):

1. 29 CFR 1926 -- Safety and Health Regulations for Construction.
    a. 29 CFR 1926 Subpart P -- Excavations.

1.03 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

B. Classification of Soil Materials: Soil materials shall be classified in accordance with ASTM D2487.

1.05 SITE CONDITIONS

A. Determine location and nature of work, character of equipment, and facilities needed for performance of work, general, and local conditions prevailing at site, and other matters affecting work under this contract according to Instructions to Bidders and General Conditions.

B. Subsurface data, including soil borings, ground water elevations, or conditions, if shown on the drawings or attached to these specifications, are presented only as information available indicating conditions found and limited to exact locations and shall not be interpreted as an indication of conditions that may actually develop during construction.

1. Make deductions of subsurface conditions that may affect methods or cost of construction and agree that no claim for damages or other compensation shall be made, except as are provided for in the agreement, should conditions be found during construction different from those as calculated or anticipated by the Contractor.

2. Neither the Board nor the A/E will be held responsible for variations found to exist between the subsurface data referred to above and actual field conditions that may develop during construction.

C. Where existing grades, utility lines, or substructures are shown on drawings, Contractor, the Board, and A/E assume no responsibility for correctness of existing conditions indicated.

1. Contractor shall locate indicated existing utility lines or substructures that may be affected by this Project, and shall be responsible for any damage or injury they may sustain as a result from working on or near these existing utilities or substructures not specified to be removed or demolished.

D. Bench Marks and Monuments:

1. Maintain existing bench marks, monuments, and other reference points, and if disturbed or destroyed, replace as directed by A/E.

1.06 JOB CONDITIONS

A. Condition of Premises: Accept site as found and excavate, fill, compact, and backfill site as indicated on drawings and specified in this section.

B. Protection:

1. Adjacent Structures and Property:

a. Take precautions to guard against movement, settlement, injury, or loss to existing structures or to equipment and furnishings housed therein arising directly or indirectly in connection with this contract according to Instructions to Bidders and General Conditions.

b. Provide and place bracing or shoring as necessary or proper according to Instructions to Bidders and General Conditions.

c. Be responsible for the safety and support of such structures and facilities and be liable for any movement or settlement, damage, or injury caused by or resulting therefrom.

(1) If, at any time, the safety of any adjacent structures or facilities appears to be in doubt, cease operations and take immediate precautions to support such structures and facilities and notify A/E at once.

(2) Resume operations only after permission has been granted by A/E.

2. Adjacent Sidewalks and Streets:

a. Take precautions to guard against movement, settlement, or collapse of any

sidewalks, curbs, or street passages on adjoining sites and be liable for any such movement, settlement, or collapse according to Instructions to Bidders and General Conditions.

(1) Repair such damage promptly when so ordered at no cost to the Board.

(2) Install necessary shoring, including sheet piling as may be required, to protect banks, adjacent paving, structures, and utilities during excavations.

(3) Be responsible for any damage to existing structures, equipment, and furnishings due directly or indirectly to construction operations. Except where removal is needed by site grading or location of new buildings, use every possible precaution to prevent injuries to landscaping, drives, curbs, and walks on or next to site of the work and replace, at no expense to the Board, any of the above destroyed.

3. Existing Landscaping, Drives, Curbs, and Walks: Except where removal is required by site grading or location of new buildings, take every possible precaution to prevent injuries or loss to individual trees, groups of trees, and other existing landscaping, drives, curbs and walks on or next to the site of the work according to Instructions to Bidders and General Conditions, and replace any such damaged or destroyed at no cost to the Board.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Satisfactory Fill Materials:

1. Soil Fill Materials: Soil fill materials classified in ASTM D2487 as GW, GP, SW and SP, and properly worked by Contractor to obtain optimum moisture and compaction.

a. Shall comply with applicable requirements of the governing building code, including but not limiited to FBC-B CHAPTER 18, FBC-B SECTION 3304, and FBC-B APPENDIX J.

2. Controlled Low-Strength Material (CLSM): Self-compacted, cementitious material may be used as a backfill in place of compacted fill only in areas where such use has been authorized in advance by the A/E.

a. CLSM used as fill shall comply with applicable requirements of the governing building code, including but not limited to FBC-B CHAPTER 18.

B. Soil Amendment Materials: Refer to Section 329300 - Plants.

C. Planting Soil Mixtures: Refer to Section 329300 - Plants.

PART 3 - EXECUTION

3.01 GENERAL

A. Safeguards During Construction: Safety during construction and the protection of adjacent public and private properties shall comply with federal, state and local

regulatory requirements, applicable requirements of the governing buildiing code including but not limited to FBC-B CHAPTER 3 and FBC-EB CHAPTER 15, and the following:

1. Public Safety: Accomplish work in a manner providing for the safety of the public and workers and the protection of property.
2. Construction: Do not close, obstruct, or store material or equipment in streets, sidewalks, alleys, or passageways without a permit according to local ordinances, regulations, codes, and the City's approval.
3. Interference: Conduct operations with minimum interference with roads, adjacent properties, and other facilities.
4. Excavations and Trench Safety: Comply with 29 CFR 1926 Subpart P (Excavations) and FS 553.60 - 553.64 (Trench Safety Act).

B. Dewatering: Dewater excavations for inspection and for construction. Concrete or fill shall not be placed in water and concrete less than 8 hours of age shall not be subjected to ground water pressure.

1. Keep excavations free of water while backfilling or construction takes place.
2. Dispose of water resulting from dewatering operations according to city, county, state, and federal regulatory requirements.
3. Conduct operations to insure storm water runoff sediment is not discharged to the adjacent lakes, waterways, sewers, streets, and adjacent properties.

C. Erosion Repair: Take every precaution and temporary measure to prevent damage from erosion of freshly graded areas.

1. Repair and reestablish grades to required elevations and slopes where settlement or washing occurs before acceptance of work at no cost to the Owner.
2. This applies to damage to the newly graded areas within the building area limits and damage to adjacent properties by eroded materials

D. Testing:

1. The Contractor shall provide services of a qualified Testing Laboratory to perform specified tests, inspections, instrumentation and inspection of work.
2. Material Testing Requirements:
    a. Soil Classification Tests: One test from each type of material encountered or proposed to be used.
    b. Moisture-Content and Density Testing:
        (1) Laboratory Tests (ASTM D1557): One test for each material encountered or proposed to be used.
        (2) Field Tests (ASTM D1556 or ASTM D2922): One test per layer of fill per 10,000 square feet of area, plus one test per 10,000 square feet of

subgrade in cut.

c. Testing of Topsoil Mixture at Lawn and Planting Areas:

(1) Laboratory Tests: As specified.

3. Fill and topsoil mixture may be inspected at any stage of operation to determine compaction characteristics, densities and freedom from organic and plastic materials.

E. Removal of Debris, Excess Materials, and Temporary Structures:

1. Unless otherwise noted or specified to be relocated or stored, debris and excess materials shall become property of Contractor and shall be removed from site.

a. Do not store or allow debris to accumulate on site.

b. If Contractor fails to remove excess debris and excess materials promptly, the Owner reserves the right to remove the debris at Contractor's expense.

2. Temporary Structures: Remove temporary structures when no longer required.

3.02 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.03 LOCATIONS AND ELEVATIONS

A. Be responsible for surveys, measurements, and layouts required for proper execution of the work.

1. Lay out lines and grades from existing survey control system and as shown on drawings.

B. Locate by stake and mark locations and elevations of following:

1. Elevations of existing earth cut and fill.

2. Final grades for landscape contours.

3. Other items as required to execute work as specified.

3.04 SITE CLEARING

A. Clearing and Grubbing: Within limits of areas designated for building area, grading and site construction work, remove trees, brush, stumps, wood debris, and other deleterious materials not required to remain as part of finished work.

1. Remove grass, plants, vegetation, and organic material from same area.

B. Stripping: Strip turf, organic material, surface litter, rubble, and overburden for entire depth of root system of grass or other vegetation within areas indicated on Site Plan.

1. For building area, remove muck or organic material above the limestone layer. Clean potholes, larger than 6 inches in any horizontal direction, in rock filled with muck or organic material.

C. Remove accumulated material daily or as necessary to prevent fire hazard condition.

1. Burning of materials is not allowed on the site.

D. For additional requirements, refer to Section 311000 - Site Clearing.

3.05 EXCAVATION

A. Begin excavation after stripping, clearing, and grubbing has been completed.

B. Excavate to grades required to accommodate the proposed construction.

C. Dewater as specified.

D. Excavations for structures shall conform to dimensions and elevations indicated for each building.

1. Extend excavations a sufficient distance from walls and footings to allow for placing and removal of forms and installation of services, except where the concrete for walls and footing is authorized to be deposited directly against excavation surfaces.

a. Excavation for any purpose shall not remove lateral support from any foundation without first underpinning or protecting the foundation against settlement or lateral translation.

2. Excavation below general machine excavation for footings and foundations shall be hand worked.

3. Bottoms of footings shall be on level planes.

E. Excavate in such a manner that quick and efficient drainage of storm water will occur.

F. Remove "unsatisfactory materials" encountered from the building areas.

G. Classify excavated materials and stockpile separately suitable soils for use as backfill materials. If sufficient quantities of excavated materials meeting requirements for backfill are not available on site, provide materials meeting these requirements.

H. Stockpile excavated material suitable for use as fill and backfill where directed by A/E.

I. For additional requirements, refer to Section 312316 - Excavation.

3.06 FILLING, BACKFILLING, AND COMPACTION

A. General:

1. Supporting Soils for Shallow Foundations: Shallow foundations shall be built on undisturbed soil, compacted fill material or controlled low-strength material (CLSM).

a. Compacted fill material shall be placed in accordance with FBC-B SECTION 1804.5.

b. CLSM shall be placed in accordance with FBC-B SECTION 1804.6.

B. Reconditioning of Subgrade:

1. Where approved compacted subgrades are disturbed by the Contractor's subsequent operations or adverse weather, scarify and compact the subgrade as specified to required density before further construction occurs.
2. Use power driven hand tampers for recompaction over underground utilities

C. Filling and Backfilling:

1. General:
    a. Materials: "Satisfactory Fill Materials" shall be used in fills and backfills.
    b. Place "Satisfactory Fill Material" in horizontal layers not exceeding depth indicated on the drawings; or if not indicated, the not more than 12 inches in loose depth.
        (1) Compact as specified in this section.
        (2) Do not place fill materials on muddy surfaces.
2. Backfilling:
    a. Do not begin backfilling until:
        (1) Construction below finished grade has been accepted.
        (2) Underground utilities systems have been inspected, tested, and accepted.
        (3) Forms have been removed.
        (4) Excavation cleaned of trash and debris.
    b. The excavation outside the foundation shall be backfilled with soil that is free of organic material, construction debris, cobbles and boulders.
        (1) The backfill shall be placed in lifts and compacted in a manner that does not damage the foundation or the waterproofing or dampproofing material.
    c. Bring backfill to indicated finished grades.
    d. Backfill materials and compaction shall be as specified.
    e. Do not place backfill in wet areas.
    f. Do not operate heavy equipment for spreading and compacting backfill closer to foundation or retaining walls than a distance equal to height of backfill above top of footing.
    g. Compact the area remaining by power-driven hand tampers suitable for material being compacted.
    h. Place backfill carefully around pipes to avoid damage to the pipes.

D. Compaction: Where shallow foundations will bear on compacted fill material, the compacted fill shall comply with:

1. Recommendations of the Geotechnical Report.

a. Refer to Section 003119 - Available Project Information, Attachment A - Geotechnical Report.

2. Applicable requirements of the governing building code, including but not limited to FBC-B CHAPTER 18.

E. Protection: Settlement or washing occurring in backfilled areas before acceptance of work shall be repaired and grades reestablished to required elevation and slope.

3.07 TRENCHING & BACKFILLING FOR UNDERGROUND PIPING

A. General:

1. Comply with applicable requirements of the governing building code, including but not limited to FBC-P SECTION 305 and FBC-P APPENDIX F.

B. Trenching and Bedding:

1. Where trenches are excavated such that the bottom of the trench forms the bed for the pipe, solid and continuous load-bearing support shall be provided between joints.

2. Where over-excavated, the trench shall be backfilled to the proper grade with compacted earth, sand, fine gravel or similar granular material.

3. Piping shall not be supported on rocks or blocks at any point.

4. Rocky or unstable soil shall be over-excavated by two or more pipe diameters and brought to the proper grade with suitable compacted granular material.

C. Backfilling:

1. Backfill shall be free from discarded construction material and debris.

2. Backfill shall be free from rocks or broken concrete until the pipe is covered by not less than 12 inches of tamped earth.

3. Backfill shall be placed evenly on both sides of the pipe and tamped to retain proper alignment.

4. Loose earth shall be carefully placed in the trench in 6-inch layers and tamped in place.

D. Backfilling and Compaction for Irrigation Piping: Refer to Section 328400 - Planting Irrigation.

E. Protection of Footings: Trenching installed parallel to footings shall not extend below the 45-degree bearing plane of the bottom edge of a wall or footing.

3.08 GRADING

A. General:

1. Provide gradients and elevations as shown in Construction Documents with current industry standard laser grading procedures to ensure specified tolerances.

2. The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for a minimum distance of 10 feet measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, a 5-percent slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2 percent where located within 10 feet of the building foundation. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building.

    a. Exception: Where climatic or soil conditions warrant, the slope of the ground away from the building foundation shall be permitted to be reduced to not less than one unit vertical in 48 units horizontal (2-percent slope). The procedure used to establish the final ground level adjacent to the foundation shall account for additional settlement of the backfill.

B. Soil Preparation for Planting and Turf Areas: Refer to Section 329300 - Plants.

C. For additional requirements, refer to Section 312200 - Grading.

END OF SECTION

SECTION 313116

TERMITE CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Chemical soil treatment.

1.02 RELATED REQUIREMENTS

A. Section 030505 - Underslab Vapor Barrier.

B. Section 033000 - Cast-in-Place Concrete.

C. Division 31 - Earthwork: Excavation, fill, grading.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. State of Florida, Department of Agriculture and Consumer Services (FL DACS):

1. FL DACS (TERM) -- Termiticides Registered in Florida for Preventive Treatment of New Construction; current edition.

C. U.S. Code (USC):

1. USC 7 -- U.S. Code, Title 7 - Agriculture.

a. USC 7-136 through 136y -- U.S. Code, Title 7, Chapter 6, Sections 136 through 136y, Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

C. Test Reports: Indicate regulatory agency approval reports when required.

D. Manufacturer's Application Instructions: Indicate caution requirements.

E. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.

F. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.

G. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work and:

1. Having minimum of 2 years documented experience.

2. Approved by manufacturer of treatment materials.

3. Licensed in the State of Florida.

1.06 REGULATORY REQUIREMENTS

A. Conform to all applicable Federal, State and Local laws, rules and regulations, and governing building code for requirements for application, application licensing, and authority to use toxicant chemicals, including but not limited to the following:

1. United States Environmental Protection Agency (EPA) regulations for termiticides.

2. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); USC 7-136 through 136y.

3. Chapter 482, Florida Statutes, and Chapter 5E-14, Florida Administrative Code.

4. Certificate of Protective Treatment for Prevention of Termites: A weather-resistant jobsite posting board shall be provided to receive duplicate Treatment Certificates as each required protective treatment is completed, providing a copy for the person the permit is issued to and another copy for the building permit files. The Treatment Certificate shall provide the product used, identity of the applicator, time and date of the treatment, site location, area treated, chemical used, percent concentration and number of gallons used, to establish a verifiable record of protective treatment.

5. Notice of Termite Protection: A permanent sign that identifies the termite treatment provider and need for re-inspection and treatment contract renewal shall be provided. The sign shall be posted in location to be determined by Project Manager.

6. Inspections: Building components and building surroundings required to be protected from termite damage in accordance with Florida Building Code shall not be covered or concealed until the release from the building official has been received.

7. Certificate of Compliance: Comply with the rules and laws as established by the Florida Department of Agriculture and Consumer Services, with respect to pre-construction soil treatment for protection against subterranean termites.

a. The pest control company shall issue to the Building Department a Certificate of Compliance that contains the following statement: "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."

8. Termiticide shall be listed by the Florida Department of Agriculture and Consumer Services (under authority of Chapter 487, Florida Statutes) as a Florida Registered Termiticide intended for use as a preventative treatment for termites for new construction.

9. Approval from applicable jurisdictions (including Miami Dade DERM) that termiticide application will not affect any water reservoir and water use systems within the vicinity of the project site.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

1.07 WARRANTY

A. Installer/Applicator Warranty:

1. Provide five year installer's warranty against damage to building caused by termites.

2. Upon completion of soil treatment and as a condition of substantial completion, furnish the Owner with a written warranty, from the applicator, which shall provide that:

a. Application was made at concentration, rates, and methods complying with applicable regulatory requirements and these specifications.

b. Effectiveness of treatment is warranted for not less than 5 years without additional cost to the Owner, by means of a 5-year Repair and Replacement Bond.

c. Upon evidence of subterranean termite activity, re-treat area at no additional charge to the Owner. Additional treatment shall be sufficient to prevent termites from attacking building or its contents.

d. Upon occurrence of damage to building or to its contents within warranty period, retreat soil and repair or replace damage to building and its contents at no cost to the Owner.

e. Warranty Bond shall be drawn in favor of the Owner, successor, or assigns and shall be non-cancelable by all parties to the contract except the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Termiticide:

1. General: Product shall have current EPA Registration and listing as a Florida Registered Termiticide.

a. Shall meet the requirements for registration as a pesticide product as required by Chapter 487, F.S., and the registered label shall contain directions for use

on new construction.

2. Manufacturer/Product: Subject to current EPA Registration and listing as a Florida Registered Termiticide, provide termiticide product listed in the FL DACS (TERM).

B. Diluent: Recommended by toxicant manufacturer.

2.02 MIXES

A. Mix toxicant to manufacturer's instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The initial chemical soil treatment shall be done after earthwork within the application area has been completed.

1. Verify that excavation, backfilling and compaction, and final grading have been completed.

2. Verify that soil surfaces are sufficiently dry to absorb toxicant, and ready to receive treatment.

B. Concrete over-pour or mortar accumulated along the exterior foundation perimeter shall be removed prior to exterior chemical soil treatment, to enhance vertical penetration of the chemicals.

C. Verify that soil surfaces are sufficiently dry to absorb toxicant, and ready to receive treatment.

D. Verify final grading is complete.

3.02 APPLICATION

A. General:

1. Comply with requirements of U.S. EPA and applicable state and local codes.

B. Spray apply toxicant in accordance with manufacturer's instructions.

1. Soil Conditions: Apply termiticide mixtures when moisture content soil is sufficiently low to allow uniform distribution of chemical throughout specified areas.

a. Apply termiticide mixture after sub-grade has been made ready for placement of vapor barrier / vapor retarder, and as soon as practical before placement of concrete slab / paving. Piling, pile caps, grade beams, foundation walls, and below grade waterproofing shall have been completed.

b. Apply at least 12 hours before placement of concrete slabs and during normal working hours to be subject to inspection. Notify applicator at least 24 hours before application of termiticide mixtures will be completed.

2. Termite protection shall be provided in accordance with applicable requirements of the governing building code, and as follows:

a. Apply toxicant at the following locations:

(1) Soil and earth that will be covered by concrete slab-on-grade.

(2) Foundation walls.

(3) Vertical surfaces in areas such as around foundations, plumbing lines, backfilled soil against foundation walls, and other areas that may warrant more than just a horizontal barrier.

(4) Other locations as required by applicable Federal, State and Local laws, rules and regulations, or governing building code.

b. Apply extra treatment to structure penetration surfaces such as pipes, conduits or ducts, and soil penetrations such as grounding rods or posts.

c. Re-treat disturbed treated soil with same toxicant as original treatment.

d. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3. Application Under Concrete Slabs on Fill: Comply with regulatory requirements and manufacturer's instructions.

a. Apply termiticide mixtures uniformly to all areas beneath concrete slabs-on-grade, including beneath walkways and entrance platforms and beneath sidewalks within 5 feet of buildings.

b. A minimum of 1 gallon of termiticide mixtures shall be uniformly applied to each 10 square feet of area to be treated.

c. Ground areas beneath concrete slabs-on-grade and paving abutting building slabs shall be similarly treated for a distance not less than 3 feet from building.

4. Application Along Foundation Walls, Pipes, and Conduits: Comply with regulatory requirements and manufacturer's instructions.

a. Treat critical areas along both sides of exterior and interior foundation walls, columns, and around utility pipes, conduits, ducts, and other similar items extending through soil beneath, and next to new construction, to a depth of 1 foot in a strip 6 inches wide, at a rate of 4 gallons of termiticide mixture to each 10 linear feet.

b. Mix chemical with soil as it is placed against walls and utility lines.

c. Apply at least 1 gallon of termiticide mixture around each pipe.

5. Application to Masonry Foundation Walls: Comply with regulatory requirements and manufacturer's instructions.

a. Treat voids of unit masonry foundation walls, top of course occurring at or just above grade level, with additional treatment of not less than 2 gallons of chemical for each 5 linear feet.

6. Vertical Barrier: Comply with regulatory requirements and manufacturer's instructions.

a. Apply vertical chemical barrier promptly after construction is completed, including initial landscaping and irrigation/sprinkler installation.

b. Establish vertical barriers in areas such as around foundations, plumbing lines, backfilled soil against foundation walls, and other areas that may warrant more than just a horizontal barrier.

7. Apply extra treatment at penetrations through concrete slab-on-grade (e.g., piping or duct penetration), and soil penetrations such as grounding rods or posts.

   a. Where a protective sleeve is provided around metallic piping penetrating a concrete slab-on-grade per requirements of FBC, provide treatment of the annular space between the protective sleeve and the pipe in accordance with Florida Building Code.

8. Any soil area disturbed after initial chemical soil treatment is applied shall be promptly re-treated by the pest control company (installer), including spaces boxed or formed. Re-treatment shall comply with all applicable health and safety standards and requirements.

   a. Re-treat disturbed treated soil with same toxicant as original treatment.

9. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 PROTECTION

A. Do not permit soil grading over treated work.

B. Chemically treated soil shall be protected with a vapor retarder or vapor barrier to protect against rainfall dilution. If rainfall occurs before vapor retarder / vapor barrier placement, re-treatment is required. Any work, including placement of reinforcing steel, done after chemical treatment until the concrete floor is poured, shall be done in such manner as to avoid penetrating or disturbing treated soil.

C. Space in concrete floors boxed out or formed for the subsequent installation of plumbing traps, drains or any other purpose shall be created by using plastic or metal permanently placed forms of sufficient depth to eliminate any planned soil disturbance after initial chemical soil treatment.

D. Condensate lines and roof downspouts shall discharge at least 1 foot (305 mm) away from the structure sidewall; where underground piping is not indicated, provide tail extension or splash block as appropriate for conditions.

END OF SECTION

SECTION 321313

CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, integral curbs, gutters, and related concrete paving applications.

B. Detectable warnings for concrete sidewalks and curb ramps.

1.02 RELATED REQUIREMENTS

A. Section 024100 - Demolition: Selective demolition and removal of concrete sidewalk, curb and gutter.

B. Section 031000 - Concrete Formwork: Formwork for on-site concrete paving elements.

C. Section 033000 - Cast-in-Place Concrete: Concrete for on-site concrete paving elements.

D. Section 079200 - Joint Sealants: Joint sealant for on-site concrete paving joints.

E. Section 312200 - Grading: Site preparation for on-site concrete paving elements.

F. Section 312323 - Fill: Filling and compaction of subbase for on-site concrete paving elements.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Concrete Institute (ACI):

1. ACI 211.1 -- Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

2. ACI 301 -- Specifications for Structural Concrete; 2010 (Errata 2012).

3. ACI 304R -- Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

4. ACI 305R -- Hot Weather Concreting; 2010.

5. ACI 306R -- Cold Weather Concreting; 2010.

C. American Society for Testing and Materials (ASTM):

1. ASTM A615/A615M -- Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

2. ASTM A1064/A1064M -- Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
3. ASTM C39/C39M -- Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
4. ASTM C94/C94M -- Standard Specification for Ready-Mixed Concrete; 2015.
5. ASTM C309 -- Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
6. ASTM C685/C685M -- Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.
7. ASTM D1751 -- Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
8. ASTM D1752 -- Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

D. Florida Building Code, 5th edition - 2014 (FBC):
1. FBC-B -- Florida Building Code, Building.
2. FBC-A -- Florida Building Code, Accessibility.

E. Florida Department of Transportation (FDOT):
1. FDOT (DES) -- FY 2017-18 Design Standards.
2. FDOT (SPEC) -- Standard Specifications for Road and Bridge Construction; July 2017.
   a. FDOT (SPEC) Section 210 -- Reworking Limerock Base.
   b. FDOT (SPEC) Section 347 -- Portland Cement Concrete - Class NS.
   c. FDOT (SPEC) Section 350 -- Cement Concrete Pavement.
   d. FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.
   e. FDOT (SPEC) Section 522 -- Concrete Sidewalk and Driveways.
   f. FDOT (SPEC) Section 527 -- Detectable Warnings.
   g. FDOT (SPEC) Section 911 -- Base and Stabilized Base Materials.
   h. FDOT (SPEC) Section 931 -- Metal Accessory Materials for Concrete Pavement and Concrete Structures.
   i. FDOT (SPEC) Section 932 -- Nonmetallic Accessory Materials for Concrete Pavement and Concrete Structures.

1.04 SUBMITTALS

A. General:

1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

C. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

PART 2 - PRODUCTS

2.01 PAVING ASSEMBLIES

A. On-Site Concrete Paving: Comply with applicable requirements of ACI 301.

1. Concrete Sidewalks and Bicycle Parking Area: 3,000 psi (20.7 MPa) 28 day concrete, 4 inches (100 mm) thick, buff color Portland cement, exposed aggregate finish.

B. Public Sidewalk, Curb and Gutter Paving:

1. Concrete Curbs: Comply with details indicated or referenced on Civil drawings and requirements specified in FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

2. Concrete Sidewalks: Comply with details indicated or referenced on Civil drawings and requirements specified in FDOT (SPEC) Section 522 -- Concrete Sidewalk and Driveways.

3. Concrete Reinforcing: Comply with details indicated or referenced on Civil drawings and requirements specified in FDOT (SPEC) Section 931 -- Metal Accessory Materials for Concrete Pavement and Concrete Structures.

2.02 FORM MATERIALS

A. Form Materials for On-Site Concrete Paving: Refer to Section 031000 - Concrete Formwork.

B. Form Materials for Public Sidewalk, Curb and Gutter Paving: Shall conform to article 520-3 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

2.03 REINFORCEMENT

A. Reinforcing Materials for On-Site Concrete Paving: ASTM C309, Type 1, Class A.

1. Reinforcing Steel: ASTM A615/A615M, Grade 80 (80,000 psi) (550 MPa) yield strength; deformed billet steel bars; galvanized.

2. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; galvanized.

3. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi (280 MPa) yield strength; deformed billet steel bars; galvanized finish.

B. Reinforcing Materials for Public Sidewalk, Curb and Gutter Paving:

1. As indicated on Civil drawings; or if not indicated, then as follows:

a. Reinforcement steel shall comply with requirements specified in article 931-1 of FDOT (SPEC) Section 931 -- Metal Accessory Materials for Concrete Pavement and Concrete Structures.

b. Bars and chairs for longitudinal joints and dowel bars shall comply with requirements specified in article 931-2 of FDOT (SPEC) Section 931 -- Metal Accessory Materials for Concrete Pavement and Concrete Structures.

c. Metal dowel bar assemblies for joints shall comply with requirements specified in article 931-3 of FDOT (SPEC) Section 931 -- Metal Accessory Materials for Concrete Pavement and Concrete Structures.

2. Acceptable Products: Use products that are currently listed on the FDOT's Approved Product List (APL).

2.04 CONCRETE MATERIALS

A. General:

1. Obtain cementitious materials from same source throughout.

B. Concrete Materials for On-Site Concrete Paving: As specified in Section 033000 - Cast-In-Place Concrete.

C. Concrete Materials for Public Sidewalk, Curb and Gutter Paving: Meet the requirements specified in article 520-2 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

a. Concrete materials shall meet the requirements of FDOT (SPEC) Section 347 -- Portland Cement Concrete - Class NS.

2.05 ACCESSORIES

A. Aggregate Base Course:

1. Aggregate Base Course Materials for On-Site Concrete Paving: Natural stone; free of shale, clay, friable material and debris.

a. Graded in accordance with ASTM D2487 Group Symbol GM.

b. For additional requirements, refer to Section 312323 - Fill.

2. Aggregate Base Course Materials for Public Sidewalk, Curb and Gutter Paving: As indicated on Civil drawings; or if not indicated, then in accordance with FDOT standards and specifications, including but not limited to:

a. Materials for Reworking of Existing Limerock Base: Shall conform to requirements specified in FDOT (SPEC) Section 911 -- Base and Stabilized Base Materials.

B. Curing Materials:

1. Curing Compound for On-Site Concrete Paving: ASTM C309, Type 1, Class A.

2. Curing Materials for Public Sidewalk, Curb and Gutter Paving: Use materials conforming to any of the curing methods specified in article 520-8 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

B. Joint Materials:

1. Joint Materials for On-Site Concrete Paving:

a. Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.

(1) Material: ASTM D1752 sponge rubber (Type I).

b. Joint Sealant: Refer to Section 079200 - Joint Sealants.

2. Joint Filler and Joint Sealant for Public Sidewalk, Curb and Gutter Paving: Furnish and install preformed joint filler and sealant at joints in newly constructed and/or existing concrete walking surfaces (sidewalk curb ramps, sidewalks, etc.) constructed in accordance with FDOT (DES) Index No. 305 and 21110.

a. Comply with details indicated or referenced on Civil drawings and requirements specified in FDOT (SPEC) Section 932 -- Nonmetallic Accessory Materials for Concrete Pavement and Concrete Structures.

b. Acceptable Products: Use products that are compatible with each other and currently listed on the FDOT's Approved Product List (APL).

C. Detectable Warnings:

1. General:

a. Detectable warnings shall comply with applicable requirements of the governing building code, including but not limited to FBC-A SECTION 705.

2. Furnish and install detectable warnings on newly constructed and/or existing concrete walking surfaces (sidewalk curb ramps, sidewalks, etc.) constructed in accordance with FDOT (DES) Index No. 304.

a. Comply with details indicated or referenced on Civil drawings and requirements specified in FDOT (SPEC) Section 527 -- Detectable Warnings.

b. Acceptable Products:

(1) Detectable Warning: Use a product that is currently listed on the FDOT's Approved Product List (APL).

(2) Adhesive: As recommended by Detectable Warning manufacturer for the type of application indicated.

c. Color: As indicated on drawings; or if not indicated, then Safety Yellow.

2.06 CONCRETE MIX DESIGN

A. On-Site Concrete Paving:

1. Proportioning Normal Weight Concrete: Comply with ACI 211.1

recommendations.

2. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

   a. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

3. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

B. Public Sidewalk, Curb and Gutter Paving: Mix design shall meet the requirements specified in article 520-8 of FDOT (SPEC) Section 347 -- Portland Cement Concrete - Class NS.

2.07 MIXING

A. Mixing for On-Site Concrete Paving:

1. On Site Mixing: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

2. Transit Mixers: Comply with ASTM C94/C94M.

B. Mixing for Public Sidewalk, Curb and Gutter Paving: Shall conform to FDOT standards and specifications.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.03 PREPARATION

A. Preparation for On-Site Concrete Paving:

1. Moisten base to minimize absorption of water from fresh concrete.

2. For additional requirements, refer to Section 312200 - Grading and Section 312323 - Fill.

B. Preparation for Public Sidewalk, Curb and Gutter Paving: Prepare subbase in accordance with FDOT standards specifications, including but not limited to:

1. Reworking of Existing Limerock Base: Shall conform to requirements specified in FDOT (SPEC) Section 210 -- Reworking Limerock Base.

3.03 FORMING

A. Formwork for On-Site Concrete Paving:

1. Place and secure forms to correct location, dimension, profile, and gradient.

2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

3. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

4. For additional requirements, refer to Section 032000 - Concrete Formwork.

B. Formwork for Public Sidewalk, Curb and Gutter Paving: Place reinforcement in accordance with FDOT standards specifications, including but not limited to:

1. Concrete Forming for Concrete Gutter and Curb Elements: Finish concrete surfaces in accordance with article 520-3 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

2. Concrete Forming for Concrete Sidewalk: Finish concrete surfaces in accordance with article 522-3 of FDOT (SPEC) Section 522 -- Concrete Sidewalk and Driveways.

3.04 REINFORCEMENT

A. Reinforcement for On-Site Concrete Paving:

1. Place reinforcement at midheight of slabs-on-grade.

2. Interrupt reinforcement at expansion joints.

B. Reinforcement for Public Sidewalk, Curb and Gutter Paving: Place reinforcement in accordance with FDOT standards specifications, including but not limited to FDOT (SPEC) Section 931 -- Metal Accessory Materials for Concrete Pavement and Concrete Structures.

3.05 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

3.06 PLACING CONCRETE

A. Concrete Placement for On-Site Concrete Paving:

1. Place concrete in accordance with ACI 304R.

2. Do not place concrete when base surface is wet.

3. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

4. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

5. Apply surface retarder to all exposed surfaces in accordance with manufacturer's

instructions.

6. For additional requirements, refer to Section 033000 - Cast-In-Place Concrete.

B. Concrete Placement for Public Sidewalk, Curb and Gutter Paving: Place concrete in accordance with FDOT standards specifications, including but not limited to:

1. Concrete Placement for Concrete Gutter and Curb Elements: Finish concrete surfaces in accordance with article 520-5 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

2. Concrete Placement for Concrete Sidewalk: Finish concrete surfaces in accordance with article 522-6 of FDOT (SPEC) Section 522 -- Concrete Sidewalk and Driveways.

3.07 JOINTS

A. Concrete Joints for On-Site Concrete Paving:

1. Align curb, gutter, and sidewalk joints.

2. Place 1/2 inch wide expansion joints at maximum 20 foot intervals, and to separate paving from vertical surfaces and other components.

a. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.

b. Secure to resist movement by wet concrete.

3. Provide scored joints.

a. At maximum 5 feet intervals, unless otherwise indicated.

b. Between on-site sidewalk/paving area and public sidewalk.

4. Saw cut contraction joints 3/16 inch (5 mm) wide at an optimum time after finishing. Cut 1/3 into depth of slab.

B. Concrete Joints for Public Sidewalk, Curb and Gutter Paving: Install concrete joints in accordance with FDOT standards specifications, including but not limited to:

1. Joints in Concrete Gutter and Curb Elements: Finish concrete surfaces in accordance with article 520-6 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.

2. Joints in Concrete Sidewalk: Finish concrete surfaces in accordance with article 522-5 of FDOT (SPEC) Section 522 -- Concrete Sidewalk and Driveways.

3.08 FINISHING

A. Concrete Finishing for On-Site Concrete Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius (6 mm radius).

1. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

B. Concrete Finishing for Public Sidewalk, Curb and Gutter Paving: Finish concrete

surfaces in accordance with FDOT standards specifications, including but not limited to:

1. Finishing of Concrete Gutter and Curb Elements: Finish concrete surfaces in accordance with article 520-7 of FDOT (SPEC) Section 520 -- Concrete Gutter, Curb Elements, and Traffic Separator.
2. Finishing of Concrete Sidewalk: Finish concrete surfaces in accordance with article 522-7 of FDOT (SPEC) Section 522 -- Concrete Sidewalk and Driveways.

3.09 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).

B. Maximum Variation From True Position: 1/4 inch (6 mm).

3.10 FIELD QUALITY CONTROL

A. Contractor shall provide a qualified testing agency to perform field quality control tests, unless otherwise indicated.

1. Provide free access to concrete operations at project site and cooperate with appointed firm.
2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd (76 cu m) or less of each class of concrete placed.

1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
2. Perform one slump test for each set of test cylinders taken.

C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION

SECTION 323119

DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Decorative aluminum fence and gate systems.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete foundations for fence and gate posts.

B. Section 087100 - Door Hardware: Coordination of keying for gate lock cylinder.

C. Division 31 - Earthwork: Excavations for fence and gate post foundations.

1.03 REFERENCE STANDARDS

A. General:

1. For requirements relating to reference standards, refer to:

a. Article 41 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

b. Section 014219 - Reference Standards.

B. American Society for Testing and Materials (ASTM):

1. ASTM A276/A276M -- Standard Specification for Stainless Steel Bars and Shapes; 2016.

2. ASTM A653/A653M -- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

3. ASTM B117 -- Standard Practice for Operating Salt Spray (Fog) Apparatus; 2011.

4. ASTM B221 -- Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

5. ASTM D523 -- Standard Test Method for Specular Gloss; 2014.

6. ASTM D714 -- Test Method for Evaluating Degree of Blistering in Paint; 2002 (R2009).

7. ASTM D822/D822M -- Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013.

8. ASTM D1654 -- Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.

9. ASTM D2244 -- Standard Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates; 2011.

10. ASTM D2794 -- Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) ; 1993 (R2010).
11. ASTM D3359 -- Test Method for Measuring Adhesion by Tape Test; 2009.
12. ASTM F2408 -- Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016.

C. Florida Building Code, 5th edition - 2014 (FBC):
1. FBC-B -- Florida Building Code, Building.
2. FBC-A -- Florida Building Code, Accessibility.

D. Florida Fire Prevention Code, 5th edition - 2014 (FFPC).

E. National Fire Protection Association (NFPA):
1. NFPA 1(FL) -- Fire Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.
2. NFPA 101(FL) -- Life Safety Code; 2012 edition, w/ State of Florida revisions; adopted per FFPC.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to start of work of this section; require attendance by affected installers.

1.05 DESIGN AND PERFORMANCE REQUIREMENTS

A. General Design Criteria:
1. Fabricator is responsible for structural design and engineering of decorative metal fence systems, including foundations and necessary modifications to meet specified requirements and maintain design intent shown in the drawings.
a. Employ a qualified Delegated Engineer to provide structural design and engineering services.
2. Design decorative metal fence systems to comply with applicable requirements of governing codes, including but not limited to FBC-B, FBC-A, and NFPA 101(FL).
3. Provide concealed fastening wherever possible.
4. Accommodate allowable tolerances and deflections for members in installation.
5. Make modifications only to meet field conditions and to ensure fitting of components.

B. Structural Performance Requirements:
1. General:
a. Design decorative metal fence systems under direct supervision of a qualified Delegated Engineer.
b. Fence assemblies shall comply with design criteria specified in the Contract

Documents and applicable requirements of the governing building code, including but not limited to FBC-B CHAPTER 16 (including HVHZ provisions), and ASCE 7.

2. Wind Load Design Loads: Comply with requirements of governing building code, criteria indicated on the Structural Drawings, and as follows:
    a. Risk Category (FBC-B SECTION 1604.5): II.
    b. Wind Speed (FBC-B SECTION 1620.2): 175 mph.
    c. Exposure (FBC-B SECTION 1620.3): C.

1.06 SUBMITTALS

A. General:
    1. For submittal procedures, refer to Articles 42 through 45 of City of Miami Capital Improvements Program Standard Contract Section 2 - General Terms and Conditions.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
    1. Preparation instructions and recommendations.
    2. Storage and handling requirements and recommendations.
    3. Installation methods.

C. Shop Drawings:
    1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
    2. Foundation details, concrete design mix and reinforcing schedule for anti-ram barrier system.

D. Engineering Design and Calculations: Engineering design calculations and detailed shop drawings shall be prepared by and bear the seal of a qualified Delegated Engineer.

E. Installer's Qualification Statement.

F. Manufacturer's Warranty.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

C. Delegated Engineer Qualifications: A Florida-registered Professional Engineer with experience in engineering design of Work specified in this Section.

1.08 DELIVERY, STORAGE AND HANDLING

A. Store materials in a manner to ensure proper ventilation and drainage. Protect against

damage, weather, vandalism and theft.

1.09 WARRANTY

A. Finish: 10 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Decorative Metal Fences:

1. Ameristar Perimeter Security, USA: www.ameristarfence.com.

2.02 MATERIALS

A. Steel: ASTM A653/A653M; tensile strength 45,000 psi (310 MPa), minimum.

1. Hot-dip galvanized; ASTM A653/A653M, G60.

B. Aluminum: ASTM B221.

1. Tubular Pickets, Rails and Posts: 6005-T5 alloy.

2. Extrusions for Posts and Rails (Outer Channel): 6005-T5 alloy.

3. Extrusions for Pickets and Rail (Inner Slide Channels): 6063-T5 alloy.

C. Fasteners: ASTM A276/A276M, Type 302 stainless steel; finished to match fence components.

2.03 FENCE SYSTEM - GENERAL

A. Description: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electro-deposition coating, and having the following performance characteristics:

1. Capable of resisting vertical load, horizontal load and infill performance requirements for fence categories defined in ASTM F2408.

B. Finishing - Aluminum:

1. Electro-Deposition Coating: Multi-stage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.

a. Total Coating Thickness: 2 mils (0.058 mm), minimum.

b. Coating Performance: Comply with general requirements of ASTM F2408.

(1) Adhesion: ASTM D3359 (Method B); Class 3B with 90 percent or more of coating remaining in tested area.

(2) Corrosion Resistance: ASTM B117, ASTM D714 and ASTM D1654; 1/8 inch (15.8 mm) coating loss or medium No.8 blisters after 1,500 hours.

(3) Impact Resistance: ASTM D2794; 60 inch pounds (6.8 N m).

(4) Weathering Resistance: ASTM D523, ASTM D822/D822M and ASTM D2244; less than 60 percent loss of gloss.

c. Color: As selected by Architect from manufacturer's standard range.

2.04 DECORATIVE ALUMINUM FENCE SYSTEM

A. Provide complete fence system meeting requirements of ASTM F2408 for Industrial class.

1. Fence Panels: 6 feet high by lengths indicated on drawings.

a. Panel Style: Three rail.

b. Panel Strength: Capable of supporting 300 pounds minimum load applied at mid-span without deflection.

c. Attach panels to posts with manufacturer's standard panel brackets and recommended fasteners.

2. Posts: Aluminum extrusions; 2-1/2 inches (63 mm) square .

3. Rails: Extruded aluminum channels.

a. Enclosed Retaining Rod: 0.125 inch (3.17 mm) diameter galvanized steel with variable pitch connection system for high angle racking and elimination of external fasteners.

b. Picket-to-Rail Intersection Seals: PVC grommets.

c. Picket Spacing, Standard: 4.715 inch (120 mm) on center.

4. Pickets: Extruded aluminum tubes.

a. Size: 1 inch (25.4 mm) square.

b. Style: Flush top rail.

5. Gates: Gates shall be fabricated using 1.75 inch square reinforced rail material, 2 inch square x 0.250 inch gate ends, and 1 inch square x 0.125 inch pickets.

a. All rail and upright intersections shall be joined by welding.

b. All picket and rail intersections shall be joined by welding.

6. Fasteners: Manufacturer's standard stainless steel bolts, screws, and washers.

a. Factory finish fasteners to match fence.

b. Tamper-proof security bolts.

7. Gate Hardware: For each gate, provide a complete gate hardware package by fence manufacturer, designed specifically for use on the gate and fence system.

a. Gate hardware package shall include the following components:

(1) Hinges: For each gate, provide one pair hinges meeting the following criteria:

(a) Description: Self-closing, tension-adjustable, hinge; designed for heavier or high-traffic metal gates (especially those with narrow frames); with alignment legs designed for added fitting strength.

(b) Product (Basis of Design): Ameristar “Heavy Duty TruClose Hinge” (# 8000-2115).

(2) Lock-Latch: For each gate, provide one lock-latch assembly meeting the following criteria:

(a) Description: Security lock with levers, keyed cylinder, and stainless steel striker plates; designed for use with fence and gate system.

(b) Product (Basis of Design): “Ameristar Lock” (# HB509S) by Ameristar.

(3) Keying shall be coordinated with Section 087100 - Door Hardware.

8. Accessories: Aluminum castings, extrusions and cold-formed strips; factory finished to match fence.

a. Flat post cap.

9. Flexibility: Capable of following variable slope of up to 1:4.

10. Product (Basis of Design): “ECHELON II Heavy Industrial Aluminum Ornamental Fence System” by Ameristar, or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set fence posts in accordance with the manufacturer recommended spacing.

C. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.

1. Base type and quantity of gate hinges o the application; weight, height, and number of gate cycles.

2. Identify the necessary hardware required for the application on the manufacturer's gate drawings.

3. Provide gate hardware by the manufacturer of the gate and install in compliance with manufacturer's recommendations.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch (6.3 mm).

B. Maximum Offset from Indicated Position: 1 inch (25.4 mm).

C. Minimum Distance from Property Line: 6 inches (152 mm).

3.05 CLEANING

A. Leave immediate work area neat at end of each work day.

B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

C. Clean fence with mild household detergent and clean water rinse well.

D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

E. Touch up scratched surfaces using materials recommended by manufacturer. Match touchup paint color to fence finish.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 328400

PLANTING IRRIGATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fully automatic irrigation system.

B. Pipe and fittings, valves, sprinkler heads and accessories.

C. Control system.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with site backfilling, landscape grading and delivery of plant life.

1.03 SUBMITTALS

A. Shop Drawings: Indicate piping layout to water source, location of sleeves under pavement, location and coverage of sprinkler heads, components, plant and landscaping features, site structures, schedule of fittings to be used.

B. Product Data: Submit complete package for manufacturers' technical data, and installation and maintenance instructions for materials, products, and equipment including, but not limited to:

1. Include component and control system and wiring diagrams.
2. Irrigation low voltage control wire.
3. Couplers, sealants, and gang-splicing (if applicable) materials for underground wire connections.
4. Automatic control valves.
5. Valve boxes and covers.
6. Sprinkler heads, nozzles, and accessories.
7. Thick-walled poly pipe and barbed fittings (for mounting sprinkler heads).
8. PVC and galvanized steel pipe, fittings, and nipples.
9. PVC solvents (for solvent-weld joints).
10. Micro and sub-surface irrigation pipe, manual valves, accessories, and fittings.
11. Virgin Teflon tape and/or other sealants (for threaded joints).
12. Backflow preventer.
13. Rain sensor.
14. Test certificates of PVC pipe.
15. Detectable underground tape

C. Record Documents: Record actual locations of all concealed components of piping system.

D. Operation and Maintenance Data:

1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.

2. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.

E. Maintenance Materials: Provide the following for Owner's use in maintenance of project.

1. Extra Sprinkler Heads: One of each type and size.

2. Extra Valve Keys for Manual Valves: One.

3. Extra Valve Box Keys: One.

4. Extra Valve Marker Keys: One.

5. Wrenches: One for each type head core and for removing and installing each type head.

1.04 QUALITY ASSURANCE

A. Comply with applicable requirements of governing authorities having jurisdiction, including South Florida Water Management District, Miami-Dade Department of Environmental Resources Management, Miami-Dade Water and Sewer Department, and City of Miami.

B. Comply with applicable provisions of National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Provide electrical components that are listed and labeled by Underwriters Laboratories (UL).

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three (3) years of documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years of experience.

1. Irrigation subcontractor’s superintendent shall be well-versed in Florida Irrigation Society standard plumbing procedures, PVC assembly procedures, plans reading and coordination with other performing contracts or services in the project area.

2. All employees shall be competent and highly skilled in their particular job in order to properly perform the work assigned to them.

E. All work and materials shall meet or exceed the specifications and standards of the Florida Irrigation Society (FIS).

F. Backflow prevention devices shall be inspected and certified before being activated for temporary use in construction or for use in full operation.

G. Mains shall be constructed and pressure checked for final acceptance.

1.05 SITE VISITS

A. Schedule site visits by Architect for field observation of trenching and backfilling, hydrostatic testing, and operational testing.

PART 2 - PRODUCTS

2.01 IRRIGATION SYSTEM

A. Fully automatic underground irrigation system, with electric valves operated by controller.

2.02 PIPING AND TUBING MATERIALS

A. General:

1. Polyvinyl Chloride (PVC) Pipe: All pipes shall be PVC unless otherwise indicated on the Drawings or called for in these specifications.

    a. All pipes shall be new and free from defects, and shall be continuously marked indicating size, schedule type, and Department of Commerce Standard Reference.

2. Galvanized Steel Pipe: All mains which are exposed to possible damage (e.g., above ground) shall be threaded end, standard weight, Schedule 40 galvanized steel pipe with 150 pound galvanized malleable fittings.

3. All flanged fittings required shall be mated steel fittings with new gaskets.

B. Irrigation Mains:

1. Pipe: ASTM D1785 Polyvinyl Chloride (PVC) plastic pipe, Schedule 40.

    a. Exception: Mains which are exposed to possible damage (e.g., above ground) shall be threaded end, standard weight, Schedule 40 galvanized steel pipe.

2. Fittings: ASTM D2466 Polyvinyl Chloride (PVC) plastic fittings, Schedule 40, socket.

    a. Exception: Where galvanized steel pipe is used, fittings shall be 150 pound galvanized malleable fittings.

3. Joint (PVC pipe): ASTM D2564, solvent cement.

C. Irrigation Sleeves:

1. Pipe: ASTM D1785 Polyvinyl Chloride (PVC) plastic pipe, Schedule 40.

2. Fittings: ASTM D2466 Polyvinyl Chloride (PVC) plastic fittings, Schedule 40, socket.

3. Joint (PVC pipe): ASTM D2564, solvent cement.

D. Irrigation Stations:

1. Pipe: ASTM D1785 Polyvinyl Chloride (PVC) plastic pipe, Schedule 40.

2. Fittings: ASTM D2466 Polyvinyl Chloride (PVC) plastic fittings, Schedule 40, socket.
3. Joint: ASTM D2564, solvent cement.

E. Sprinkler Head Flexible Joint:

1. Pipe: ASTM D2737 polyethylene (PE) plastic tubing.
2. Fittings: Thread / Barb.
3. Joint: Screw / Inserted.
4. Product:
    a. Rainbird “Swing Pipe”.
    b. Toro “Poly Pipe”.

F. Electrical Conduit Pipe: Provide gray polyvinyl chloride (PVC) conduit and fittings underground. Comply with NEMA TC-2, NEMA TC-3, and UL 651. Convert to hot-dip galvanized rigid steel conduit before rising above ground.

1. Size: As required by governing building code or as indicated on drawings, whichever is largest. Minimum size 1 inch (27 mm).
2. Conduit included under this Section is limited to low voltage wiring between time clock controller and automatic valve locations.

2.03 OUTLETS

A. Equipment shall be as indicated on Drawings.

2.04 VALVES AND CONTROLS

A. Gate Valve: Refer to Equipment Schedule on Drawings.

B. Automatic Time Controller: Refer to Equipment Schedule on Drawings.

C. Automatic Control Valves: Refer to Equipment Schedule on Drawings; 24-volt, automatic.

D. Valve Box: Refer to Equipment Schedule on Drawings.

E. Moisture Sensor: Refer to Equipment Schedule on Drawings.

2.05 SAND

A. Cleaned, washed coarse sand, free of silt, sludge, and toxic materials, with 100 percent of the sand passing a number 8 sieve and not more than 4 percent passing a number 100 sieve.

2.06 WIRES

A. Provide minimum 16 AWG wires. Provide solid copper conductors for sizes 10 AWG and smaller, stranded copper conductors for sizes 8 AWG and larger. Provide copper conductors with conductivity of 98 percent at 68˚F (20˚C). Provide wires with THHN/THWN thermoplastic insulation.

2.07 SPLICES

A. Subject to compliance with application requirements, provide 3M DBY and DBR direct burial splice kits manufactured for 3M.

2.08 PIPING AND WIRING MARKERS

A. Subject to compliance with applicable requirements, provide plastic-encased aluminum Blue Detectable Underground Tape labeled *Buried Underground Irrigation Line* Below.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify location of existing utilities.

B. Verify that required utilities are available, in proper location, and ready for use.

3.02 DESIGN

A. Design pressures are indicated on Drawings at connection to water supply and at farthest station points. Verify that pressure at water supply is maintained above indicated pressure at time of day when irrigation is programmed to operate.

3.03 PREPARATION

A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.

B. Do not decrease system component quantities indicated unless otherwise acceptable to Architect.

C. Layout and stake locations of system components.

D. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.04 TRENCHING

A. Excavate straight and true with bottom uniformly sloped to low points. Excavate trenches to a depth of 3 inches below invert of pipe. Provide minimum cover over top of piping as scheduled on Drawings.

B. Trench to accommodate grade changes and slope to drains.

C. Maintain trenches free of debris, material, or obstructions that may damage pipe.

D. Protect existing vegetation. Do not excavate within drip-line of vegetation. Jack piping sleeves under root system if possible. Remove and replant vegetation as necessary to complete installation. Replace damaged vegetation with new to match existing.

E. At each location where irrigation pipe is indicated to cross beneath paving, it shall be placed in a PVC irrigation sleeve twice water pipe size, at depth below grade indicated on Drawings.

3.05 INSTALLATION

A. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions.

B. Install automatic valves in valve boxes, arranged for easy adjustment and removal. Provide pipe adapters and valve plugs as required. Adjust automatic valves to provide flow rate of rated operating pressure required for each irrigation station.

C. Install conduits and wires to connect automatic controller to automatic electric valves and rain sensor switch. Provide 24 inch (610 mm) expansion coil at each valve to which controls are connected, and at 100 ft (30 m) intervals. Waterproof wiring splices with direct burial splice kits in station valve boxes.

D. Provide sleeves twice water pipe size under pavements and through planter walls.

E. Lay pipe on solid subbase, uniformly sloped without humps or depressions.

F. Install PVC pipe in dry weather when temperature is above 40˚ F (4˚ C) in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperatures above 40˚ F (4˚ C) before testing, unless otherwise recommended by manufacturer.

G. Connect to utilities.

H. Set outlets and box covers at finish grade elevations.

I. Provide for thermal movement of components in system.

J. Use threaded nipples for risers to each outlet.

K. Provide continuous underground line markers, located directly over buried piping and wiring lines at 8 inches below finish grade.

L. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

M. Install sprinkler heads after hydrostatic test is completed. Install heads at manufacturer's recommended heights. Locate part-circle heads to maintain minimum of 12 inches from building walls, and 4 inches from pavements and other boundaries, unless otherwise indicated. Adjust pattern arcs and radiuses to avoid water spillage onto pavements.

3.06 FIELD QUALITY CONTROL

A. Hydrostatic Testing:

1. Conduct test in presence of Architect. Test water piping and valves, before backfilling trenches, to a hydrostatic pressure of not less than 100 psi (690 kPa) for one hour. Remove and repair piping, connections, and valves that do not pass hydrostatic testing.

2. System is acceptable if no leakage or loss of pressure occurs and system self drains during test period.

B. Operational Testing:

1. Conduct test in presence of Architect. Perform operational testing after hydrostatic testing is completed, backfill is in place, and system components adjusted to final position. Demonstrate to Architect that system meets coverage requirements and

that automatic controls function properly.

3.07 BACKFILLING

A. Backfill with satisfactory material from excavation. Remove organic material as well as rocks and debris larger than 1 inch in diameter. Backfill with clean sand if excavated material is not acceptable to Architect. Place and compact satisfactory soil material in 6-inch layers to density of surrounding original ground..

B. Backfill trench to specified subgrade elevation. Protect piping from displacement.

3.08 EXISTING PAVEMENTS

A. Where existing pavements must be cut to install landscape irrigation system, cut smoothly to straight lines 6 inches wider than trench. Jack piping sleeves under paving material at walks if possible.

B. Excavate trench to required depth and width. Backfill with dry sand, placing and compacting in 6-inch layers. Repair or replace pavement cuts with equivalent materials and finishes.

3.09 DISPOSAL OF WASTE

A. Remove and legally dispose of surplus soil and waste material, including excess subsoil, unsuitable soil, trash, debris, and contaminated materials, off project site. Do not use waste material as backfill, or in sodding and planting soil mixture. Burning is not permitted on project site.

3.10 SYSTEM STARTUP

A. Prepare and start system in accordance with manufacturer's instructions.

B. Begin system operation and maintenance immediately after planting and sodding.

C. Adjust control system to achieve time cycles required.

D. Adjust head types for full water coverage as directed.

E. Maintain underground irrigation system until final acceptance of landscape work.

3.11 CLOSEOUT ACTIVITIES

A. Instruct Owner's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance data as basis for demonstration.

END OF SECTION

SECTION 329300

PLANTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil and topsoil.

B. New trees, shrubs, and ground cover.

C. Mulch and Fertilizer.

D. Tree Pruning.

1.02 SUBMITTALS

A. Submit list of plant life sources with accompanying recent photograph of typical sample for each scheduled plant species.

B. Submit certificates of inspection as required by governing authorities having jurisdiction. Submit plant samples and cultivar certificates issued by nursery.

C. Submit certified analyses for topsoil, sand, and fertilizers. Submit laboratory analysis results for pH and cationic exchange rate tests for topsoil and sand. Provide tests and analyses conducted by recognized laboratory or manufacturer in accordance with methods established by the Association of Official Agriculture Chemists.

D. Submit manufacturers' published technical data, and installation and maintenance instructions for materials and products.

E. Submit proposed schedule with dates for each type of planting during favorable weather for such work. Correlate schedule with specified maintenance period to provide maintenance from date of Substantial Completion for planting. Once schedule is reviewed, revise dates only as accepted in writing, after documentation of reasons for delays.

F. Submit typewritten instructions recommending maintenance procedures to be established by Owner for maintenance of plants for one full year. Submit instructions prior to expiration of required maintenance period.

1.03 QUALITY ASSURANCE

A. Comply with applicable requirements of governing authorities having jurisdiction, including Animal and Plant Health Inspection Services of the US Department of Agriculture, Florida Department of Agriculture and Consumer Services, South Florida Water Management District, Miami-Dade County, and City of Miami.

B. Comply with applicable requirements of Florida Power & Light Company, including line clearance certification.

C. Provide plants that comply with applicable provisions of Florida Department of Agriculture and Consumer Services Grades and Standards for Nursery Plants for Grade Number 1 or better.

D. Provide plants that comply with applicable provisions of ANSI Z60.1.

E. Provide plants that have a habit of growth that is normal for species and cultivars, and that are sound, healthy, vigorous, well rooted, and free of insect pests, plant diseases, weeds, and injuries.

F. Provide plants grown in recognized nursery in accordance with good horticultural practice, unless site, collected, or plantation stock is indicated. Provide plants grown in climate, soil, and water conditions similar to Project site conditions.

G. Provide plants with uniform height, spread, and caliper where matched quantities are indicated.

H. Ship plants with certificates of inspection required by governing authorities having jurisdiction. Label at least one sample of each plant type with a securely attached waterproof tag bearing legible designation of common name and botanical name, including cultivar.

I. Architect may review plants at nursery or at project site before planting for compliance with requirements.

J. Architect retains right to further review plants for quality, pests, damage, and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected plants promptly from project site.

K. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.

L. Installer Qualifications: Company specializing in installing and planting the plants with minimum five years experience.

1.04 SITE VISITS

A. Schedule site visits by Architect for review of plants and planting soil mixtures, and field observation of planting layout, subsoil conditions, soil mixtures, rough and finish grades, planting, and planted vegetation.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Protect and maintain plant life until planted.

C. Provide timely root-pruned, freshly dug field-grown plants. Do not prune plants prior to delivery unless otherwise indicated. Do not tie, bend, or lift plants in such manner as to destroy natural shape, break branches, or damage bark or rootball. Provide protective covering during delivery. Do not drop plants during delivery.

D. Deliver field-grown plants after preparations for planting have been completed. Plant immediately. If planting is delayed more than 6 hours after delivery, set plants in shade, protect from weather, prevent mechanical damage, and keep roots moist with mulch or burlap. Do not remove container-grown stock from containers until planting time.

1.06 FIELD CONDITIONS

A. Proceed with and complete planting as rapidly as portions of Project site become

available. Work within weather limitations for each type of work required.

B. When conditions detrimental to plant growth are encountered, such as fill, debris, contamination, adverse drainage conditions, or ground or overhead obstructions, notify Architect before grading and planting.

C. Plant vegetation and install materials during weather favorable for such work. Correlate planting and installation with specified maintenance period to provide maintenance from date of Substantial Completion for planting.

D. Install plants after final grades are established and prior to sodding of lawns, unless otherwise acceptable to Architect. If planting occurs after sodding, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.07 WARRANTY

A. Provide one year warranty.

B. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.

C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

PART 2 - PRODUCTS

2.01 PLANTS

A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

2.02 SOIL AMENDMENT MATERIALS

A. Fertilizer: Subject to compliance with applicable requirements, provide fertilizers manufactured by Atlantic Florida East Coast Fertilizer and Chemical (AFEC) as scheduled below:

Vegetation	*Medium*	*Manufacturer*	*Mix*	*Analysis*
Palms	Ground	AFEC	6878	08-04-12
Trees, shrubs	Ground	AFEC	1631	06-06-06
Herbs	Ground	Scott’s	Osmocote	14-14-14

B. Peat Humus: Brown, finely divided, granular, non-fibrous, decomposed Canadian sphagnum moss, with pH range 5.5 to 7.5, or as otherwise suitable for intended use, and with minimum organic matter content of 85% by weight as determined by ASTM D2974, Method D.

1. Provide peat that is free of nemotodes, reasonably free of subsoil, brush, weeds, and other litter, and free of roots, stumps, stones larger than 1 inch in any dimension, and other extraneous or toxic matter harmful to grass growth.

C. Sand: Cleaned, washed, number 70 silica sand, free of silt, sludge, and toxic materials, with 100 percent of sand passing a number 16 sieve and not more than 8 percent passing a number 100 sieve.

D. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth of plants.

2.03 MULCH MATERIALS

A. Mulching Material: Subject to compliance with applicable requirements, provide Florimulch produced by Forestry Resources Incorporated.

2.04 ACCESSORIES

A. Filtration/Separation Fabric: Provide water permeable filtration material of fiberglass or polypropylene fabric.

B. Wrapping Materials: Burlap.

C. Stakes, Braces, and Cleats: Provide stakes, braces, and cleats of sound, new treated softwood, free of knotholes and other defects. Provide steel straps and hot-dip galvanized nails.

D. Ties: Subject to compliance with applicable requirements, provide olive green AT Arborties manufactured by DeepRoot.

E. Bed Divider: Subject to compliance with applicable requirements, provide Black Diamond BD-20 bed divider manufactured by Valley View Industries.

2.05 SOURCE QUALITY CONTROL

A. Provide testing and analysis of imported topsoil.

B. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that prepared subsoil is ready to receive work.

B. Saturate soil with water to test drainage.

C. Verify that required underground utilities are available, in proper location, and ready for use.

3.02 PREPARATION OF SUBSOIL

A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

C. Scarify subsoil to a depth of 3 inches (75 mm) where plants are to be placed. Repeat

cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

D. Dig pits, trenches, and beds of sizes indicated on Drawings with vertical sides and slightly raised bottom at center to provide proper drainage. Loosen hard subsoil at bottom of excavation. Fill excavation with water and allow percolating before planting.

3.03 TRANSPLANTING

A. Trench around field-grown plants to be transplanted, whether nursery or site stock, to form rootballs of sizes indicated on Drawings. Backfill with native ground topsoil or with planting soil mixture if growing medium is limestone.

B. Relocate plants when sufficient, but not excessive, new root growth is established to assure full recovery. Repeat root-pruning as required to check excessive root growth.

3.04 LAYOUT

A. Stake individual planting locations and outline multiple planting areas. Secure Architect's acceptance before start of planting work. Make adjustments as may be requested.

3.05 INSTALLATION

A. Subject to compliance with applicable requirements, install materials and products in accordance with manufacturers' recommendations.

3.06 PLANTING SOIL MIXTURES

A. Provide planting soil mixes composed by volume as scheduled below:

Vegetation	Peat Humus	Sand
Palms	30%	70%
Trees, shrubs, herbs	50%	50%

B. Before mixing, screen peat humus to a friable condition free of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth. Thoroughly mix topsoil and amendments.

3.07 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Delay mixing of fertilizer if planting will not follow mixing within 3 days.

3.08 PLANTING

A. Set plants plumb and centered on raised excavation bottoms with top of rootballs flush with adjacent topsoil. Remove burlap from sides, but not from bottom, of rootballs of field-grown stock.

B. Backfill with planting soil mixture. Place mixture in lightly compacted layers. Work and water each layer to settle backfill, eliminate voids, and saturate planting soil mixture. Backfill excavations flush with adjacent topsoil, allowing for natural settlement. Dish top of backfill to retain water and accommodate mulch around plants.

C. Stake and brace palms and trees immediately after planting, as indicated on Drawings. Do not nail through braces and cleats into palm trunks.

3.09 MULCHING

A. Mulch entire surface of pits, trenches, and beds. Provide mulch thickness indicated on Drawings. Do not apply mulch against trunks or stems. Finish mulch level with adjacent finish grades.

3.10 BED DIVIDER

A. Install bed divider in accordance with recommendations of manufacturers.

3.10 TREE PRUNING

A. Perform pruning of trees as recommended in ANSI A300 Part 1.

B. Prune, thin out, and shape plants as indicated on Drawings to retain natural character and provide required height, spread, and clear trunk immediately after planting, unless otherwise indicated. Do not cut tree trunk leaders or unopened palm fronds. Remove only dead or injured branches from flowering trees. Remove and replace excessively pruned or malformed plants resulting from improper pruning.

3.11 ANTIDESICCANT

A. Apply antidesiccant to trees and palms using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage. If deciduous trees are moved in full leaf, spray with antidesiccant at nursery before moving and again after 2 weeks after planting.

3.12 FIELD QUALITY CONTROL

A. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.13 MAINTENANCE

A. Begin maintenance immediately after planting. Maintain plants until final acceptance, but for not less than 180 days after Substantial Completion of planting.

B. Maintain plants by watering, fertilizing, weeding, trimming, and other operations such as regrading and replanting, as required to establish acceptable plants. Spray as required to keep plants free of insect pests and plant diseases.

C. Water field-grown plants daily for 30 days, every other day for 150 days, and weekly thereafter. Apply 3 gallons of water per caliper inch. Do not water if rootball is wet on watering day.

D. Replace mulch when deteriorated.

E. Maintain wrappings, guys, stakes and ties. Repair or replace accessories when required.

3.14 DISPOSAL OF WASTE

A. Remove and legally dispose of surplus soil and waste material, including excess subsoil, unsuitable soil, trash, debris, and contaminated materials, off Project site. Do not use waste material as backfill or in planting soil mixtures. Burning is not permitted on Project

site.

B. Remove temporary supports, such as stakes, braces, cleats, straps, and nails, once plants become established and self-supporting, but not sooner than 90 days per inch of trunk caliper after planting, whether occurring during or after specified maintenance period.

3.15 CLEANUP AND PROTECTION

A. Keep pavements clean and work area in an orderly condition. Protect work against damage due to planting operations, operations by others, and actions of trespassers. Maintain protection during installation and maintenance periods. Treat, repair, and replace damaged work as directed.

3.16 ACCEPTANCE

A. When planting, including maintenance, is completed, schedule site visit by Architect for field observation to determine acceptability.

B. When observed work does not comply with requirements, replace rejected work and continue specified maintenance until observed again by Architect and found to be acceptable. Remove rejected plants and materials promptly from Project site.

END OF SECTION

SECTION 331116

WATER DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Section includes but is not limited to the following:

1. Water distribution piping and fittings complete.

2. Water valves, boxes, backflow preventers, appurtenances and incidentals; water meters by others.

3. Furnishing, installation and testing of the above.

1.02 SUBMITTALS:

A. In general, the following data and shop drawings shall be submitted to the Architect/Engineer for approval prior to construction:

1. Mill Test Certificates or Certified Test Reports on Pipe

2. Details of Restrained and Flexible Joints

3. Meter Vaults and Covers

4. Valves and Valve Boxes

5. Fire Hydrant Assemblies

6. Backflow Prevention Devices

PART 2 - MATERIALS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Ductile Iron Pipe: Ductile iron pipe shall conform to the requirements of ANSI Standard A21.51, Class 52 for all sizes up to 8-inches; Class 50 for sizes larger than 8-inches, unless otherwise specified. Joints for ductile iron pipe shall be mechanical or push on joints and conform to ANSI A21.11. Pipe interior shall have a bituminous seal coat over a cement mortar lining conforming to ANSI Standard A21.4.

B. Fittings: All ductile iron fittings shall be mechanical joint or single gasket, push on type with a minimum pressure rating of 150 psi, and shall conform to the requirements of ANSI A21.10. Fittings shall be cement lined, seal coated and outside coated as specified above for ductile iron pipe.

C. Joints: Mechanical joints consisting of bell, socket, gland gasket, bolts and nuts shall conform to ANSI A21.11. Bolts shall be high strength, annealed, cast iron, or high strength low alloy steel, T-head type having hexagonal nuts. Bolts and nuts shall be machined true and nuts shall be tapped at right angles to a smooth bearing surface. Single seal gasket push on type joints shall conform to the requirements of ANSI

A21.11 and shall be "Tyton", "Fastite", "Super Bell Tite", or approved equal.

D. Gaskets: Gaskets shall be of vulcanized crude rubber or polyvinyl chloride plastisol. Gaskets shall have plain tips unless otherwise specified.

2.02 GALVANIZED STEEL PIPE AND FITTINGS

A. Steel pipe, except as otherwise specified, shall be Schedule 40 galvanized seamless steel pipe conforming to either ASTM Standard A53, "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless" Type S, Grade A or B, or to ASTM Standard A120, "Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses", Type S. Black steel pipe may be used in fabricating items which are to be hot-dip galvanized after fabrication.

B. Screwed fittings shall be 150 psi galvanized malleable iron, and shall conform to ANSI Standard B16.3. Screwed unions shall be galvanized steel or galvanized malleable iron with ground brass seats. Threads shall be ANSI Standard B2.1, NPT. Joint compound shall be used on all threaded joints, applied to the mate threads only.

2.03 VALVES AND VALVE BOXES

A. Gate Valves: Gate valves 3" and larger shall be iron body, bronze mounted, double disc, parallel or inclined seats, non-rising stem, 2-inch square nut operated, mechanical joint and/or single gasket, push-on type gate valves designed to meet the requirements of the AWWA Specification C550, latest revision. Valves shall open to the left (counter-clockwise). Valves up to and including size 12 inches shall have an "O" ring type pressure seal.

B. Valve Boxes: Slip type valve boxes, of the same type used by the Miami-Dade Water and Sewer Department, shall be carefully centered and set flush with the finished grade and held in position by a 30-inch diameter by 8-inch thick ring of concrete poured under the support flange.

C. Gate valves smaller than 3 inches in size, otherwise noted on the drawings, shall be 150 lbs., all bronze, wedge disc, non-rising stem with hand wheels, screwed bonnet, Crane No. 437 or an approved equal. Valve stem extensions and cast iron slip type valve boxes of the same type used by Miami-Dade Water and Sewer Department shall be provided where needed.

2.04 CORPORATION STOPS

A. Corporation stops shall be brass, equipped with connections compatible with the connecting service pipe type, threaded in accordance with AWWA Standard C800, and as manufactured by Mueller Co., Decatur, I11., or an approved equal.

2.05 MISCELLANEOUS ITEMS

A. Other items necessary for the complete installation and not specified herein shall conform to the details and notes shown on the Drawings. All minor items implied, included or required for the construction of a complete operational system shall be installed whether shown on the detail drawings or not.

PART 3 - EXECUTION

3.01 HANDLING AND CUTTING PIPE

A. Every care shall be taken in handling and laying pipe and fittings to avoid scratching, marring surfaces, abrasion or the coating or otherwise damaging the pipe.

B. Any cracked fitting or any pipe fitting which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen shall be marked rejected and removed at once from the work.

C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe may be perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack.

D. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters or knives adopted to the purpose. All cut ends shall be examined for possible cracks caused by cutting.

3.02 INSTALLATION

A. Installation of cast iron pipe and fittings shall be in accordance with AWWA Specification C600, latest revision.

B. Trenching shall be in conformance with Section 312300 of these Specifications.

C Single seal gasket push-on joints may be made underwater.

D. Pipe Bedding

1. The bottom of the trench shall be shaped to give uniform support for each pipe. The trench bottom shall be cut to fit the lower circular third of the pipe.

2. Each sections of pipes shall be uniformly supported for the full length of its barrel with recesses excavated to accommodate bells and joints.

3. The Contractor shall lay pipe in conformance with the bidding details shown on the drawings. If pipe is laid in water, the trench bottom, shall be over-excavated 9 inches and the pipe shall be bedded and cradled on and in clean graded gravel or pea rock.

E. Alignment

1. Pipe and fittings shall be laid accurately to the lines and grades indicated on the lines and grades indicated on the drawings or as required by special field conditions. Care shall be taken to ensure a good alignment both horizontally and vertically and to give the pipe a firm bearing along its entire length.

2. When bell and spigot pipe or similar pipe is laid, the bell of the pipe shall be cleaned and wiped out before the cleaned and prepared spigot of the next pipe is inserted into properly seated and held securely until the joint has been completed.

3. No defective pipe or fittings shall be laid or placed in the system and any piece discovered to be defective after having been laid, shall be removed and replaced by a sound and satisfactory piece.

4. Each pipe and fitting shall be cleaned of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.

F. Temporary plugs

1. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means.

2. If water is in the trench when work is resumed the plug shall not be removed until all danger of foreign matter entering the pipe has passed.

G. Where single seal gasket type joints are used, bronze wedges shall be inserted in the joint at opposite sides on the spring line.

H. All water meter assemblies shall be in accordance with the requirements of the Miami-Dade Water and Sewer Department.

I. Thrust Blocks: The Contractor shall furnish and install all support necessary to hold piping and appurtenances in a firm, substantial manner.

J. Backfilling shall be in conformance with Section 312300 of these Specifications.

3.03 CLEANING AND FLUSHING

A. Upon the completion of the pipe installation for any section, the mains shall be thoroughly flushed; and, care shall be taken to dispose of the water without causing a nuisance or property damage.

3.04TESTING AND INSPECTION

A. All components of water systems including mains, fittings, connections, service connections and valves, shall remain uncovered until tested and accepted; provided, however, that pipe trenches under traveled roads may be backfilled with the permission of the Architect/Engineer. No testing shall be done until all concrete thrust blocks are in place and set. In testing, the system shall be filled with water and subjected to a sustained pressure of 150 pounds per square inch. Piping to be tested in sections, thereby testing each gate valve for secure closure. While the system is being filled, air shall be carefully and completely exhausted. Thrust blocking shall have been in place 5 days before subjected to testing operations. All expenses for tests shall be borne by the Contractor.

1. Testing of water mains shall be performed in accordance with requirements of Miami-Dade Water & Sewer Department; and, shall be performed in the presence of City of West Miami personnel.

B. Sterilization:

1. Disinfection of the water mains and appurtenances and bacteriological testing shall

be in accordance with the latest revision of AWWA Specification C601.

2. The sterilization agent shall be free chlorine in aqueous solution, with sustained concentration for 12 hours or more of not less than 50 parts per million. Chlorine may be derived from chlorine gas or 70 percent (high test) calcium hypochlorite (HTH or Perchloron, or equal). Administration may be by any of the several methods described in Standard Specification C601. Proposals as to method must be made prior to commencement of the sterilization process. Following contact with chlorine solution, the system must be thoroughly flushed out.

3. Bacteriological testing shall be performed by the Miami-Dade County Health Department. Contractor shall be responsible for all fees assessed by the Health Department to perform these tests.

3.05CONNECTING TO EXISTING SYSTEM

A. All connections to existing mains of the Miami-Dade Water & Sewer Department shall be made by or under their direction. Valves separating the mains being installed from existing mains shall be operated by or under the direction of the City/Department's representative. The cost of the work by the Department in making the connection shall be paid for by the Contractor.

B. In the event the proposed main is to be connected to a main which has one or more active services between the point of connection and the first existing line valve, a temporary plug or cap shall be installed on the new main until the pressure tests and disinfecting are completed. Upon satisfactory completion, the cap or plug shall be removed from both mains and the connection made with the pipe which has been swabbed out with a solution of chlorine and water. The connection shall be made as swiftly as possible and any water in the ditch shall be kept below the level of the pipe. The pipeline shall then be placed in service by the Department personnel.

C. In the event any existing customers will be without water while a connection is being made, the Contractor shall notify the affected parties when the water will be turned off and when they may expect service to be resumed. In some instances these connections may have to be made at night. No customer shall be without water service for more then two hours.

END OF SECTION

SECTION 333111

SANITARY SEWER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Section includes but is not necessarily limited to the following:

1. Underground gravity sanitary sewer pipe and fittings and incidentals, including service laterals.

2. Furnishing, installation and testing of the above.

1.02 SUBMITTALS

A. In general, the following data and shop drawings shall be submitted to the Architect/Engineer for approval prior to construction:

1. Manufacturer's Certified Test Report on Castings

2. Certified Test Records for Polyvinyl Chloride Pipe

3. Mill Test Certificates on Ductile Iron Pipe

4. Precast Manhole Shop Drawings

PART 2 - PRODUCTS

2.01 POLYVINYL CHLORIDE PIPE

A. Plastic gravity sewer pipe and fittings shall conform to AWWA C900, rubber-ring gasket bell end or plain end with elastomeric gasket coupling, DR 18 or as shown in the drawings, cast iron equivalent outside diameter, material cell classification 12454 per ASTM D1784, latest revision.

B. The pipe joint must be the bell and spigot rubber gasket type, in which the bell portion is an integral portion of the pipe.

C. PVC pipe and fittings which show signs of ultra-violet degradation will be considered substandard and unfit for use.

2.02 MANHOLES

A. Precast concrete manholes shall conform to the Drawings. Concrete for use in precast manholes shall be minimum strength 4,000 psi.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Contractor shall excavate the trench in accordance with the details shown on the drawings, and as specified in Section 312300 of these Specifications. Width of the trench at one foot above pipe and below shall be held to the external pipe diameter plus one foot on each side. Trench shall be excavated and backfilled with select materials to form the elevation required by pipe bedding.

3.02PIPE LAYING

A. The bottom of the trench shall be shaped to give substantially uniform circumferential support to each pipe, along the full length of its barrel. Cut out for bells. Pipe laying shall commence at the lowest end of the system and proceed upgrade with spigot ends of bell and spigot pipe pointing in the direction of the flow. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offsets of the flow lines. As the work progresses, the interior of the sewer shall be cleared of all dirt and superfluous materials of every description. At all times when work is not on progress, all open ends of pipe and fittings shall be securely closed so that no debris, earth, or other substance will enter pipe or fittings.

B. Following placing of one foot of compacted backfill cover above the top of pipe, the pipe shall be sighted to insure proper grade and alignment. Defects noted shall be immediately dug up and corrected after which backfilling may proceed to the top of the trench. The Contractor is required to maintain this condition, insuring against displacement, flotation, etc., so that final inspection of completed sections will be facilitated.

C. Where directed by the Architect/Engineer and/or where the sewer crosses a water main a vertical distance less than 1.5 feet, the Contractor shall install ductile iron pipe for a distance of ten feet on either side of the point of crossing. All ductile iron pipe shall conform to ANSI Specification A 21.51, latest revision.

D. Pipes and appurtenances may be bedded and laid in the dry or in water up to a maximum level of the current, normal water table, at Contractor's option. If pipe is laid in water, a 9" layer of well and uniformly graded hard gravel or pea rock shall be used for bedding pipe, and backfill around pipe up to centerline of pipe shall be the same uniformly graded hard gravel or pea rock. The gravel or pea rock shall be hard durable stone free of fines not soluble nor subject to dissolving in water, and subject to approval of the Architect/Engineer.

E. Contractor may be required to dewater lines and trenches completely at no additional cost to Owner for inspections and investigations of the work and to locate defects if the work does not pass all required tests and inspections, including a clear, straight, unobstructed full circle when sighting lines.

3.03INSPECTION AND TESTS

A. All work constructed under this Section of the contract specifications will be subject to visual inspection for faults, defects, leaks, and all deviations or omissions must be corrected at once.

B. All testing equipment shall be furnished by the Contractor, who shall conduct tests in the presence of the Architect/Engineer, or his designated representative. Test pressures shall remain under pressure for the length of time required to inspect the entire piping system and not less than 4 hours, unless otherwise noted.

C. All faults discovered as a result of tests shall be remedied and the test repeated.

D. Tests shall be conducted at such places and with timing to permit the work to proceed

with as little interruption as possible. Tests shall be made before any of the work is covered or concealed.

E. Materials other than those specified for jointing will not be permitted in the piping systems for the purpose of stopping leaks.

F The Contractor shall obtain from the pipe manufacturer(s) and furnish to the Architect/Engineer a certificate(s) of inspection to the effect that the pipe supplied for this contract has been inspected at the plant and that the pipe meets the requirements of these specifications.

G. On completion of the sewerage system, or such other times as the Architect/Engineer may direct, the sewer shall be cleaned, tested and inspected. Each manhole and other appurtenance to the system shall be of the specified size and form, be watertight, neatly and substantially constructed, with the top set permanently to exact position and grade. All repairs shown necessary by the inspection shall be made; broken or cracked pipe replaced; all deposits removed and the sewer left true to line and grade, entirely clean, and ready for use.

3.04LIMITS OF INFILTRATION, EXFILTRATION AND TESTING

A. The allowable limits of infiltration or exfiltration or leakage for the entire system or any portion thereof, including house service lines, shall not exceed a rate of 0.1 gallon per foot of pipe per 24 hours for all sizes of pipe throughout the system. The allowable limits of infiltration or exfiltration of manholes shall not exceed a rate of four gallons per manhole per 24 hours.

B. Any part or all of the system may be tested for infiltration or exfiltration, as directed by the Architect/Engineer. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of testing. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, or by other approved methods.

C. The exfiltration test will be conducted by fillling the portion of the system being tested with water to a level which will provide: a minimum head on a service lateral connected to the test portion of 2-feet; or in the event there are no service laterals in the test portion, a minimum difference in elevation of 5-feet between the crown of the highest portion of the sewer and the test level.

D. The Contractor shall provide all labor, equipment and materials and shall conduct all testing required, under the direction of the Architect/Engineer. No separate or additional payment will be made for this work.

END OF SECTION

SECTION 33 71 19

ELECTRICAL SITE UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordinate all incoming utilities, including, but not limited to, power, telephone and cable TV to provide all required materials and labor necessary for site utility services into the Building. Coordination shall include all utility companies' service specifications and requirements.
B. Coordinate with power company to provide all required materials and labor necessary for site temporary construction power services for the project. Coordination shall include all utility companies' service specifications and requirements.

1.2 SUBMITTALS

A. Dimensioned drawings of all handholes.

1.3 LABELING: Materials to bear Underwriters' Laboratories Labels, where applicable.

PART 2 PRODUCTS

2.1 DUCTS

A. Underground ducts of the size as indicated on drawings shall consist of a number of individual PVC or steel ducts as indicated with a minimum depth of 24 inches between finished grade.

B. Plastic conduit shall be single bore, and shall be schedule 40 polyvinyl-chloride conduit conforming to NEMA TC-2. Conduit fittings shall conform to the applicable NEMA Standards, except that where NEMA standards for conduit fittings do not exist for the type of plastic installed, fittings shall be as recommended by the conduit manufacturer.

C. Conduit and fittings shall be free, within commercial tolerances, of objectionable lines, striations, bubbles, welds, and other manufacturing defects that would impair the service of the conduit. The bore of the conduit shall be straight and circular in cross section with smooth interior surfaces free from obstructions and rough and flakey areas. The conduit and fittings shall be free from all substances that injuriously affect any wire or cable covering such as is used on rubber-covered wire, polyethylene or polyvinyl chloride sheathed cable. The conduit and fittings shall be corrosion-resistant and not adversely affected by acids, alkalies, salts, bacteria, and other organic matter that would normally be encountered in the ground. The conduit length for each size shall be the length that is standard with the manufacturer with a permissible tolerance of l/4 inch per l0-foot length. Bends, elbows, and other fittings shall be capable of freely passing a ball that is l/4 inch less in diameter that the nominal bore of the conduit. Fittings shall be of a type especially made for use with plastic conduit for electrical service. Conduit and fittings shall be capable of being joined, by means of a solvent welding cement so as to provide a watertight and root-proof joint.

D. Provide #l2 AWG galvanized iron drag wire in all empty power and signal ducts.

E. Steel ducts shall be schedule 40 hot dipped galvanized rigid steel conduit.

2.2 UNDERGROUND CONCRETE PULL BOXES

A. Concrete pull boxes sizes as shown on the drawings can be either pour-in-place as described for MANHOLES, or precast concrete, as manufactured by Brooks Products, Inc., or equivalent. Boxes to be provided with vehicular traffic covers. Covers to have 1/2 inch hex bolt at two places to bolt down cover to pull box walls. Boxes to be installed plumb and level with final grade: do not install boxes in walkways. Boxes to be accessible and only for the use intended: do not mix power and communication cables in the same box or normal power with emergency power unless system cables are completely isolated in a manner approved by Project Engineer. Boxes shall be installed not to allow more than 200 feet of cable pulling. Provide ground rod where shown on drawings.

PART 3 EXECUTION

3.1 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.2 DUCT LINE INSTALLATION

A. Duct lines shall be laid to a minimum grade of 4 inches per l00 feet. Grade may be away from buildings, from one manhole to the next or both ways from a high point between manholes, depending on the contour of the finished grade. Low points that may trap water are not acceptable. Duct lines shall be installed so that the top of concrete in encased duct lines is not less than 24 inches below finished grade or finished paving at any point. Changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet, except that manufactured bends may be used at the ends of the run. The long sweep bends may be made up of one or more curved or straight sections and/or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with ducts of less than 3 inches in diameter and a minimum radius of 36 inches for ducts of 3 inches in diameter and larger. Conduits shall terminate in end bells where duct lines enter manholes. Conduit shall be thoroughly cleaned before using or laying. During construction and after the duct line is completed, the ends of the conduits shall be plugged to prevent water washing mud into the conduits or manholes. Particular care shall be taken to keep the conduits clean of concrete, dirt, and any other substance during the course of construction.

B. After the duct line has been completed, a standard flexible mandrel not less than 12 inches long, having a diameter approximately 1/4 inch less than the inside diameter of the conduit, shall be pulled through each conduit after which a brush with stiff bristles shall be pulled through each conduit to make certain that no particles of earth, sand, or gravel have been left in the line. Pneumatic rodding may be used to draw in the lead wire. Where connection is made to an existing duct that is of different material and shape that the duct line being installed, a suitable coupling of a type recommended by the duct manufacturer shall be used. Conduits shall be stored to avoid warping or deterioration. Plastic conduit shall be stored on a flat surface and protected

from the direct rays of the sun. Conduit joints in concrete encasement may be placed side-by-side horizontally but shall be staggered at least 6 inches vertically. At all locations where transition couplings between different types of conduits are installed and either run of conduit is concrete encased, unless otherwise shown on the drawings or required, the encasement shall include the conduit joint plus a 30 inch extension of the encasement behind the conduit joint measured along the centerline of the conduit unless the 30 inch extension carries to a point more than 8 inches above grade level in which case the encasement may be terminated at the 8 inch level.

C. Installation of couplings: Joints in all types of conduit shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. In the absence of specific recommendations, the various types of conduit joint couplings shall be made watertight.

D. Plastic conduit joints shall be made up by brushing plastic solvent cement on the inside of the plastic coupling fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together, until seated, with a slight twist to set the joint tightly, and the conduit then rotated one-half turn to distribute the cement evenly. Excess cement built up on the inside surface of the conduit shall then be removed.

E. Ends of cable carrying ducts shall be adequately sealed against water entry. Provide end bells on conduit entries into manholes and walls as specified under manholes.

F. Duct openings in manholes shall have extended reinforcing rods and shall be keyed-in reinforcing rods of duct bank.

G. Steel reinforcing rods shall be installed during construction of the duct bank.

H. Spare conduits shall be capped inside building wall. Spare ducts shall be plugged with plastic duct plugs in all manholes.

END OF SECTION