



architects + engineers

PROJECT MANUAL

VILLAGE OF MOUNT KISCO
104 Main Street
Mount Kisco, NY 10549

ADDITIONS AND ALTERATIONS AT

MUTUAL STATION
99 MAIN STREET
MT KISCO, NY 10549

Project No: MKIV 1802

CONTRACT G - GENERAL CONSTRUCTION
Volume II of III: Division 02 - 14

FINAL BID DOCUMENTS
February 8, 2022

H2M architects + engineers

3 Lear Jet Lane, Suite 205, Latham, NY 12110
tel 518.765.5105 fax 518.765.5107

www.h2m.com

TABLE OF CONTENTS

VOLUME I DIVISIONS 00 - 01

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
000105	Seals Page – Independent Fire Station	1 – 1
000105	Seals Page – Mutual Fire Station	1 – 1
001000	Project Manual Preface	1 – 2
001116	Invitation to Bid	1 – 2
002100	Notice to Bidders	1 – 3
002113	Instructions to Bidders AIA – A701, 2018 – Independent Station	1 – 8
02113	Instructions to Bidders AIA – A701, 2018 – Mutual Station	1 – 8
004100	Bid Form for both Independent and Mutual Stations	1 – 7
004313	Bid Bond, AIA – A310, 2010, Independent and Mutual Stations	1 – 2
005000	Standard Form of Agreement Between Owner and Contractor AIA – A101, 2017, Independent and Mutual Stations	1 – 8
	Attachment “A” – Project Manual Enumeration – Independent Station	each
	Attachment “A” – Project Manual Enumeration – Mutual Station	1 – 7
	Attachment “B” – Drawing Set Enumeration – Independent Station	1 – 1
	Attachment “B” – Drawing Set Enumeration – Mutual Station	1 – 1
	Attachment “C” – Insurance Requirements	1 – 2
	Attachment “D” – Milestone Schedule	1 – 1
006113	Performance & Payment Bond, AIA – A312, 2010 – Independent & Mutual Fire Stations	
007000	General Conditions of the Contract for Construction, AIA – A201, 2017, Independent and Mutual Stations	1 – 45
		each
007343	Prevailing Wage Information	1 – 1
	Project Labor Agreement (PLA)	1 – 60

DIVISION 01 – GENERAL REQUIREMENTS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
010600	Regulatory Requirements and Safety	1 – 4
012100	Allowances	1 – 2
012200	Unit Prices	1 – 2
012300	Alternates	1 – 3
012600	Contract Modification Procedures	1 – 4
012900	Payment Procedures-Partial Release & Waiver of Lien for both Independent & Mutual Stations (AIA G702, G703)	
013100	Project Management & Coordination	1 – 5
013200	Construction Progress Documentation	1 – 4
013300	Submittal Procedures	1 – 8
	Submittal Cover Sheets for both Independent & Mutual Stations	1 – 1
014000	Quality Requirements	1 – 6
014100	Regulatory Requirements	1 – 2
014216	Definitions	1 – 3
014500.11	Statement of Special Inspections and Tests (2020) – Independent Station	1 – 7
014500.11	Statement of Special Inspections and Tests (2020) – Mutual Station	1 – 7
014523	Testing and Inspection Services	1 – 4
044533	Code Required Special Inspections	1 – 13
015000	Temporary Facilities and Controls	1 – 11
015800	Project Identification	1 – 3

H2M

016000	Product Requirements	1 – 7
017123	Field Engineering	1 – 2
017329	Cutting and Patching	1 – 4
017423	Cleaning	1 – 3
017700	Closeout Procedures, AIA G706, G706A, G707 and Final Waiver of Lien for both Independent and Mutual Stations	
017900	Demonstration and Training	1 – 4

TABLE OF CONTENTS

VOLUME II – DIVISIONS 02 - 14

DIVISION 02 – EXISTING CONDITIONS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
023200	Geotechnical Investigations	1 – 1
	Geotechnical Report	1 – 24
024119	Selective Demolition	1 – 8
028080	Removal and Disposal of Asbestos Containing Materials	1 – 25
028080.01	Lab Asbestos and Lead Report	1 – 71

DIVISION 03 – CONCRETE

<u>Section</u>	<u>Title</u>	<u>Pages</u>
031000	Concrete Forming and Accessories	1 – 6
033000	Cast-In-Place Concrete	1 – 13
033500	Concrete Finishing	1 – 4
034500	Precast Architectural Concrete	1 – 5
036000	Grouting	1 – 3

DIVISION 04 – MASONRY

<u>Section</u>	<u>Title</u>	<u>Pages</u>
040513	Mortar	1 – 4
040523	Masonry Accessories	1 – 8
042113	Brick Masonry	1 – 7
042200	Concrete Unit Masonry	1 – 10
042300	Glass Unit Masonry	1 – 5

DIVISION 05 – METALS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
051200	Structural Steel Framing	1 – 12
052100	Steel Joist	1 – 7
053100	Steel Decking	1 – 8
054000	Cold Formed Metal Framing	1 – 8
055000	Metal Fabrications	1 – 10
055133	Metal Ladders	1 – 4

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

<u>Section</u>	<u>Title</u>	<u>Pages</u>
061000	Rough Carpentry	1 – 7
061643	Gypsum Sheathing	1 – 4
062000	Finish Carpentry	1 – 4

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

<u>Section</u>	<u>Title</u>	<u>Pages</u>
071116	Cementitious Waterproofing	1 – 2
072113	Board Insulation	1 – 4
072116	Blanket Insulation	1 – 5
072129	Spray Foam Insulation	1 – 6

072400	Exterior Insulating Finish Systems (EIFS)	1 – 13
072713	Air Barrier/Vapor Retarder	1 – 5
075323	Fully Adhered EPDM Roofing System	1 – 15
076200	Sheet Metal Flashing & Trim	1 – 6
077213	Manufactured Curbs	1 – 1
077233	Roof Hatches	1 – 4
078400	Firestopping	1 – 9
078413	Penetration Firestopping	1 – 6
078600	Smoke Barrier System	1 – 3
079200	Sealants	1 – 9

DIVISION 08 – OPENINGS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
081113	Hollow Metal Doors & Frames	1 – 8
081429	Pre-finished Wood Doors	1 – 6
083113	Access Doors and Frames	1 – 3
083613	Sectional Overhead Doors	1 – 6
085213	Aluminum Clad Wood Windows	1 – 7
087100	Door Hardware	1 – 12
088000	Glazing	1 – 10
088300	Mirrors	1 – 5

DIVISION 09 – FINISHES

<u>Section</u>	<u>Title</u>	<u>Pages</u>
090561.13	Moisture Vapor Emission Control	1 – 5
092116	Gypsum Board Assemblies	1 – 13
093013	Ceramic Tiling	1 – 8
093016	Quarry Tiling	1 – 6
095100	Acoustical Lay-In Ceilings	1 – 7
096513	Resilient Base and Accessories	1 – 3
096513.23	Resilient Stair Treads	1 – 4
096519.23	Luxury Vinyl Tile	1 – 5
096813	Carpet Tile	1 – 5
097720	Fiberglass Reinforced Plastic Panels	1 – 3
097813	Metal Interior Wall Paneling	1 – 3
099100	Painting	1 – 10

DIVISION 10 – SPECIALTIES

<u>Section</u>	<u>Title</u>	<u>Pages</u>
101400	Signage	1 – 5
102113.21	Toilet Partitions – High Privacy	1 – 5
102813	Toilet & Miscellaneous Accessories	1 – 4
104319	Emergency Eyewash Station	1 – 2
104400	Fire Protection Specialties	1 – 4
107316.13	Canopies	1 – 4

DIVISION 11 – EQUIPMENT

<u>Section</u>	<u>Title</u>	<u>Pages</u>
115213	Projections Screens	1 – 2

DIVISION 12 – FURNISHINGS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
123216	Plastic Laminate Countertops, Shelving and Casework	1 – 3

DIVISION 14 – CONVEYING EQUIPMENT

<u>Section</u>	<u>Title</u>	<u>Pages</u>
142400	Machine Room-Less Hydraulic Passenger Elevator	1 – 12

VOLUME III – DIVISIONS 22 - 33**DIVISION 22 – PLUMBING**

<u>Section</u>	<u>Title</u>	<u>Pages</u>
220517	Sleeves and Sleeve Seals for Plumbing Piping	1 – 4
220523	General-Duty Valves for Plumbing Piping	1 – 7
220529	Hangers and Supports for Plumbing Piping and Equipment	1 – 3
220553	Identification for Plumbing Piping and Equipment	1 – 3
220719	Plumbing Piping Insulation	1 – 4
221005	Plumbing Piping	1 – 10
221006	Plumbing Piping Specialties	1 – 6
221500	General Service Compressed-Air Systems	1 - 2
223000	Plumbing Equipment	1 – 3
22400	Plumbing Fixtures	1 – 6

**DIVISION 23 – HEATING, VENTILATING AND AIR
CONDITIONING (HVAC)**

<u>Section</u>	<u>Title</u>	<u>Pages</u>
230010	General Mechanical Requirements	1 – 10
230015	Mechanical Demolition	1 – 4
230135	HVAC System Cleaning	1 – 8
230529	Pipe Hangers and Supports	1 – 6
230555	Mechanical System Identification	1 – 3
230594	Balancing of Air and Hydronic Systems	1 – 6
230700	Pipe Insulation	1 – 8
230719	Ductwork Insulation	1 – 9
230991	Instrumentation and Control Integration	1 – 10
230993	Sequence of Operations	1 – 4
232000	Pipe, Valves and Fittings	1 – 11
232001	Condensate Drain Piping	1 – 3
232123	Hydronic Pumps	1 – 5
232300	Refrigerant Piping	1 – 7
233113	Sheet Metal Work	1 – 14
233416	Exhaust Fans	1 – 6
233418	Vehicle Exhaust Systems	1 – 9
233713	Diffusers, Registers and Grilles	1 – 3
233813	Kitchen Hood Systems	1 – 10
236002.22	Vehicle Exhaust Gas Detection System	1 – 2
238100	Packaged Rooftop Units	1 – 5
238126	Ductless Split System Air Conditioner	1 – 4
238239	Electric Heaters	1 – 2
238239.12	Hydronic Unit Heater	1 – 2

DIVISION 26 – ELECTRICAL

<u>Section</u>	<u>Title</u>	<u>Pages</u>
260000	Electrical	1 – 4
260010	Electrical Demolition	1 – 2
260519	Low-Voltage Electrical Power Conductors and Cables	1 – 6
260526	Grounding and Bonding for Electrical Systems	1 – 2
260529	Hangers and Supports for Electrical Systems	1 – 2
260533	Raceways and Boxes for Electrical Systems	1 – 10
260553	Identification for Electrical Systems	1 – 3
261823	Surge Protection	1 – 3
262400	Switch Boards and Panel Boards	1 – 3
262726	Wiring Devices	1 – 3
262816	Enclosed Switches and Circuit Breakers	1 – 3
262914	Combination Motor Controllers	1 – 2
262917	Transfer Switch (Wall Mount)	1 – 5
263214	Natural Gas Engine Generator Systems	1 – 15
265000	Lighting	1 – 4
267173	Electrical Utility Services	1 – 1
267174	Temporary Electrical Utility Services and Controls	1 – 2

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

<u>Section</u>	<u>Title</u>	<u>Pages</u>
283100	Fire Detection and Alarm	1 – 19

DIVISION 31 – EARTHWORK

<u>Section</u>	<u>Title</u>	<u>Pages</u>
311000	Site Clearing	1 – 1
312200	Grading	1 – 3
312316	Excavation	1 – 2
312333	Trenching	1 – 4
312323	Fill	1 – 3
315000	Excavation Support and Protection	1 – 3

DIVISION 32 – EXTERIOR IMPROVEMENTS

<u>Section</u>	<u>Title</u>	<u>Pages</u>
321123	Aggregate Base Courses	1 – 2
321216	Asphaltic Concrete Paving	1 – 4
321728	Pavement Markings – Traffic Paint	1 – 2
329219	Seeding	1 – 3

DIVISION 33 – UTILITIES

<u>Section</u>	<u>Title</u>	<u>Pages</u>
330513.13	Manhole Grade Adjustment	1 – 2
334124.24	PVC Drainage Pipe	1 – 3
334913.13	Storm Drainage Manholes	1 – 3

APPENDIX A

<u>Pages</u>
Stormwater Report for Small Project SWPPP's
1 – 217

PART 1 GENERAL

1.01 SUMMARY

- A. This section describes a limited soils investigation at the site. The Geotechnical Report is an integral part of the Contract Document.

1.02 SOILS INVESTIGATION REPORT

- A. General:
 - 1. A Geotechnical Report has been prepared for the site of this Work.
- B. Use of Data:
 - 1. This report is available for bidder's information but is not warranty of subsurface conditions.
 - 2. Owner, Civil Engineer and Architect will not be responsible for interpretations or conclusions drawn from the Geotechnical Report by the Contractor.
 - 3. Owner, Civil Engineer and Architect are not responsible for the accuracy and/or completeness of the information given in the Geotechnical Report.
 - 4. Bidders should visit the site and acquaint themselves with existing conditions.
 - 5. Bidders may make their own subsurface investigations at their own cost to satisfy themselves as to site and subsurface conditions. Such investigations may be performed only under time schedules and arrangements approved in advance by the Owner.

1.03 TERMINOLOGY

- A. General:
 - 1. All terms referring to excavation and/or fill should be the same as the terms in Section 31 and the Civil Documents.
 - 2. Any variation, the terms in Section 31 and Civil Documents shall take precedent.

END OF SECTION

PAGE INTENTIONALLY BLANK



Melick-Tully
& Associates

A Division of GZA



SUBSURFACE SOIL INVESTIGATION

PROPOSED BUILDING ADDITIONS VILLAGE OF MOUNT KISCO, WESTCHESTER COUNTY, NEW YORK

April 20, 2018

File No. 26.0091286.02

PREPARED FOR:

Village of Mount Kisco
c/o H2M Architects/Engineers
Purchase, New York

Melick-Tully, A Division of GZA

117 Canal Road | South Bound Brook, NJ 08880
732-356-3400

GZA has 32 Offices Nationwide

www.melick-tully.com

www.gza.com

Copyright© 2018 GZA GeoEnvironmental, Inc.



Melick-Tully
& Associates
A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION
MANAGEMENT

117 Canal Road
South Bound Brook, NJ 08880
732-400-1400
www.melick-tully.com
www.gza.com



April 20, 2018
File No. 26.0091286.02

Village of Mount Kisco
c/o H2M Architects/Engineers
2700 Westchester Avenue, Suite 415
Purchase, New York 10577

Attention: Mr. Cole Podolsky, LEED AP
Project Designer

Report
Subsurface Soil Investigation
Proposed Building Additions
Mutual Fire Station
Village of Mount Kisco, Westchester County, New York

Introduction

This report presents the results of a subsurface soil investigation performed by Melick-Tully and Associates, a Division of GZA GeoEnvironmental, Inc. and affiliated with GZA GeoEnvironmental of New York (MTA) for additions to the existing Mutual fire station. The Mutual fire station is located at 99 Main Street in the Village of Mount Kisco, Westchester County, New York as shown on the Site Location Map, Plate 1.

Proposed Construction

Plans provided to us indicate that the existing Mutual fire station would be improved by constructing two interconnected additions to the northeast side of the existing fire house. The addition attached to the existing fire house would be approximately 16 feet by 28 feet in overall plan dimensions and a larger addition connected to the north of the smaller addition would be approximately 34 feet by 40 feet in outside plan dimensions. We understand that the additions would be two story slab-on-grade structures. Structural loading was not

provided to us at the time of this report; however, we believe that the additions would impose light to moderate foundation loads and light to moderate floor slab loads.

Grading plans were not provided to us at this time; however, we understand that the additions would be located close to the level of the existing floor slab at Elevation +285.4 feet requiring cuts of up to approximately 12 feet in the rear of the larger addition to reach the proposed floor slab subgrade level.

Purpose and Scope of Work

The purpose of our services was to:

- 1) explore the subsurface soil, rock and groundwater conditions as close as practical to the boring locations identified by H2M within the proposed building addition areas;
- 2) estimate the relevant geotechnical engineering properties of the encountered materials;
- 3) evaluate the site foundation requirements considering the anticipated structural loads and encountered subsurface conditions;
- 4) recommend an appropriate type of foundation for support of the proposed additions and provide geotechnical-related foundation design and installation criteria, including an estimate of the Site Class as defined by the Building Code of New York State, 2017 Edition, for seismic design purposes;
- 5) provide recommendations for the support and the need for subdrainage of the ground level floor slab;
- 6) estimate the post-construction settlements of the recommended floor and foundation systems;
- 7) provide estimated soil parameters as requested in your RFP including but not limited to equivalent soil pressures, subgrade moduli, internal angles of friction and unit weights of soil;
- 8) recommend pavement improvements including milling and resurfacing or full depth replacement; and
- 9) discuss appropriate earthwork considerations consistent with the proposed construction and encountered subsurface conditions.

To accomplish these purposes, a subsurface exploration program consisting of four supervised test borings was performed at the site, as requested. The borings were advanced using all-terrain vehicle mounted hollow-stem auger drilling equipment and extended to depths of approximately 3 to 6 feet below the existing surface grades.

All borings terminated upon refusal on the underlying schist bedrock. The approximate locations of the explorations are shown on the Plot Plan, Plate 2.

All work was performed under the direct technical observation of a representative from MTA. Our representative located the explorations in the field using the existing site features, maintained continuous logs of the borings as the work proceeded and supervised the soil sampling operations. Closely-spaced soil samples were obtained from the borings using the general procedures of the Standard Penetration Test.

Detailed descriptions of the materials encountered in the explorations are shown on the individual Logs of Borings, Plates 3A through 3D. The soils were visually classified in general accordance with the Unified Soil Classification System (USCS) presented on Plate 4. The soil samples obtained from the explorations were brought to our office where they were further examined in our soil mechanics laboratory. Two of the samples were subjected to geotechnical laboratory testing consisting of grain-size analyses and moisture content determinations. The results of the grain-size tests are presented on Plate 5, Gradation Curves. The results of the moisture content tests are presented on Plate 5 and on the appropriate exploration logs.

The results of our subsurface exploration program, our visual examination of the soil samples and our review of the laboratory test results have provided the basis for our engineering analyses and design recommendations. The following discussions of our findings are subject to the limitations attached as Appendix II to this report.

Site Conditions

Surface Features: The western portion of the proposed addition area is currently paved and existing improvements including a masonry block retaining wall, a macadam drainage swale, a dumpster enclosure and a drainage inlet with PVC piping are present. The eastern portion of the addition area is grass covered and moderately wooded. A number of rock outcrops were visible at the surface in the unimproved portion of the

site east of the proposed additions. The asphalt parking area to the north of the existing firehouse is in various states of disrepair, and numerous cracks were evident.

Topographic information shown on plans provided to us indicate that the paved western edge of the proposed additions is relatively flat with an elevation of approximately +286 feet. The eastern portion of the addition behind the improvements slope gently to steeply upward from west to east, to a high of approximately Elevation +297 feet in the southeast corner of the northern addition footprint. Grades continue sloping up to the east at approximately 1.5H:1V to about Elevation +346 feet before the grade flattens out and continues at a more gradual slope to about +356 feet near the southeast property corner.

Subsurface Conditions: The following generalized strata were encountered in the explorations and are listed in order of increasing depth:

- 1) Surface Treatments: A surficial layer of topsoil approximately 4 inches thick was encountered in Borings No. MB-3 and MB-4 in the unimproved areas in the eastern portion of the proposed additions. In Borings No. MB-1 and MB-2, the surface treatments consisted of a layer of asphalt pavement approximately 2 to 4 inches in thickness over a 2-inch stone subbase course.
- 2) Fill: Fill materials consisting of silty sand were encountered in Boring No. MB-3 extending to a depth of 18 inches below grade.
- 3) Silty Sand: The surface treatments and fill materials were underlain by silty sands in Borings No. MB-1, MB-2 and MB-3. The sandy materials extended to depths of approximately 3 to 6 feet below the existing surface grades. In Boring No. MB-4, the topsoil was underlain by fractured schist bedrock.
- 4) Schist Bedrock: Schist bedrock was encountered below the sandy soils in Borings No. MB-1 through MB-3 and beginning below the topsoil in Boring No. MB-4. Refusal to further auger and/or sampler penetration was encountered in all four of the borings at depths of approximately 3 to 6 feet below the existing surface grades. Rock outcrops were evident in the unimproved area to the east of the existing firehouse.

Groundwater was not encountered in any of the borings to the maximum depths explored of up to 6 feet below grade at the time of our study.

Findings and Recommendations

General: Based on the results of our study, it is our opinion that:

- 1) The foundations of the proposed additions may derive their support from the schist bedrock encountered at depths of approximately 3 to 6 feet below grade. The floor slabs could be supported by competent portions of the surficial sandy soils, or schist bedrock.
- 2) Schist bedrock was encountered at levels of 3 to 6 feet in the borings, and cuts of up to 12 feet below the existing surface grades are anticipated to reach the proposed addition floor level. This excavation will extend below the surface of the rock in the east portions of the additions. Consequently, blasting or other means of rock removal will be required to achieve the proposed grades.
- 3) The moisture contents of the overburden soils were observed to be at or slightly above levels which would allow for immediate reuse as backfill. We believe that some scarification and drying of the near surface soils will be required for use as backfill, or for floor slab support in the west portion of the addition.
- 4) Groundwater was not encountered to the maximum depths explored of up to 6 feet below the existing surface grades at the time of our study; however, perched groundwater traveling across the top of relatively sound bedrock and/or surface runoff may be encountered during construction. Note that Borings MB-3 and MB-4 encountered refusal above the proposed floor levels.

Further discussion of these and other items considered relevant to the proposed additions are presented in subsequent sections of this report.

Site Preparation: The site should be cleared and grubbed of all trees and vegetation. The existing improvements including the drainage swale, underground stormwater piping, concrete block retaining wall and trash enclosure should be removed, and the resulting demolition rubble legally disposed of off-site. The existing topsoil in the eastern portion of the proposed addition areas should be stripped and the existing asphalt pavement in the western portion of the proposed additional areas should be broken up and the resulting asphalt fragments legally disposed of off-site.

After clearing and stripping and removal of the existing improvements, excavation should proceed to reach the building subgrade levels.

Schist bedrock was encountered in all four of the borings at depths of approximately 3 to 6 feet below the existing surface grades, and rock outcrops were evident in the slope to the east of the existing firehouse and additions. We believe that excavations could extend only slightly below the refusal levels encountered using rippers or larger excavation equipment equipped with rock removal teeth. It should be anticipated that deeper cuts where rock is encountered will require blasting or presplitting and extensive hammering to achieve the proposed foundation and floor slab subgrade levels. The rock removal should extend to a depth to account for any subslab utilities and the building foundations.

Any subgrade materials in the western portion of the addition which appear to be soft or unstable should be scarified, aerated and dried and recompact in place or excavated to the surface of competent soils and replaced with controlled compacted fill. We believe that portions of the sandy material could be stockpiled for reuse as backfill as required; however, moisture contents run on the sands indicate that they are at or above moisture contents which would allow immediate reuse for controlled compacted fill. Consequently, some aeration and drying of the sandy soils may be required. Any fill installed to achieve the floor slab subgrade levels or to backfill the proposed improvements should be spread in layers on the order of 8 to 10 inches in loose thickness and uniformly compacted to 95 percent of its maximum dry density as determined by the ASTM D-1557 test procedure.

All construction excavations should be performed in accordance with the most recent OSHA Excavation guidelines and governing safety codes. Based on the results of our explorations, we believe that the existing site soils will be considered a Type "C" soil as defined by the latest OSHA Excavation regulations. Excavation side slopes should be flattened as necessary to maintain safe excavations at all times. Steeper slopes could be permitted for excavations penetrating the bedrock. Fracturing and orientation of the bedding should be fully evaluated during construction to determine if stable rock conditions prevail.

We recommend that test pits be performed on the east side of the addition to better define the depth of overburden soils to bedrock to aid in the design of the excavation support system required to construct the rear walls.

Groundwater was not encountered to the maximum depths explored of up to 6 feet below the existing surface grades at the time of our study. We believe that perched groundwater seepage atop the existing bedrock could be encountered and that surface runoff from the slope to the east of the building could enter into construction excavations. We recommend that the contract documents require the contractor to maintain relatively dry excavations at all times.

Below-Grade Walls: We understand that the rear (east) walls of the proposed additions would be constructed as retaining walls. We recommend that any below-grade walls be provided with a vertical drainage system to prevent the buildup of hydrostatic pressure behind the wall. The vertical drain should consist of synthetic drainage material (Enkadrain or equivalent) or a column of crushed stone which extends from the top of the wall foundation to within 2 feet of the proposed ground surface. If stone is used, it should be separated from the adjacent soils by a geotextile fabric. The vertical drainage layer should be connected to a foundation drain consisting of a minimum 6-inch diameter porous concrete or perforated ADS pipe surrounded on all sides by a minimum of 6 inches of free-draining crushed stone wrapped in filter fabric. The foundation drain should be sloped to drain by gravity to the storm sewer system. The civil engineer should grade the slope with a swale or other means to prevent runoff from accumulating against the east wall of the addition.

The below-grade walls should be designed to resist lateral earth pressure imposed by the adjacent soils as well as surcharge loads due to sloping backfill, surface improvements, temporary construction traffic, material stockpiles, etc. Walls which are free to rotate slightly during backfilling may be designed to resist lateral earth pressure assuming an active earth pressure condition. Provided the sandier portions of the on-site soils are

used as backfill and compacted to at least 95 percent of their maximum dry density as determined by the ASTM D-1557 test procedure, a total unit weight of 135 pounds per cubic foot and a friction angle of 32 degrees may be used. A friction factor between concrete and the schist bedrock of 0.60 could be used to resist sliding.

Typical soil parameters for the overburden soils could be estimated based on the following table:

Typical Soil Parameters

			Lateral Equivalent Soil Pressures (psf/ft)				
Soil Type	Bearing Capacity	Subgrade Modulus (lbs/in ⁽³⁾)	Active*	Passive	At-Rest*	Friction Angle (degrees)	Estimated Total Unit Weight (pcf)
Silty Sand (SM)	6,000 psf	150	41	439	63	32	135

*The active and at-rest soil pressures should be adjusted to account for the sloping backfill to the east of the wall once grading plans are developed and a more complete evaluation of the depth to bedrock is determined from test pits.

Foundation Design Criteria: Following the site preparation procedures previously described, foundations for the proposed addition may consist of conventional shallow foundations which derive their support from the schist bedrock anticipated to be present at the foundation subgrade levels. Foundations on the schist bedrock may be designed for allowable bearing pressures of 8,000 psf.

Exterior foundations are generally required to extend to depths of 4 feet below the lowest adjacent exterior grade for frost penetration. However, if the footings are on rock, footings could be constructed at shallower levels. Interior foundations in permanently heated portions of the structure could be established at more convenient levels. We recommend that a geotechnical engineer from MTA be present at the site to determine the suitability of the foundation subgrade materials before placing concrete.

We estimate that foundations supported on the relatively sound schist bedrock would be negligible.

Seismic Design Criteria: Based on our review of the soil boring information, it is our opinion that the site subsurface conditions are representative of a Site Class "B" as defined by the Building Code of New York State,

2017 Edition, for seismic design purposes. Considering a Site Class "B" the published USGS design maps estimate a short acceleration period (S_s) equal to .253 and a 1-second acceleration (S_1) equal to 0.070. A copy of the USGS design map summary report is included as Appendix I.

Floor Slab Design Criteria: We believe the proposed floor slabs could be supported atop the sandy overburden soils in the western portion of the site compacted to a dense and unyielding condition. Any areas observed to be soft or unstable should be removed to suitable bearing materials and be replaced with granular controlled compacted fill. We recommend that the schist bedrock in the eastern portion of the addition area be overexcavated a minimum of 12 inches and be replaced with controlled compacted fill or clean stone in order to provide a uniform subgrade support for the slab. The slab should be underlain by a minimum of 6 inches of 3/4-inch clean crushed stone or washed gravel to provide a stable working base during construction. The subslab stone layer should be connected to the storm sewer system so that any water which accumulates in the stone could be removed.

We believe that floor slabs constructed in accordance with our recommendations would experience total settlements on the order of 1/4 of 1 inch, or less.

Pavement Rehabilitation: Two pavement cores, one each in Borings MB-1 and MB-2 indicated a variable pavement section of between 2 and 4 inches of asphalt over 2 inches of processed stone. No estimates of vehicle trips were provided to us to evaluate the thickness design. Based on our observations, it appears that significant cracking of the pavement is evident, especially over the existing storm drain trenches. Due to the extensive cracking throughout the parking area, especially over the existing storm system, and the variable thickness of the asphalt, it does not appear that partial removal and replacement of the pavement section would be adequate. We recommend that the existing pavement be removed for its full depth and the asphalt fragments legally disposed of off-site. We recommend that the exposed subgrade materials be graded to allow

a uniform asphalt pavement section be installed. We recommend that the exposed stone base course exposed after removal of the pavement and grading be proofrolled with a loaded tandem dump truck to observe any soft subgrades which may require removal and replacement. Any areas which are observed to deflect under the proofrolling should be removed for their full depth, and any soft or disturbed soils removed and replaced with a processed stone material compacted to 95 percent of its maximum dry density as determined by the ASTM D-1557 test procedure prior to replacing the pavement.

Please feel free to contact us if you have any questions regarding this report.

The following Plates and Appendices are attached and complete this report:

Plate 1 – Site Location Map
Plate 2 – Plot Plan
Plates 3A through 3D – Logs of Borings
Plate 4 – Unified Soils Classification System
Plate 5 – Gradation Curves
Appendix I – Seismic Design Summary Report
Appendix II – Limitations

Respectfully submitted,

MELICK-TULLY and ASSOCIATES,
a Division of GZA GeoEnvironmental, Inc.



James H. Beattie, P.E.
Senior Consultant

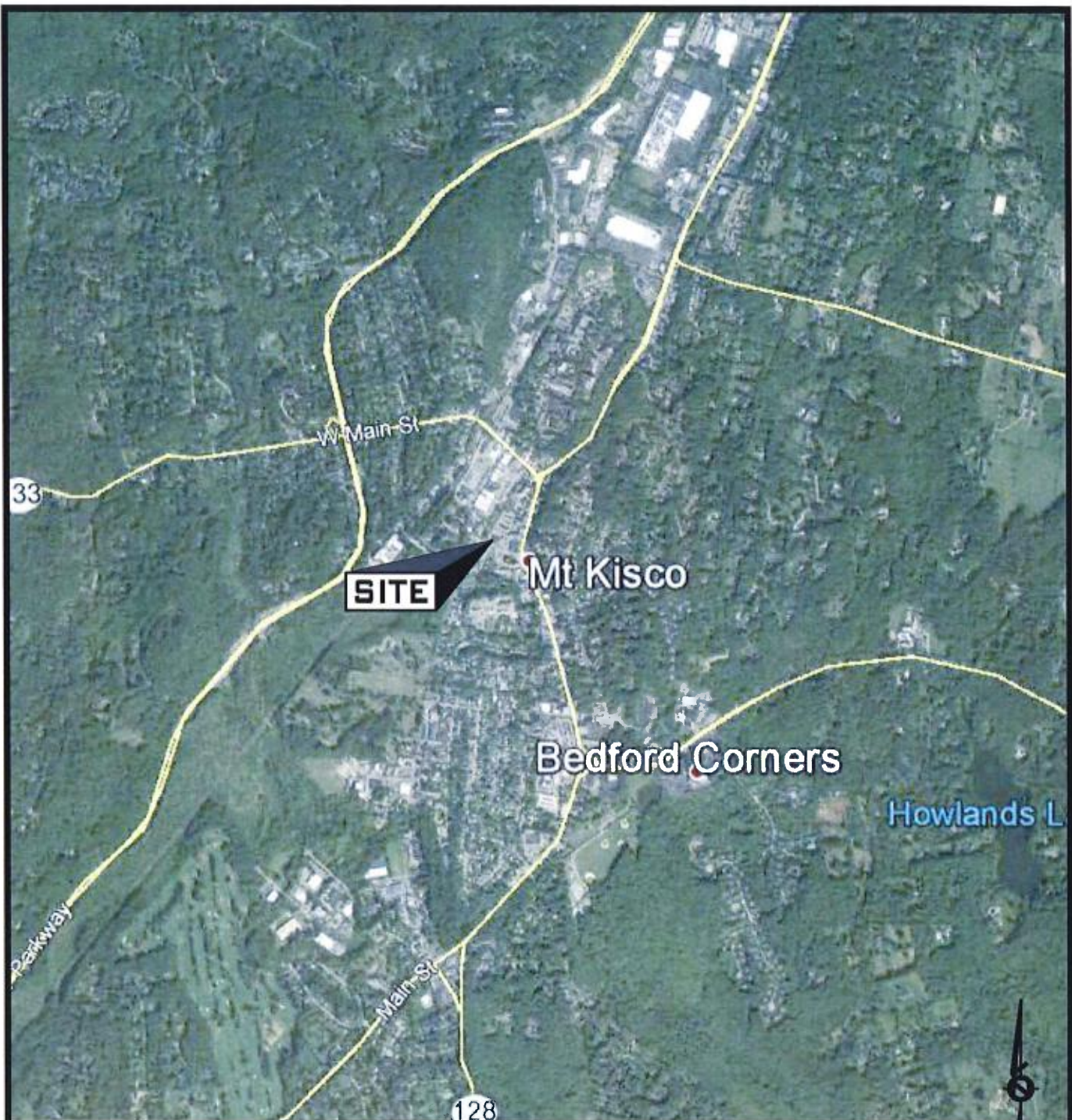


Ernest R. Hanna, P.E.
Consultant/Reviewer



Todd E. Horowitz, P.E.
Associate Principal

JHB:TEH/pm
(3 copies submitted)



Aerial Photo courtesy of Google Earth Pro



MELICK-TULLY AND ASSOCIATES

A Division of GZA

Geotechnical Engineers & Environmental Consultants

117 Canal Road

South Bound Brook, New Jersey 08880

(732) 356-3400

SITE LOCATION MAP

**BUILDING ADDITIONS AT GREEN STREET
MOUNT KISCO, NEW YORK
H2M ARCHITECTS & ENGINEERS**

JOB NO.

26.0091286.00

FILE NO.

—

DR. BY
VJD

CHK. BY
JHB

DATE
3/30/18

SCALE
1"=2,000'

PLATE
1

LOG OF BORING

COMPLETION DATE: 3/5/18
JOB NUMBER: 26.0091286.02

BORING NO. MB-1
SURFACE ELEVATION: +285.5 ft. (±)

WATER LEVEL: *
READING DATE: 3/5/18

DEPTH	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
					2" Asphalt over 2" stone	
	S1	59/6"		SM	Brown fine to coarse sand, little silt, trace fine gravel (possible fill)(moist)(very dense)	
	S2	50/0"			- auger and sampler refusal encountered @ 3'-6" atop schist bedrock	
5					Boring completed @ 3'-6" atop schist bedrock	5
					*Groundwater not encountered	
10						10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 4/18

Sheet: 1 of 1 PLATE: 3A

LOG OF BORING

COMPLETION DATE: 3/5/18
JOB NUMBER: 26.0091286.02

BORING NO. MB-2
SURFACE ELEVATION: +285.0 ft. (±)

WATER LEVEL: *
READING DATE: 3/5/18

DEPTH	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
					4" Asphalt over 2" stone	
	S1	31	10.5	SM	Brown fine to coarse sand, some silt, little fine gravel (moist)(dense)	
	S2	50/0"			- auger and sampler refusal @ 3'	
5					Boring completed @ 3' atop schist bedrock	5
					*Groundwater not encountered	
10						10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 4/18

Sheet: 1 of 1 PLATE: 3B

LOG OF BORING

COMPLETION DATE: 3/6/18
JOB NUMBER: 26.0091286.02

BORING NO. MB-3
SURFACE ELEVATION: +293.0 ft. (±)

WATER LEVEL: *
READING DATE: 3/6/18

DEPTH	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
					4" Topsoil	
	S1	50/0"			FILL - Light brown/white fine to medium sand, some silt, little fine to coarse gravel (moist)(very dense)	
					Brown fine to coarse sand, some silt, some fine gravel (moist)(very dense)	
				SM		
5	S2	50/2"	15.9		- schist rock fragments in spoon - auger refusal encountered @ 6' atop schist bedrock	5
					Boring completed @ 6'	
					*Groundwater not encountered	
10						10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 4/18

Sheet: 1 of 1 PLATE: 3C

LOG OF BORING

COMPLETION DATE: 3/6/18
JOB NUMBER: 26.0091286.02

BORING NO. MB-4
SURFACE ELEVATION: +291.0 ft. (±)

WATER LEVEL: *
READING DATE: 3/6/18

DEPTH	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
					4" Topsoil	
	S1	15			White fractured schist bedrock	
	S2	23				
	S3	50/0"			- auger refusal encountered @ 4'-6" atop schist bedrock	
5					Boring completed @ 4'-6"	5
					*Groundwater not encountered	
10						10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO
ADVANCE A 2" OD SAMPLER A DISTANCE
OF 12 INCHES USING A 140 POUND
WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 4/18

Sheet: 1 of 1 PLATE: 3D

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is LARGER than No. 200 Sieve	GRAVEL & GRAVELLY SOILS More than 50% of coarse fraction RETAINED on No. 4 Sieve	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS More than 50% of coarse fraction PASSING a No. 4 Sieve	CLEAN SAND (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SP	Poorly-graded sands, gravelly sands, little or no fines.
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS More than 50% of material is SMALLER than No. 200 Sieve.	SILTS AND CLAYS Liquid limit LESS than 50	SILTS AND CLAYS Liquid limit GREATER than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS Liquid limit GREATER than 50		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
			HIGHLY ORGANIC SOILS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

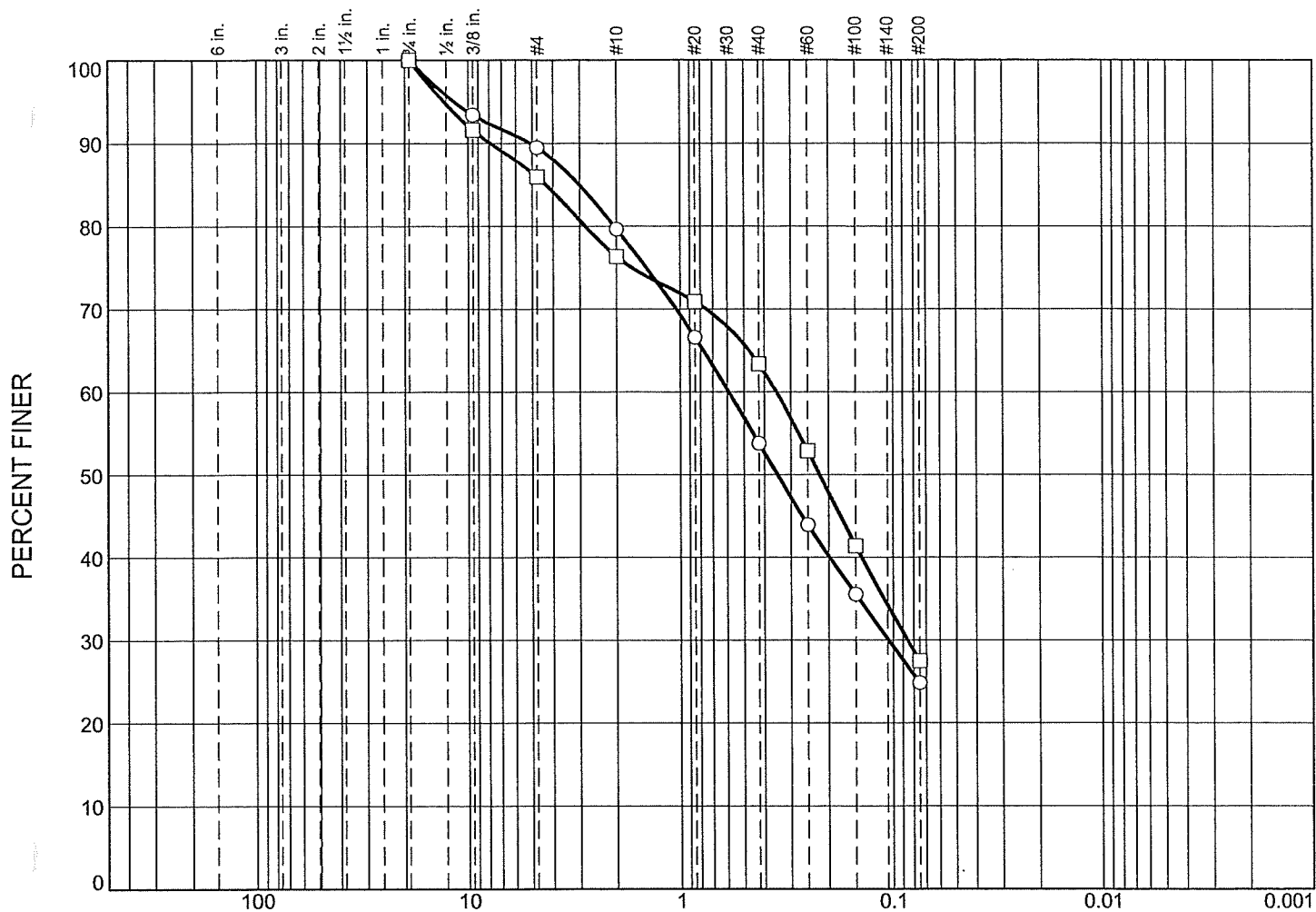
GRADATION*		COMPACTNESS*		CONSISTENCY*	
sand and/or gravel		clay and/or silt			
% Finer by Weight		Relative Density		Range of Shearing Strength in Pounds per Square Foot	
Trace	0% to 10%	Loose	0% to 40%	Very Soft	less than 250
Little	10% to 20%	Medium Dense	40% to 70%	Soft	250 to 500
Some	20% to 35%	Dense	70% to 90%	Medium	500 to 1000
And	35% to 50%	Very Dense	90% to 100%	Stiff	1000 to 2000
				Very Stiff	2000 to 4000
				Hard	Greater than 4000

*Values are from laboratory or field test data, where applicable. When no testing was performed, values are estimated.

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

Gradation Curve(s)



GRAIN SIZE - mm.

	% Cobbles	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	10.5	9.8	25.9	29.0	24.8
□	0.0	0.0	14.0	9.7	12.9	35.9	27.5

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	MB-2	S-1A	1-3	Fine to coarse Sand, some Silt, little fine Gravel. (MC=10.5%)	SM
□	MB-3	S-2	2-4	Fine to coarse Sand, some Silt, some fine Gravel.(MC=15.9%)	SM

Melick-Tully & Associates, P.C.

South Bound Brook, NJ

Client: H2M Architects & Engineers

Project: Building Additions at Three Fire Stations, Mt. Kisco, NY

Project No.: 26.0091286.02

Plate 5

APPENDIX I – Seismic Design Summary Report

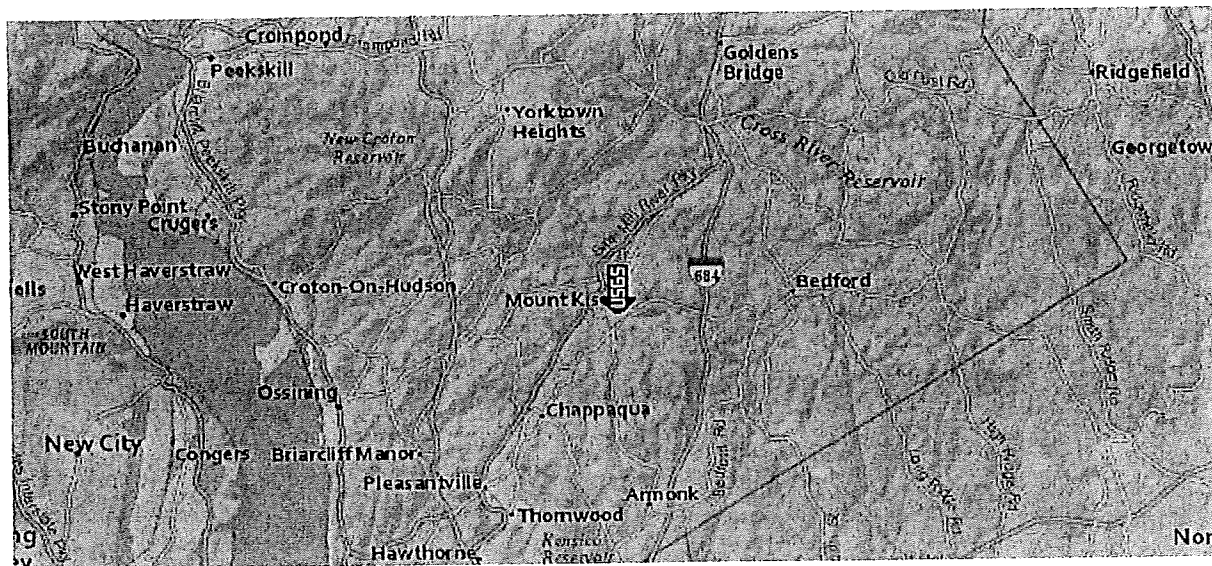
Design Maps Summary Report

User-Specified Input

Building Code Reference Document ASCE 41-13 Retrofit Standard, BSE-2N
(which utilizes USGS hazard data available in 2008)

Site Coordinates 41.205°N, 73.729°W

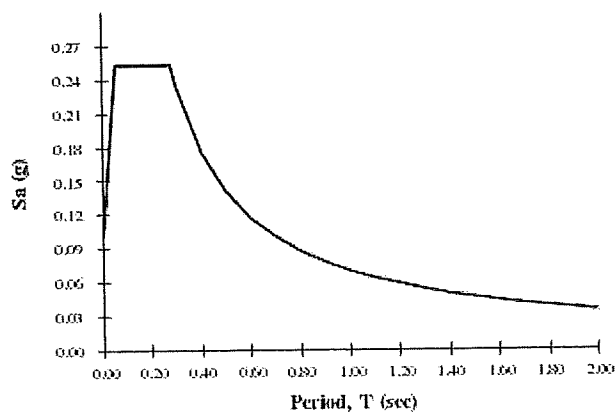
Site Soil Classification Site Class B – “Rock”



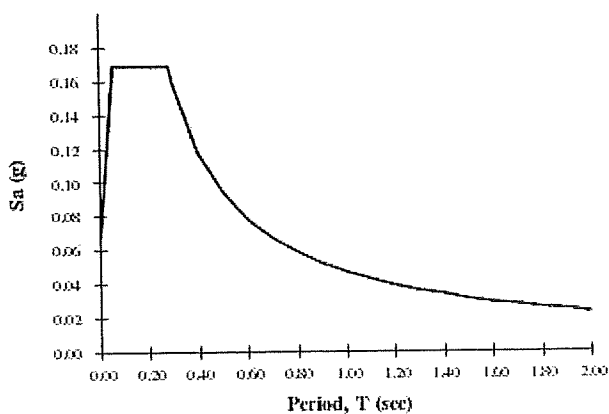
USGS-Provided Output

$S_{S,BSE-2N}$	0.253 g	$S_{XS,BSE-2N}$	0.253 g
$S_{I,BSE-2N}$	0.070 g	$S_{XI,BSE-2N}$	0.070 g

Horizontal Spectrum



Vertical Spectrum



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

APPENDIX II - Limitations

APPENDIX II

Limitations

A. Subsurface Information

Locations: The locations of the explorations were approximately determined by tape measurement from an aerial photo provided to us by H2M. Elevations of the explorations were approximately determined by interpolation between contours shown on topographic plans provided to us by the architect. The locations and elevations of the explorations should be considered accurate only to the degree implied by the method used.

Interface of Strata: The stratification lines shown on the individual logs of the subsurface explorations represent the approximate boundaries between soil types, and the transitions may be gradual.

Field Logs/Final Logs: A field log was prepared for each exploration by a member of our staff. The field log contains factual information and interpretation of the soil conditions between samples. Our recommendations are based on the final logs as shown in this report and the information contained therein, and not on the field logs. The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and/or tests of the field samples.

Water Levels: Water level readings have been made in the explorations at times and under conditions stated on the individual logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater will occur due to variations in rainfall, temperature, and other factors.

Pollution/Contamination: Unless specifically indicated to the contrary in this report, the scope of our services was limited only to investigation and evaluation of the geotechnical engineering aspects of the site conditions, and did not include any consideration of potential site pollution or contamination resulting from the presence of chemicals, metals, radioactive elements, etc. This report offers no facts or opinions related to potential pollution/contamination of the site.

Environmental Considerations: Unless specifically indicated to the contrary in this report, this report does not address environmental considerations which may affect the site development, e.g., wetlands determinations, flora and fauna, wildlife, etc. The conclusions and recommendations of this report are not intended to supersede any environmental conditions which should be reflected in the site planning.

B. Applicability of Report

This report has been prepared in accordance with generally accepted soils and foundation engineering practices for the exclusive use of The Village of Mt. Kisco for specific application to the design of the proposed additions. No other warranty, expressed or implied, is made.

This report may be referred to in the project specifications for general information purposes only, but should not be used as the technical specifications for the work, as it was prepared for design purposes exclusively.

C. Reinterpretation of Recommendations

Change in Location or Nature of Facilities: In the event that any changes in the nature, design or location of the additions are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

Changed Conditions During Construction: The analyses and recommendations submitted in this report are based in part upon the data obtained from four widely-spaced test borings performed for this study. The nature and extent of variations between the explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

Changes in State-of-the-Art: The conclusions and recommendations contained in this report are based upon the applicable standards of our profession at the time this report was prepared.

D. Use of Report by Prospective Bidders

This soil and foundation engineering report was prepared for the project by Melick-Tully and Associates, a Division of GZA GeoEnvironmental Inc. (MTA) for design purposes and may not be sufficient to prepare an accurate bid. Contractors utilizing the information in the report should do so with the express understanding that its scope was developed to address design considerations. Prospective bidders should obtain the owner's permission to perform whatever additional explorations or data gathering they deem necessary to prepare their bid accurately.

E. Construction Observation

We recommend that MTA be retained to provide on-site soils engineering services during the earthwork construction and foundation phases of the work. This is to observe compliance with the design concepts and to allow changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to Work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of portions of existing fire station, site improvements and other designated materials.
 - 2. Removing below-grade construction.
 - 3. Disconnecting, capping or sealing, and abandoning in-place or removing site utilities.
 - 4. Salvaging items for reuse.
 - 5. Vermin control during demolition and removal.
 - 6. Items indicated on the plans to be abandoned in place may be filled with flowable fill or other approved materials.
 - 7. Temporary barriers to restrict access, control dust, keep existing areas weather tight.
 - 8. Protection of remaining building components until replacement construction is complete.
 - 9. Identification of utilities.
- B. Related Sections: Other specification Sections which directly relate to the work of this section include, but are not limited to, the following:
 - 1. Section 002100 - Notice to Bidders
 - 2. Section 015000 - Temporary Facilities & Controls
 - 3. Section 017700 - Closeout Procedures
 - 4. Section 230015 - Mechanical Demolition
 - 5. Section 260010 - Electrical Demolition

1.03 DEFINITIONS

- A. Demolish: Completely remove and legally dispose of off-site.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- C. LEAD-SAFE working practices - an EPA term defining Contractor required procedures for containing work areas, minimizing dust and cleaning up when working with possible lead paint during construction projects.
- D. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.
- E. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- F. Remove and Reinstall: Detach items from existing construction, store, prepare them for reuse, and reinstall them where indicated.
- G. Remove and Salvage: Detach items for existing construction and store for Owner.
- H. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and store for Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of the General Construction Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.05 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Submit to the Architect proposed abandonment and removal schedule and procedures. Include proposed methods for control of dust and noise.
- C. Photographs or videotape, sufficiently detailed of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the Work.

1.06 QUALITY ASSURANCE

- A. Conduct demolition operations in a manner that will minimize interference with structure to remain and with public or private property in the vicinity of said operations.
- B. Pre-demolition Conference: Conduct conference at Project site with Architect. Review methods and procedures related to building demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review structural load limitations of existing structures.
 - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and finalize protection requirements.
 - 5. Review procedures for protection of structure to remain, existing utilities, and existing exposed surfaces to remain.
- C. Review items to be salvaged and returned to Owner and/or reused in the construction process.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable state and local codes for demolition of structures, safety of adjacent structures, dust control, runoff control, disposal and utility removal and cap offs.
- B. Obtain required permits from Regulatory and Governing Authorities.
- C. Notify affected utility companies before starting Work and comply with their requirements.
- D. Do not close or obstruct roadways, sidewalks or adjacent utilities without approval by authorities having jurisdiction and Architect.
- E. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials. Hazardous and/or contaminated material removal are not the responsibility of this Contractor except where noted.
- F. Required hazardous/contaminated removals include the following:

1. Removal of asbestos containing materials, See Section 028080 - "Removal and Disposal of Asbestos Containing Materials".
2. Removal and disposal of all refrigerant from air conditioning and other cooling equipment.
3. Removal and disposal of existing light fixture lamps (bulbs) and ballasts for light fixtures indicated to be removed and not re-used.
4. Removal and disposal of batteries that may be found in EXIT Lights, Emergency Lights, Fire Alarm Panels and/or other fixtures/equipment containing localized batteries for emergency operation.
5. Removal of existing oil/water separator(s), grease trap(s) (or tanks), holding tank(s), and septic tank(s) contents if tank removal is shown on Contract Drawings.
6. Removal and disposal of all thermostats and temperature gauges indicated to be removed.
7. Removal of existing generator including batteries and engine oil.

1.08 PROJECT CONDITIONS

- A. Fire Station has been vacated and its use discontinued.
- B. Assume all existing paint is lead base paint. Employ lead safe working practices when cutting, removing, and/or disturbing existing painted materials. EPA LEAD-SAFE working practices: <http://www.epa.gov/lead/pubs/renovation.htm>. See also OSHA 29 CFR Section 1926.62(a).
- C. Owner assumes no responsibility for buildings and structures to be selectively demolished.
 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Except where indicated to be salvaged as part of this Contract, on-site storage of removed items or materials is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- F. Promptly repair any damages caused by selective demolition work, at no additional cost to the Owner.

1.09 LEAD PAINT WARNING:

- A. All contractors shall comply with the requirements of the OSHA construction standard for lead (29 CFR 1926.62) when disturbing painted surfaces at this facility.
- B. OSHA does not recognize any method of paint film evaluation as an acceptable means of determining the applicability of these regulations. It is the responsibility of contractors on this project to determine which of their activities are subject to the OSHA construction standard for lead and to implement any and all controls required by that standard at no additional cost to the Owner.
- C. All paint on existing structural steel, miscellaneous steel, any surface or other equipment at this facility shall be handled as "lead-based paint" unless proven otherwise. Any testing conducted to prove otherwise shall be at the expense of the party requiring such proof.

PART 2 PRODUCTS

2.01 NOT APPLICABLE

PART 3 EXECUTION

3.01 EXAMINATION

- A. Provide, erect, and maintain temporary barriers and security devices as required.
- B. Protect existing materials, structure, driveways and walls which are not to be demolished.
- C. Prevent movement or settlement of remaining structure. Provide bracing and shoring, as required.
- D. Mark location of utilities.
- E. Verify that utilities have been disconnected and capped before starting demolition.
- F. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- G. Survey existing conditions and correlate with requirements indicated to determine extent of selective and complete demolition required. Record existing conditions by use of pre-construction photographs.
- H. Inventory and record the conditions of items to be removed and reinstalled and items to be removed and salvaged.

3.02 PREPARATION

- A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
 - 1. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
 - 2. Arrange to shut off indicated utilities with the applicable local utility provider.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of 24 inches below grade and well outside areas to be excavated. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction. Record location of any stubs still connected to active systems.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.
 - 2. Brace and stabilize any structure removed and stored for reinstallation to preserve stability and alignment of structure during its removal from its existing location, during transport of the structure from its existing location, and to and from all storage locations, both during storage and during transport to the structure's final location on the Work site.
 - 3. Engineer, design and install bracing, shoring and stabilization to comply with the following:
 - a. Loads imposed by movement.

- b. Environmental loads as defined in Chapter 16 of the International Building Code of New York State.
- c. Additional load and environmental effects of vibration.
- d. All other loads identified by an independent engineer.

3.03 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with structure to remain.
- B. Provide temporary enclosures and protection to maintain a weathertight building at all times.
- C. Cease operations immediately if adjacent structure appears to be in danger. Notify authority having jurisdiction and Architect immediately. Do not resume operations until directed.

3.04 PROTECTION

- A. Existing Facilities:
 - 1. Protect adjacent walkways, roofs, building entries, and other building facilities not scheduled for removal during demolition operations.
 - 2. Maintain required exits from existing buildings.
 - 3. Erect temporary barricades to prevent access from the occupied portions of the existing station to the construction work area. Maintain required means of egress. Adjust location and extent of temporary barricades as demolition/construction dictates.
 - 4. Erect temporary, insulated enclosures to seal off dirt, dust, fumes, etc. and to reduce noise from traveling into the occupied portions of the existing station. Modify temporary enclosures as demolition/construction progress dictates. If travel between the construction area and occupied portions of the existing station is required, provide temporary, insulated, self-closing doors with walk-off mats to control dirt, dust and noise.
 - 5. Erect temporary weather tight enclosures to prevent existing station from inclement weather of all types. Provide insulated enclosures when temperatures dictate.
 - 6. Remove temporary barricades and enclosures when no longer required. Restore any damage to existing surfaces caused by the installation and/or use of temporary barricades and enclosures. Leave area clean and neat.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction, and as indicated. Comply with requirements in Section 015000 - "Temporary Facilities and Controls".
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.05 VERMIN CONTROL

- A. Employ a "Certified Commercial Applicator", certified by the New York State Department of Environmental Conservation, to exterminate rodents and vermin in the building and spaces to be demolished. Sequence extermination efforts with demolition activities to prevent re-infestation of any portion of the building or spaces. During demolition activities, provide all necessary additional efforts to effectively watch for, capture, and exterminate any rodents and vermin that survive extermination efforts before such rodents and vermin can leave the site. Legally dispose of any carcasses and/or remains.

3.06 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 2. Provide 72 hours' notice of any operations likely to mar, stain, discolor, singe, or otherwise disturb adjoining exposed surfaces. Consult with Owner and Architect for best method of preservation of existing building surface to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 6. Dispose of demolished items off-site at an approved facility.
 - a. Dispose of existing light fixture lamps and ballasts in accordance with the Toxic Substances and Control Act (TSCA), New York State Department of Environmental Conservation (NYSDEC) and local authorities having jurisdiction.

3.07 DEMOLITION, GENERAL

- A. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Demolition under this Project does not include any removal or relocation of asbestos containing materials or removal of any buried petroleum tanks. Identification and demolition of such materials/items will be completed prior to commencement of work under this Project.
 - a. Hazardous Materials: If materials suspected of containing hazardous materials other than those identified to be removed are encountered, do not disturb; immediately notify Owner.
 - 2. Disconnect, remove, and/or end cap and identify designated utilities within demolition areas as indicated on the drawings.
 - 3. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect in accordance with requirements of this Section.

4. Remove demolished materials from site and dispose of legally.
 5. Do not burn or bury materials on site. Remove demolished materials as Work progresses. Leave building and site in clean condition.
 6. Demolish in an orderly and careful manner. Protect existing supporting structural members.
 7. At or adjacent to existing construction to remain, neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 8. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 9. Maintain fire watch during and for at least 48 hours after flame cutting operations as required by applicable local and state regulations.
 10. Maintain adequate ventilation when using cutting torches.
 11. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 12. Remove air-conditioning equipment without releasing refrigerants. Dispose of any refrigerant materials in accordance with authorities having jurisdiction. Refrigerant materials to be handled by a qualified and trained refrigerant technician.
 - a. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations and other authorities having jurisdiction regulations. Include name and address of technician and date(s) refrigerant was recovered.
 13. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.08 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
 2. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
- C. Below-Grade Construction: Demolish foundation walls and other below-grade construction where such construction is two or more feet below finished grade.

1. Demolish all such below-grade construction that lies within the footprint indicated for new construction or that extends up to 5 feet outside the footprint indicated for new construction.
2. Abandon all such below-grade construction lying over 5 feet outside the footprint indicated for new construction.
3. Remove below-grade construction, including basements, foundation walls, and footings, to depths indicated.
4. Septic and/or holding tanks shall be pumped out by a licensed, professional septic system contractor. Metal tanks shall be removed and disposed of in accordance with authorities having jurisdiction. Backfill tank excavations with select granular fill, compacted in 8" lifts. Concrete tanks, distribution boxes and drywells if outside the new structure footprint and pavement areas may be crushed (after pumping) and compacted in place or filled with lean concrete unless prohibited by local codes. Concrete septic tanks, drywells and distribution boxes within the new structure footprint and/or pavement areas shall be removed, backfilled in 8" lifts and compacted with select granular fill.

3.09 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before demolition operations began.
- B. Promptly repair damage to adjacent structure caused by demolition operations.

3.10 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth, rolled surface, free from irregular surface changes. Areas of demolished construction shall not pond water and shall be graded to sheet surface water away from areas of new proposed construction. Provide a smooth transition between adjacent existing grades and new grade.

3.11 EXTERIOR BUILDING ENVELOPE RESTORATION

- A. Promptly seal all openings in the exterior building envelope resulting from selective demolition removals.
 1. If opening will be re-used, temporary sealing may be employed.
 2. All Permanent sealing methods for each different type of condition shall be submitted to the Architect for approval.
 3. Thru penetrations must be sealed from both sides of the penetration.
 4. Permanent sealing shall be finished to match existing finishes both interior and exterior for thru walls penetrations, and finished to match on penetration side if not thru wall (i.e. fastener holes).

3.12 INTERIOR BUILDING WALL, FLOOR AND CEILING RESTORATION

- A. Seal all openings in interior walls, floors and ceilings resulting from selective demolition removals where the openings are not scheduled to be re-used or if their re-use will not involve the full opening.
 1. Sealing shall be finished to match existing finishes on both sides of penetrations.

END OF SECTION 024119

PART 1 GENERAL**1.01 SCOPE OF WORK**

- A. This asbestos abatement Project will consist of the removal and disposal of Asbestos Containing Materials (ACM) from the existing portion of the fire station prior to demolition activities.
 - 1. Village of Mount Kisco, Mutual Station, 99 Main Street, Mount Kisco, NY 10549.
 - a. Environmental Investigation for Asbestos Containing Materials and Lead Based Paint was conducted by H2M architects + engineers. Copies of the Asbestos Survey reports that identify these materials is a part of this specification.
- B. The work shall include but not limited to the removal of the following materials: Specifically defined in the report.
- C. The building will not be inhabited during the abatement work.
- D. Definitions:
 - 1. Owner: Village of Mount Kisco – may be referred to as “Project Monitor”.
 - 2. Contractor: Asbestos - NYSDOL-licensed asbestos abatement firm responsible for asbestos abatement activities. Referred to as “Contractor”.
 - 3. Air Technician: To be hired independently by Owner to conduct air sampling during asbestos abatement activities.
- E. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of any obligation to furnish all labor and materials necessary to perform the Work.
- F. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.
- G. Working hours shall be as required and approved by the Owner. Asbestos abatement activities shall include but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. All work is to be performed during regular business hours, Monday through Friday. In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate all Work with the facility and Owner's representative regarding scheduling.

1.02 SPECIAL JOB CONDITIONS

- A. Any special job conditions, including variances obtained by the Owner, shall be adhered to by the Contractor.
- B. The Current Industrial Code Rule 56 (ICR 56) must be enforced.

1.03 PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.

H2M architects + engineers

Village of Mount Kisco-Additions/Alterations at
Mutual StationREMOVAL & DISPOSAL OF ASBESTOS
CONTAINING MATERIALS
028080-1

- B. Perform asbestos related Work in accordance with New York State Industrial Code Tule 56, 40 CFR 61 and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements. Effective September 5, 2006 all work conducted must be in accord with amended ICR-56 that was adopted January 11, 2006.
- C. The Contractor and its Subcontractors performing asbestos abatement work must maintain current licenses pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials. The Contractor is responsible for making sure that its Subcontractors performing this work are compliant with the amended ICR 56.
- D. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Industrial Code Rule 56.
- E. The Contractor shall comply fully with any variances secured from regulatory agencies by the Owner in the performance of the Work. Should the Contractors choose to apply for a site-specific variance, approval of Owner is first required. Any Contractor submitted petition for a site-specific variance must be submitted by the Contractor (at his/her own cost) a minimum of two weeks prior to commencement of the project. Any petition for variance must be completed and submitted by a person possessing a valid NYSDOL Project Designer certification. Any Petition for a Variance shall be submitted to the Owner for review prior to submitting to the NYSDOL.
- F. It is the sole responsibility of the Contractor to determine what, if any, patents are applicable to the Project. The Contractor shall pay all royalties and/or license fees. He shall defend all Suits or claims for infringement of any patent rights and save the Owner, Architect and Environmental Consultant, harmless from loss, including attorney's fees, on account thereof.
- G. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.04 SUBMITTALS

- A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below:
 - 1. Contractor and Subcontractor licenses issued by New York State Department of Labor.
 - 2. A list of all Workers used in the performance of the Project, including name, birth date, and a copy of their current NYSDOL Asbestos Certification.
 - 3. For each Worker used in the performance of the Project, submit required employee statements including current Medical Examination Statement, current asbestos training certification, Worker's Acknowledgement Statement, Respirator Fit Test, and Employee Training Statement.
 - 4. A list of Projects performed within the past two (2) years including the dollar value of all Projects. Provide Project references to include Owner, consultant, and air monitoring firm's name, contact persons, address, and phone number.
 - 5. Progress Schedule:
 - a. Provide proposed schedule prior to the pre-construction initial job meeting.
 - b. Show the complete sequence of abatement activities and the sequencing of Work.

- c. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building or phase.
- 6. Project Notifications: As required by Federal and State regulatory agencies together with proof of transmittal (i.e. certified mail return receipt).
- 7. Building Occupant Notification: As required by regulatory agencies.
- 8. Abatement Work Plan: Provide plans that clearly indicate the following:
 - a. All Work Areas/containments numbered sequentially.
 - b. Locations and types of all decontamination enclosures.
 - c. Entrances and exits to the Work Areas/containments.
 - d. Type of abatement activity/technique for each Work Area/containment.
 - e. Number and location of negative air units and exhaust. Also provide calculations for determining number of negative air pressure units.
 - f. Proposed location and construction of storage facilities and field office.
 - g. Location of water and electrical connections to building services.
 - h. Waste transport routes through the building to the waste storage container.
- B. On-Site Submittals: Refer to Part 3.01 D. for all submittals, documentation, and postings required to be maintained on-site during abatement activities.
- C. Project Close-out Submittals: Within 30 days of project completion, the Contractor shall submit 4 copies of the documents listed below. One set of the documents shall be forwarded to the Owner.
 - 1. Originals of all waste disposal manifests, seals, and disposal logs.
 - 2. Provide verification of payment of all fees by Contractor including removal of materials from the job site.
 - 3. Daily progress log, including the entry/ext log.
 - 4. Pre-construction, construction, and final clearance sampling results.
 - 5. Final project notifications and variances.

1.05 PRE-CONSTRUCTION CONFERENCE

- A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by the Project Monitor and Air Technician.
- B. Agenda for this conference shall include but not necessarily be limited to:
 - 1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.
 - 2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
 - 3. Project Monitor's duties, functions, and authority. The Project Monitor shall have the authority to stop abatement work if it is not being performed in accord with applicable regulations.
 - 4. Contractor's Work procedures including:
 - a. Methods of job site preparation and removal methods.
 - b. Respiratory protection.
 - c. Disposal procedures.
 - d. Clean-up procedures
 - e. Fire exits and emergency procedures.
 - 5. Contractor's required pre-work and on-site submittals, documentation and postings.
 - 6. Contractors' plan for twenty-four (24) hour Project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
 - 7. Temporary utilities.

8. Handling of furniture and other moveable objects.
 9. Storage of removed asbestos containing materials.
 10. Waste disposal requirements and procedures, including use of the Owner supplied waste manifest and container seals.
- C. In conjunction with the conference the Contractor shall accompany the Project Monitor on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.06 APPLICABLE STANDARDS AND REGULATIONS

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
1. 29 CFR 1910.1001, "Asbestos" (OSHA)
 2. 29 CFR 1910.1200 "Hazard Communication" (OSHA)
 3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
 4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
 5. 29 CFR 1926, "Construction Industry" (OSHA)
 6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
 7. 29 CFR 1926.500, "Guardrails, Handrails and Covers" (OSHA)
 8. 40 CFR 61, Subpart A, "General Provisions" (EPA)
 9. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
 10. 49 CFR 171-172, Transportation Standards (DOT)
- C. New York Regulations:
1. 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 adopted January 11, 2006.
 2. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
 3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)
- D. Local Regulations
1. Village of Mount Kisco Building Department Requirements.
- E. Standards and Guidance Documents:
1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection.
 2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems.
 3. EPA 560/585-024, guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
 4. EPA 530-SW-85-007, Asbestos Waste Management Guidance.
 5. ASTM Standard E1368 Standard Practice for Visual Inspection of Asbestos Abatement Projects.

1.07 NOTICES

- A. The Contractor shall provide notification of intent to commence asbestos abatement activities as indicated below:
1. Contractor is responsible to pay all fees for notifications and to obtain all applicable permits.
 2. At least ten (10) Working days prior to beginning abatement activities, send written notification to:

H2M architects + engineers

REMOVAL & DISPOSAL OF ASBESTOS
CONTAINING MATERIALS

Village of Mount Kisco-Additions/Alterations at
Mutual Station

028080-4

- a. U.S. Environmental Protection Agency, National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Coordinator, 26 Federal Plaza, New York, NY 10278
 - 3. At least ten (10) days prior to beginning abatement activities send written notification to:
 - a. New York State Department of Labor, Division of Safety and Health, Asbestos Control Program, State Office Campus, Building 12-Room 454, Albany, NY 12240
- B. The Contractor is required to send notifications to regulatory agencies via mail or package delivery service that will provide proof of delivery and receipt. Contractor is responsible for all costs associated with notifications, permits, postage, and delivery fees.
- C. The Contractor shall post and/or provide Building Occupant Notification at least ten (10) days prior to beginning abatement activities as required by NYS Industrial Code Rule 56. The posting shall include the following information:
 - 1. The locations of the abatement Project.
 - 2. The amounts and types of asbestos containing materials being abated.
 - 3. The commencement and completion dates of the Project.
 - 4. The name, address, and asbestos license number of the Environmental Consultant and laboratory.

1.08 PROJECT MONITORING AND AIR SAMPLING

- A. The Owner shall engage the services of a NYSDOL certified Air Technician. The Contractor is to coordinate activities with the Air Technician and Project Monitor.
- B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the air sampling and Project monitoring functions described below. The Contractor shall comply with all direction given by the Consultant during the course of the Project.
- C. the Consultant shall provide the following administrative services:
 - 1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
 - 2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
 - 3. Review and approve the Contractor's OSHA compliance testing laboratory.
- D. The Owner shall staff the Project with a representative in regard to the performance of the asbestos abatement Project and provide direction as required throughout the entire abatement period. This individual shall be designated as the Abatement Project Monitor (APM) or Project Monitor (PM).
 - 1. The APM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The APM shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed, or when ambient fiber concentrations outside the removal area exceed .01 flcc or background level.
 - a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
 - b. Standby time required to resolve the situation shall be at the Contractor's expense.
 - 2. The APM shall provide the following services:

- a. Observation of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
 - b. Provide abatement Project (Air Technician) air sampling as required by applicable regulations (NYS/AHERA) and the Owner. Sampling will include background, pre-abatement, during abatement and clearance sampling.
 - c. Verify daily that all Workers used in the performance of the Project are certified by the appropriate regulatory agency.
 - d. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
 - e. Monitor, verify, and document all waste load-out operations.
 - f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
 - g. The APM shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
3. The following minimum inspections shall be conducted by the APM. Additional inspections shall be conducted as required by Project conditions. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the APM.
- a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Area and to document these conditions.
 - b. Pre-Commencement Inspection: The purpose of this inspection is to verify the integrity of each containment system prior to disturbance of any asbestos containing material. This inspection shall take place only after the Work Area is fully prepped for removal.
 - c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the APM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
 - d. Pre-Encapsulation Inspection: The purpose of this inspection is to ensure the complete removal of Asbestos Containing Material (ACM), from all surfaces in the Work Area prior to encapsulation.
 - e. Visual Clearance Inspection: The purpose of this inspection is to verify the Contractor's certification that all materials have been removed from the Work Area and the absence of all visible accumulations of debris in the Work Area. This inspection shall be conducted after encapsulation and removal of all surface plastic in the area, except for critical barriers, but before final air clearance testing.
 - f. Post-Clearance Inspection: the purpose of this inspection is to ensure the complete removal of ACM, including debris, from the Work Area after satisfactory final clearance sampling and removal of all critical barriers and equipment from the Work Area.
 - g. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
- E. The Owner shall provide abatement Project air sampling and analysis as required by applicable regulations (New York State and/or AHERA). Sampling will include background, pre-abatement, during-abatement, and clearance sampling.
- 1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by Phase Contrast Microscopy (PCM). Results shall be available within 24 hours of completion of sampling.

2. For large and small Projects, samples shall be collected as required by applicable regulations (New York State and/or AHERA).
3. For tent removals, a minimum of at least one clearance sample shall be collected in each tent. Additional samples shall be collected in accordance with small or large Project requirements if cumulative Project quantities exceed those of a minor Project.
4. If the air sampling during abatement reveals airborne fiber levels at or above .01 fibers/cc or the pre-abatement/environmental level (whichever is greater) outside the Work Area, then the Consultant shall issue as immediate Stop Work order. The Contractor shall then inspect the barriers for leakage and HEPA vacuum and/or wet clean the surface outside the Work Area. The Contractor shall bear the burden of any and all costs incurred by this delay.
5. The Environmental Consultant shall submit copies of all final air clearance results to the NYS Department of Labor at the completion of the Project.

1.09 CONTRACTOR AIR SAMPLING

- A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every Work shift in each Work Area during which abatement activities occur in order to determine that appropriate respiratory protection id being worn and utilized.
- B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.
- C. The Contractor's laboratory analysis of air samples shall be conducted by an NYS DOH FLAP approved laboratory, subject to approval of the Environmental Consultant.
- D. Results of personnel air sample analyses shall be available, verbally, within twenty-four (24) hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the Work site within five (5) days. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

1.10 PROJECT SUPERVISOR

- A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
 1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.
 2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one year experience as a supervisor.
 3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without written consent of the Owner and the Environmental Consultant. The Project Supervisor shall be removed from the Project if so requested by the Owner.
- C. The Project Supervisor shall maintain the Project Logbook required by New York State Department of Labor and section 2.03 of the specifications and the Waste Disposal Log required by section 4.04 of the specifications.

- D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

1.11 MEDICAL REQUIREMENTS

- A. Before exposure to airborne asbestos fibers, provide Workers with a comprehensive medical examination as required by 29 CFR 1910.1001, and 29 CFR 1926.1101.
 - 1. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1910.1001, and 29 CFR 1926.1101 within the past year.
 - 2. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos fibers and within thirty (30) calendar days before or after the termination of employment in such occupations.
- B. As required by 29 CFR 1910.1001, and 29 CFR 1926.1101 maintain complete and accurate records of employees' medical examinations for a period of thirty (30) years after termination of employment and make records of the required medical examinations available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute of Occupational Safety and Health (NIOSH), authorized representatives of either of them and an employee's physician upon the request of the employee or former employee.
- C. The Contractor shall furnish the Owner evidence of its firm's medical surveillance program required under 29 CFR 1910.1001, and 29 CFR 1926.1101.

1.12 TRAINING

- A. As required by applicable regulations, prior to assignment to asbestos Work instruct each employee with regard to hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment.
- B. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.1101. Provide respirator training and fit testing.

1.13 RESPIRATORY PROTECTION

- A. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.
- B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual. Fit-test records shall be maintained on site for each employee.
- C. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators (PAPR) are the minimum allowable respiratory protection permitted to be utilized during gross removal operations.
- D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.

- E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.1101.
- F. A storage area for respirators shall be provided by the Contractor in the clean room side of the personnel decontamination enclosure where they will be kept in a clean environment.
- G. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the workday. Filters will be removed and discarded during the decontamination process. Filters cannot be reused. Filters must be changed if breathing becomes difficult.
- H. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour workday.
- I. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed for the Project site and not be permitted to return.
- J. The Contractor shall have at least two (2) Powered Air Purifying Respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the Contractor.

1.14 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
 - 1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
 - 2. Protect materials from unintended contamination and theft.
 - 3. Storage areas shall be kept clean and organized.
- C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

1.15 TEMPORARY FACILITIES, UTILITIES AND AIDS

- A. The asbestos Contractor is responsible for providing, maintaining and securing his own on-site field offices, storage and similar facilities.
- B. Sanitary Facilities: Asbestos Contractor shall provide temporary toilets.
- C. Contractor shall provide his own temporary telephone service.
 - 1. Provide Superintendent with cellular telephone for use when away from the site.
- D. Contractor shall provide for Fire Prevention, Protection, and Extinguishing by complying with all Federal, State and local laws and ordinances including OSHA requirements.
 - 1. Locate and maintain separate volatile and flammable material storage.
 - 2. Follow all applicable rules and regulations with regard to fire prevention and protection during construction operations such as welding and similar activities.
 - a. Provide and maintain a "Multi-Purpose Type ABC Fire Extinguisher" at all locations where torches, welders, and similar equipment are used.
 - b. Provide and maintain fire extinguishers at intervals throughout Project construction areas. Relocate if necessary.

- E. Contractor shall coordinate appropriate shut down and lock out all electrical power to the asbestos Work Areas. Electrical service to the buildings will be maintained 24 hours a day, 7 days a week by the Owner. No afterhours work is to be performed unless authorized by the Owner.
- F. Provide temporary 120-240 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work Area.
 - 1. Obtain power from Owner's existing system.
 - 2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all equipment and tools.
 - 3. Provide wiring and receptacles as required by the Environmental Consultant for air sampling equipment.
 - 4. All power to the Work Area shall be brought in from outside the area through GFCI's at the source.
- G. Lighting is available using the existing lights in the building.
 - 1. The entire Work Area shall be kept illuminated at all times.
 - 2. Provide lighting as required for the purposes of performing required inspections.
- H. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.
- I. Utilize domestic water service from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands, where applicable.

PART 2 PRODUCTS

2.01 PROTECTIVE CLOTHING

- A. Provide personnel utilized during the project with disposable protective whole-body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves, to protect hands. Cloth gloves may be worn inside plastic or rubber for comfort but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by use of tape or provide disposable coverings with elastic wrists or tops.
- B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.
- C. Eye Protection and hard hats shall be provided and made available for all personnel entering any Work Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

2.02 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to asbestos Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
 - 1. Provide danger signs in vertical format conforming to 29 CFR 1926.1101, minimum 20"x14" displaying the following legend.

DANGER
ASBESTOS CANCER AND LUNG DISEASE
HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

2. Provide 3" wide yellow barricade tape printed with black lettered, "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos Work Area. Install tape 3' to 4' AFF.
- B. Provide asbestos danger labels affixed to all asbestos materials, scrap, waste, debris and other products contaminated with asbestos.
1. Provide asbestos danger labels of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

2. Provide the following asbestos labels, of sufficient size to be clearly legible, for display on waste containers (bags or drums) which will be used to transport asbestos contaminated material in accordance with United States Department of Transportation 49 CFR Parts 171 and 172:

RQ HAZARDOUS
SUBSTANCE
SOLD, NOS
ORN-E, NA 9188
ASBESTOS

3. Generator identification information shall be affixed to each waste container indicating the following printed in indelible ink:
 - a. Generator Name:
 - b. Facility Name:
 - c. Facility Address:

2.03 PROJECT LOGBOOK

- A. Provide a permanently bound Project logbook. Logbook shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department.
- B. All entries into the logbook shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.
- C. All persons entering and exiting the Work Area shall sign the log and include name, social security number, and time each time they enter the Work Area.
- D. The Project Supervisor shall document all Work performed daily and note all inspections required by NYS Industrial Code Rule 56, i.e. testing and inspection of barriers and enclosures.

H2M architects + engineers

REMOVAL & DISPOSAL OF ASBESTOS
CONTAINING MATERIALS

Village of Mount Kisco-Additions/Alterations at
Mutual Station

028080-11

2.04 SCAFFOLDING AND LADDERS

- A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.
- B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.05 SURFACTANT (AMENDED WATER)

- A. Wet all asbestos-containing materials prior to removal with surfactant mixed and applied in accordance with manufacturer's printed instructions.
- B. Approved Manufacturer:
 - 1. International Protective Coatings Corp.: Serpiflex Shield
 - 2. American Coatings Corp.: EPA 55 Asbestos Removal Agent
 - 3. Certified Technologies: CerTane 2075 Penetrating Surfactant

2.06 ENCAPSULANT

- A. Encapsulant shall be tinted or pigmented so that application when dry is readily discernible.
- B. Approved Manufacturer:
 - 1. International Protective Coatings Corp.: Serpiflex Shield
 - 2. American Coatings Corp.: FNE High Temperature Sealant
 - 3. Certified Technologies: CerTane 1000 Post Removal Encapsulant

2.07 DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall also be imprinted with U.S. Department of Transportation required markings.
- B. Provide 30 or 55 gallon capacity fiber or metal drums capable of being sealed air and watertight if asbestos waste has the potential to damage or puncture disposal bags. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.
- C. Containers and bags must be labeled with the names of the waste generator and the location at which the waste was generated in accordance with 40 CFR Part 61 NESHAPS.
- D. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as ACM waste.

2.08 HEPA VACUUM EQUIPMENT

- A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Absolute (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

- B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.
- C. Approved Manufacturers:
 - 1. Hako Minuteman
 - 2. Micro-Trap Inc.
 - 3. Control Resource Systems, Inc.

2.09 POWER TOOLS

- A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

2.10 POLYETHYLENE SHEETING

- A. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.
- B. Decontamination enclosure systems shall utilize at least 6 mil opaque fire retardant plastic sheeting. At least 2 layers of 6 mil reinforced fire retardant plastic sheeting shall be used for the flooring.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Should the area beyond the Work Area(s) become contaminated with asbestos containing materials or elevated fiber levels, immediately stop Work and institute emergency procedures. Contaminated non-Work Areas shall be isolated and decontaminated in accordance with procedures established for asbestos removal. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.
- B. Medical approval, fit test reports, Worker Acknowledgements, and NYS DOL certificates shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.
- C. Perform all asbestos removal Work using wet removal procedures. Mix and apply surfactant in accordance with manufacturer's written instructions. Dry removal procedures are not permitted. Sequential abatement of multiple types of ACM within a work area shall be followed by performing "top-down" abatement: most friable to least friable. Complete cleaning at conclusion of each abatement type and subsequent clearance sampling is required per amended ICR-S 6.
- D. The following submittals, documentation, and postings shall be maintained on-site during abatement activities at a location approved by the Asbestos Project Monitor.
 - 1. Contractor license issued by New York State Department of Labor.
 - 2. Certification, Worker Training, Medical Surveillance, Acknowledgements:
 - a. New York State Asbestos Handler certification cards for each person employed in the removal, handling, or disturbance of asbestos.
 - b. Evidence that Workers have received proper training required by the regulations and the medical examinations required by OSHA 29CFR 1926.1101.

- c. Documentation that Workers have been fit-tested specifically for respirators used on the Project.
- d. Worker's Acknowledgements: Statements signed by each employee that the employee has received training in the proper handling of asbestos containing material, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.
- 3. Daily OSHA personal air monitoring results.
- 4. NYS Department of Health ELAP certification for the laboratory that will be analyzing the 051-1A personal air samples.
- 5. NYS Department of Environmental Conservation Waste Transporter Permit.
- 6. Project documents (specifications and drawings)
- 7. Notifications and variance (site specific and applicable). Ensure that the most up-to-date notifications and variances are on-site.
- 8. Applicable regulations.
- 9. Material Safety Data Sheets of supplies/chemicals used on the Project.
- 10. Approved Abatement Work Plan
- 11. List of emergency telephone numbers.
- 12. Waste Disposal Log
- 13. Project Logbook
- E. The Work Area will be vacated by building occupants prior to decontamination enclosure construction and Work Area preparation. This Specification assumes that the buildings will be vacant at the time of ACM abatement.
- F. All demolition necessary to access asbestos containing materials for removal must be conducted within negative pressure enclosures by licensed asbestos handlers. Demolition debris may be disposed of as construction and demolition debris provided the Asbestos Project Monitor determines that it is not contaminated with asbestos. If the demolition debris is determined to be contaminated, it must be disposed of as asbestos waste.

3.02 PERSONNEL DECONTAMINATION ENCLOSURE

- A. Provide a personnel decontamination enclosure contiguous to the Work Area, where applicable. The decontamination enclosure shall be attached to the Work Area and not located within it. If the decontamination chamber is accessible to the public, it shall be fully framed and sheathed to prevent unauthorized entry.
- B. Access to the Work Area will be from the clean room through and air-lock to the shower, through and air-lock to the equipment room, through and air-lock to the Work Area. Each air-lock shall be a minimum of three feet from door-to-door.
- C. The decontamination enclosure ceiling and walls shall be covered with two layers of opaque 6 mil polyethylene sheeting. Two layers of reinforced polyethylene sheeting shall be used to cover the floor.
- D. Establish a triple layer of 6 mil polyethylene at the decontamination chamber doorways, weighted to insure a tight seal of the enclosure. Prior to establishing doorway seals move all required tools, scaffolding, and equipment into the Work Area.
- E. The entrance to the clean room shall have a lockable door. Provide suitable lockers for storage of Worker's street clothes. Storage for respirators along with replacement filters and disposable towels shall also be provided.

- F. Provide a temporary shower with individual hot and cold-water supplies and faucets. Provide a sufficient supply of soap and shampoo. There shall be one shower for every six (6) Workers. The shower room shall be constructed in such a way so that travel through the shower chamber shall be through the shower. The shower shall not be able to be bypassed.
- G. Shower water shall be drained, collected and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered wastewater shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- H. The equipment room shall be used for the storage of tools and equipment. A walk-off pan filled with water shall be located in the Work Area outside the equipment room for Workers to clean foot coverings when leaving the Work Area. A labeled 6 mil plastic ACM waste bag for collection of contaminated clothing shall be located in this room.
- I. The personal decontamination enclosure shall be cleaned and disinfected minimally at the end of each Work shift and as otherwise directed by the Asbestos Project Manager.

3.03 WASTE DECONTAMINATION ENCLOSURE

- A. Provide a waste decontamination enclosure contiguous to the Work Area. The decontamination enclosure shall be attached to the Work Area and not located within it. If the decontamination chamber is accessible to the public, it shall be fully framed and sheathed to prevent unauthorized entry.
- B. The waste decontamination enclosure system shall consist of a washroom/cleanup room with an air-lock to the Work Area and another air-lock doorway to the holding area. Each air-lock shall be a minimum of three feet form door-to-door. The entrance to the holding area shall have a lockable door.
- C. The decontamination enclosure ceiling and walls shall be covered with two layers of opaque 6 mil polyethylene sheeting. Two layers of reinforced polyethylene sheeting shall be used to cover the floor.
- D. Establish a triple layer of 6 mil polyethylene at the decontamination chamber doorways, weighted to insure a tight seal of the enclosure. Prior to establishing doorway seals move all requires tools, scaffolding, and equipment into the Work Area.
- E. Where there is only one egress from the Work Area, the holding area of the waste decontamination enclosure system may branch off from the personnel decontaminations enclosure equipment room, which then serves as the waste washroom.
- F. The waste washroom water shall be drained, collected, and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered wastewater shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- G. In small asbestos Projects where only one egress from the Work Area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Access to and from the asbestos Work Area is permitted only through the personnel decontamination enclosure unless otherwise stipulated in a site specific or applicable variance.
- B. Workers shall sign the entry/exit log upon every entry and exit.
- C. The following procedures shall be followed when entering the Work Area:
 - 1. Before entering the Work Area, Workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.
 - 2. Workers shall proceed from the clean room through the shower room and the equipment room and into the Work Area
- D. The following procedures shall be followed when exiting the Work Area:
 - 1. Before leaving the Work Area, gross asbestos contamination will be removed by brushing, wet cleaning and/or HEPA vacuuming.
 - 2. In the equipment room, Workers shall remove disposable clothing, but not respirators, and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room.
 - 3. Workers shall shower thoroughly while wearing respirators then wash respirator with soap and water prior to removal.
 - 4. Upon exiting the shower, Workers shall don new disposable clothing if the Work shift is to continue or street clothes to exit area. Under no circumstances shall Workers enter public non-Work Areas in disposable protective clothing.

3.05 WORK AREA PREPARATION

- A. Asbestos danger signs shall be posted at all approaches to the asbestos Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with asbestos caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the asbestos Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.
- B. Shut down and lock out the specific work area heating, ventilating and air conditioning and electrical systems. Provide temporary electric power and lighting as needed to work areas.
- C. All surfaces and objects within the Work Area shall be pre-cleaned using HEPA vacuuming and/or wet-wiping methods. Dry sweeping and any other methods that raise dust are prohibited. ACM shall not be disturbed during pre-cleaning.
- D. Movable objects within the Work Area shall be HEPA vacuumed and/or wet-wiped and removed from the Work Area.
- E. All non-movable equipment in the Work Area shall be completely covered with 2 layers of polyethylene sheeting, at least 6 mil in thickness, and secured in place with duct tape and/or spray adhesive.
- F. Provide enclosure of the asbestos Work Area necessary to isolate it from unsealed areas of the building in accordance with the approved asbestos Work plan and as specified herein.
- G. Seal off all openings including but not limited to windows, diffusers, grills, electrical outlets and boxes, doors, floor drains, and any other penetrations of the Work Area enclosure, using 2 layers of at least 6 mil polyethylene sheeting to form a critical barrier.

- H. Provide temporary framing and sheathing at openings larger than 32 square feet forming the limits of the asbestos Work Area. Sheathing thickness must be a minimum of 3/8 inch and all sheathing shall be caulked and the Work Area side sealed with 2 layers of 6 mil polyethylene sheeting to form an isolation barrier.
- I. Isolation barriers shall be installed at all elevator openings in the Work Area. Elevator controls shall be modified so that elevators bypass the Work Area.
- J. Provide two layers of 6 mil polyethylene sheeting over all floor, wall, and ceiling surfaces. Isolation barriers shall also be covered with two layers (for a total of four layers). Sheeting shall be secured with spray adhesive and then sealed with duct tape. All joints in polyethylene sheeting shall overlap 12" minimum.
- K. Frame out emergency exits. Provide double layer 6 mil polyethylene sheeting and tape seal opening. Post as emergency exits only. Within the Work Area, mark the locations and directions of emergency exits throughout the Work Area using signs and/or duct tape.
- L. Remove all items attached to or in contact with ACM only after the Work Area enclosure is in place. HEPA vacuum and wet wipe with amended water all removed items prior to their removal from the Work Area and before start of asbestos removal operations.
- M. Any ceiling tile removal is to be coordinated with the Owner. Suspended ceiling tiles shall only be removed after Work Area preparation is complete. Non-contaminated ceiling tiles shall be HEPA vacuumed and removed from the Work area before asbestos removals begin. Any contaminated ceiling tiles shall be disposed of as asbestos waste.

3.06 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 in of water column within all full enclosure areas relative to adjacent unsealed areas and that provides a minimum of 4 air changes per hours in the Work Area during abatement, where applicable.
- B. Such filtration systems must be operated 24 hours per day during the entire Project until the final cleanup is completed, and satisfactory results of the final air samples are received from the laboratory.
- C. The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace filters every 2 hours, secondary pre-filters every 2 hours, and primary HEPA filters every 600 hours of operation.
- D. A minimum of one additional filtration unit of at least the same capacity as the primary unit(s) shall be installed and fully functional to be used during primary unit(s) filter changing and in case of primary failure. There shall be at least one back-up unit for every five primary units.
- E. At no time will the unit exhaust indoors, within 50 feet of a receptor, including but not limited to windows and doors, or adversely affect the air intake of the buildings.
- F. Upon electrical power failure or shut-down of any filtration unit, all abatement activities shall stop immediately and only resume after power is restored and all filtration units are fully

operating. For shut-downs longer than one hour, all openings into the Work Area, including the decontamination enclosures, shall be sealed.

- G. During final air clearance sampling, negative air filtration shall be reduced to half the required air changes per hour.
- H. The Contractor shall provide either a manometer or a photohelic style negative air pressure gauge with chart recorder to measure and record negative pressure differential across the Work Area barriers without interruption 24 hours per day as directed by the Environmental Consultant.
- I. There shall be at least a 12 hour settling period after the Work Area is fully prepared and the negative filtration units have been started to ensure integrity of the barriers.

3.07 REMOVAL OF ASBESTOS CONTAINING MATERIALS

- A. Asbestos containing materials shall be removed in accordance with the Contract Documents and the approved Asbestos Work Plan.
- B. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.
- C. One Worker shall continuously apply amended water while ACM is being removed.
- D. Perform cutting, drilling, abrading, or any penetration or disturbance of asbestos containing material in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.
- E. Upon removal of ACM from the substrate, the newly exposed surface shall be HEPA vacuumed and/or wet cleaned. Surfaces must be thoroughly cleaned using necessary methods and any required solvents to completely remove any adhesive, mastic, etc.
- F. All removed material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate or whenever there is enough accumulation to fill a single bag or container. Maintain the surfaces of the Work Area free of accumulation of asbestos debris.
- G. Dust-tight enclosed inclined chutes shall be used for materials dropped from distances greater than 10 ft.
- H. Large components shall be wrapped in two layers of 6 mil polyethylene sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.
- I. Power or pressure washers are not permitted for asbestos removal or clean-up procedures.
- J. All open ends of pipe and duct insulation not scheduled for removal shall be encapsulated using lag cloth.
- K. All construction and demolition debris determined by the Environmental Consultant to be contaminated with asbestos shall be handled and disposed of as asbestos waste.

- L. The use of metal shovels, metal dust pans, etc. are not permitted inside the Work Area.

3.08 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

- A. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the Work Area before moving such items into the waste decontamination enclosure system air-lock by person assigned to this duty. The Work Area persons shall not enter the air-lock.
- B. The containers and equipment shall be removed from the airlock by persons stationed in the washroom during waste removal operations. The external surfaces of containers and equipment shall be cleaned a second time by wet cleaning.
- C. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting, as the item's physical characteristics demand, and sealed airtight
- D. The cleaned re-containerized items shall be moved into the air-lock that leads to the holding area. Workers in the washroom shall not enter this air-lock or the Work Area until waste removal is finished for that period.
- E. Containers and equipment shall be moved from the air-lock and into the holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.
- F. The cleaned containers of asbestos material and equipment shall be placed in watertight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- G. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- H. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

3.09 APPLICATION OF ENCAPSULANT

- A. Following first cleaning and prior to first sheeting removal, and once Work Area has been rendered free of visible residues, a thin coat of Encapsulant shall be applied to any surfaces in the Work Area which were not the subject of removal.
- B. In no event shall Encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results.
- C. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The Asbestos Project Monitor shall determine adequacy of coverage.

3.10 WORK AREA DECONTAMINATION

- A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed unless modified by a site-specific variance.
- B. First Cleaning:
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid and may either be decontaminated prior to removal from the Work Area or disposed of as asbestos.
 - 3. The Asbestos Project Monitor shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
 - 4. The Contractor shall then apply a thin coat of encapsulant to all surfaces in the Work Area that were not the subject of removal. In no event shall encapsulant be applies to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results.
 - 5. After the encapsulant has dried, the first layer of polyethylene sheeting shall then be removed and bagged, and the Work Area shall be vacated for a minimum of 12 hours.
- C. Second Cleaning:
 - 1. All surfaces in the Work Area shall be HEPA vacuumed and/or wet cleaned.
 - 2. The Asbestos Project Monitor shall conduct a second visual inspection of the Work Area for cleanliness.
 - 3. The second layer of polyethylene sheeting shall be removed and bagged, and the Work Area shall be vacated for a minimum of 12 hours.
- D. Third Cleaning:
 - 1. All surfaces in the Work Area shall be HEPA vacuumed and/or wet cleaned.
 - 2. The Asbestos Project Monitor shall conduct a third visual inspection of the Work Area for cleanliness.
 - 3. The Work Area shall be vacated for a minimum of 12 hours regardless of the cleaning method (HEPA vacuumed or wet cleaning) utilized.
 - 4. Aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
 - 5. Upon receipt of satisfactory final clearance air sampling results, the negative air pressure equipment can then be shut down and decontamination areas, isolation and critical barriers removed.
- E. After isolation and critical barriers are removed, the Asbestos Project Monitor shall inspect the Work Area for cleanliness. If necessary, additional cleaning shall be performed by the Contractor as directed by the Asbestos Project Monitor.
- F. As a result of any visual inspection by the Asbestos Project Monitor or should air sampling results indicate high fiber levels, the Contractor will clean or re-clean the affected area at no additional expense to the Owner.

3.11 TENT ENCLOSURES

- A. Tent enclosures may only be used in areas specifically permitted by NYS Department of Labor Code Rule 56 or a Project specific variance issued by the NYS Department of Labor.
- B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.

- C. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as require by Project size.
- D. The Work Area shall be pre-cleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with two layers of 6 mil polyethylene and tape.
- E. The tent shall be a single use barrier constructed with a rigid frame and at least two layers of 6 mil polyethylene unless one layer of 6 mil polyethylene is otherwise permitted by a site-specific variance. All seams shall be sealed airtight using duct tape and/or spray adhesive.
- F. The tent shall be constructed with at least one air-lock for worker/waste egress.
- G. During removals, a HEPA vacuum or small capacity negative pressure filtration unit shall be used to provide negative air pressure inside the tent.
- H. Workers shall wear two disposable suits for all phases of Work. Workers exiting the tent shall HEPA vacuum the outer suit, enter the air-lock, remove the outer suit and then place it back into the Work Area. A second clean suit shall be donned before exiting the air-lock and proceeding to the decontamination enclosure or another work area.
- I. OSHA compliance air monitoring is required per Section 1.09.
- J. ACM removal shall follow procedures defined in Section 3.07.
- K. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed before being passed in the air-lock for double-bagging. The bags or containers shall then be transported to the decontamination enclosure and the bagged for a third time and transported to the waste storage container. All transportations of waste bags and containers outside the Work Area shall be in watertight carts.
- L. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed:
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid and shall be decontaminated prior to removal from the Work Area.
 - 3. The Asbestos Project Monitor shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
 - 4. The Contractor shall then apply a thin coat of encapsulant to all surfaces in the Work Area that were not the subject of removal. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results.
 - 5. After the encapsulant has dried, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
 - 6. Upon receipt of satisfactory final clearance air sampling results, the tent shall be collapsed into itself, placed in suitable disposable bags, and transported to the waste decontamination enclosure. Isolation and critical barriers shall then be removed.

3.12 GLOVE BAG REMOVAL

- A. Glove bag removals may only be used as specifically permitted by NYS Department of Labor Code Rule 56 or a Project specific variance issued by the NYS Department of Labor. Glove bags may only be used on piping.
- B. In addition to conformance with applicable regulations and variances, glove bag removals are only permitted to be conducted within tent enclosures complying with these specifications. Removal and disposals must also be conducted in conformance with all Project variance conditions.
- C. The Contractor shall restrict access to the immediate area where tent/glove bag removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- D. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as require by Project size.
- E. The Work Area shall be pre-cleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with two layers of 6 mil polyethylene and tape.
- F. Glove bag removals shall utilize commercially available glove bags of at least 6 mil thickness. Use shall be in accordance with the manufacturer's instructions and the following minimum requirements:
 - 1. The sides of the glove bag shall be cut to fit the size pipe being removed. Tools shall be inserted into the attached tool pocket.
 - 2. The glove bag shall be placed around the pipe and the open edges shall be folded and sealed with staples and duct tape. The glove bag shall also be sealed at the pipe to form a tight seal.
 - 3. Openings shall be made in the glove bag for the wetting tube and HEPA vacuum hose. The opening shall be sealed to form a tight seal.
 - 4. All glove bags shall be smoke tested by the Asbestos Project Monitor before removal operations commence. Glove bags that do not pass the smoke test shall be resealed and then retested.
 - 5. After first wetting the materials to be removed, removal may commence ACM shall be continuously wetted. After removal of the ACM, the piping shall be scrubbed or brushed so that no visible ACM remains. Open ends of pipe insulation shall be encapsulated.
 - 6. After the piping is cleaned, the inside of the glove bag shall be washed down and the wetting tube removed.
 - 7. A disposal bag shall be placed around the glove bag that is then detached from the pipe. The disposal bag is then sealed and transported to the decontamination enclosure.
- G. After glove bag removals are complete, then decontamination procedures shall be followed.

3.13 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

- A. After final clearance remove locks and restore electrical and HVAC systems as directed by Owner. All temporary power shall be disconnected, power lockouts removed, and power restored. All temporary plumbing shall be removed.

- B. The building is intended for demolition subsequent to completion of ACM abatement activities. Restoration work, repairs to roofing or fire stops is not anticipated.

PART 4 DISPOSAL OF ASBESTOS WASTE

4.01 APPLICABLE REGULATIONS

- A. Contractor is responsible for all permits, costs and fees associated with compliance with applicable regulations. All asbestos waste shall be stored, transported and disposed of in accordance with the following regulations as a minimum:
 1. NYSDEC, 6 NYRCC Part 360 and 364
 2. US EPA NESHAPS 40 CFR 61
 3. US EPA Asbestos Waste Management Guidance EPAI530-SW85

4.02 TRANSPORTATION AND DISPOSAL SITE

- A. The Contractor's Hauler and Disposal Site shall be approved by the Owner.
- B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present, and the Environmental Consultant authorizes the release of the waste as described herein.
- C. The Contractor shall have the Hauler provide the estimated date and time of arrival at the disposal site.
- D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Part 364 Asbestos Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority.
- E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Asbestos Waste Manifest.
- F. Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfers of the waste or allow the waste to be transported or combined with any other off-site asbestos material. The Hauler must travel directly to the disposal site as identified on the notifications with no unauthorized stops.

4.03 WASTE STORAGE CONTAINERS

- A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.). No open containers will be permitted on-site (i.e. open dumpster with canvas cover, etc.) unless specifically permitted by an applicable or site-specific variance.
- B. The Environmental Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the New York State Department of Environmental Conservation Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.
- C. The container shall be plasticized and sealed with a minimum of one (1) layer of 6 mil polyethylene on the sides and two (2) layers of 6 mil polyethylene on the floor. Once on

site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.

- D. While on-site, the container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
- E. The New York State Department of Environmental Conservation Asbestos Hauler's Permit number shall be stenciled on both sides and back of container.
- F. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.
- G. Before an enclosed container is removed from the Project site for transportation to the Disposal Site, a seal will be placed on the door(s) of the container by the Environmental Consultant. The door(s) shall also be locked. The seals and locks shall be removed at the Disposal Site by the operator of the Disposal Facility and the seals shall be returned by the Disposal Facility to the Contractor.
- H. If a lined and sealed open-top container is used pursuant to a site-specific variance, a seal is not required.
- I. The Owner may initiate random checks at the Disposal Site to ensure that the procedures outlined herein are complied with.

4.04 OWNER'S AND HAULER'S ASBESTOS WASTE MANIFESTS

- A. An Asbestos Waste Manifest shall be provided by the Owner (Appendix A) and shall be utilized in conjunction with the Asbestos Hauler's Manifest.
- B. The Owner's Manifest and the Hauler's Manifest shall be completed by the Contractor and verified by the Environmental Consultant.
- C. The Manifest shall have the appropriate signatures of the Environmental Consultant, the Contractor, and the Hauler representatives prior to any waste being removed from the site.
- D. Copies of the completed Owner's Manifest and the Hauler's Manifest shall be retained by the Environmental Consultant and the Contractor and shall remain on site for inspection.
- E. Upon arrival at the Disposal Site, the Owner's Manifest and the Hauler's Manifest shall be signed by the Disposal Facility operator to certify receipt of ACM covered by the manifest.
- F. The Disposal Facility operator shall return the original Owner's Manifest and the Hauler's Manifest and the container seals to the Contractor.
- G. The Contractor shall forward copies of the Owner's Manifest and the Hauler's Manifest and the container seals to the Environmental Consultant within 3 business days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.

- H. The Contractor shall utilize the Waste Disposal Log provided by the Owner. This log shall be maintained by the Project Supervisor and shall be kept on site at all times.
- I. Originals of all waste disposal manifest, seals, and disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

END OF SECTION

PAGE INTENTIONALLY BLANK



architects + engineers

538 Broad Hollow Road, 4th Floor East tel 631.756.8000
Melville, NY 11747 fax 631.694.4122

March 15, 2018

Mr. Edward Brancatti, Village Manager
Village of Mount Kisco
104 Main Street
Mount Kisco, NY 10549-0150

**Re: Limited Asbestos and Lead Survey Report
Mutual Fire Station
99 Main Street, Mount Kisco, New York
H2M Job No.: MKIV1802**

Dear Mr. Brancatti:

In accordance with your request, H2M architects + engineers (H2M) conducted a limited asbestos and lead inspection survey at the above-referenced property. We provide herein the results of our findings.

Asbestos Sampling

On March 5, 2018, H2M collected limited bulk samples of suspect asbestos containing materials (ACM) that were located within the above referenced property. H2M inspected areas of the property that were determined to be potentially impacted with the upcoming renovations.

Bulk samples were submitted to EMSL Analytical, Inc. (EMSL) of Carle Place, New York. EMSL is certified by the New York State Department of Health (NYSDOH), Environmental Laboratory Approval Program (ELAP), No. 11469. Bulk samples were collected and submitted by New York State Department of Labor (NYS DOL) certified inspectors Mr. Kyle P. Vander Schuyt (NYSDOL Cert No. 12-11293) and Ms. Melissa L. Farina (NYSDOL Cert. No. 16-15108).

Asbestos Results

According to the Asbestos Hazard Emergency Response Act (AHERA), the Occupational Safety and Health Administration (OSHA) and the NYSDOL (12 NYCRR Part 56); asbestos containing material (ACM) is defined as any material or product which contains greater than one percent (1%) of asbestos.

Mutual Fire Station			
99 MAIN STREET, MOUNT KISCO, NY			
LOCATION	MATERIAL DESCRIPTION	RESULT FINDINGS	APPROXIMATE QUANTITY OF ACM
Exterior, Roof	Roof Membrane (Bottom, Middle, and Top)	Non-ACM	--
Exterior, Roof	Flashing	Non-ACM	--
Exterior, Roof	Caulk	Non-ACM	--

NOTE: Only a small portion of the existing second floor VCT is scheduled to be removed. See Architectural Demolition Plan for limits of VCT removal.

Mutual Fire Station			
99 MAIN STREET, MOUNT KISCO, NY			
LOCATION	MATERIAL DESCRIPTION	RESULT FINDINGS	APPROXIMATE QUANTITY OF ACM
Exterior	Door Caulk	Non-ACM	--
Interior, 1 st Floor	Glass Block Mortar	Non-ACM	--
Interior, 1st Floor	CMU Block mortar	Non-ACM	--
Interior, 1st Floor, Dispatcher Office	2'x2' Ceiling Tile	Non-ACM	--
Interior, 1st Floor, Dispatcher Office Closet	Pipe Lagging and Fitting	ACM	16 LF*
Interior, Bathroom	Wall Tile Grout	Non-ACM	--
Interior, Bathroom	Floor Tile Grout	Non-ACM	--
Interior, Captain's Office	2'x4' Ceiling Tile	Non-ACM	--
Interior, Captain's Office	Carpet Mastic	Non-ACM	--
Interior, 2 nd Floor, Bar	Floor Tile Grout	Non-ACM	--
Interior, 2 nd Floor, Member's Room	Ceiling Tile	Non-ACM	--
Interior, 2 nd Floor, Meeting Room	Ceiling Tile	Non-ACM	--
Interior, 2nd Floor	12"x12" Floor Tile on top of 9"x9" Floor Tile	ACM	2,510 SF*
Interior, 2 nd Floor	Associated Mastic to Floor Tile	Non-ACM	--
Interior, 2 nd Floor	Cove Base and Associated Mastic	Non-ACM	--
Interior, 2 nd Floor	Gypsum Wallboard, Tape, and Joint Compound	Non-ACM	--
ACM- Asbestos Containing Material Non-ACM / Trace; Contains <1% or No-Asbestos Detected in Material Samples *All quantities should be verified on site by the contractor prior to submitting a cost estimate or abatement notification/filings. H2M should be notified if there is a change in quantities or work scope.			

Lead Based Paint Testing

According to the U.S. Environmental Protection Agency (USEPA) and U.S. Department of Housing and Urban Development (USHUD), any painted surface structure containing 1.0 milligrams per centimeter square (mg/cm²) or more of lead is considered to contain lead-based paint.

Lead Testing Results

On March 9, 2018, lead based paint testing was conducted throughout the entire building by EPA certified Risk Assessor Mr. Joseph DeFilippis (Certification No. NY-R-14035-3). All testing was conducted using an XRF (X-Ray Fluorescence) instrument.

Please be advised that the following components contain above 1.0 milligrams per centimeter square (mg/cm²) of lead and therefore are considered to be **lead based paint**:

Mutual Fire Station				
99 MAIN STREET, MOUNT KISCO, NY				
Floor	Room/Component	Substrate	Color	Interpretation
1	Interior Lobby and Staircase- Wall	Ceramic	Grey	Lead Based Paint
1	Interior Lobby and Staircase- Stair Stringer	Metal	Grey	Lead Based Paint
1	Interior Lobby and Staircase- Newell Post	Metal	Grey	Lead Based Paint
1	Interior Lobby and Staircase- Bannister	Metal	Grey	Lead Based Paint
1	Interior Apparatus Bay- Wall	Ceramic	Grey	Lead Based Paint
1	Interior Under Stairs- Support Column	Metal	Grey	Lead Based Paint
1	Interior Under Stairs- Ceiling	Metal	Grey	Lead Based Paint
1	Interior Under Stairs- Underside of Stairs	Metal	Grey	Lead Based Paint
1	Interior Bathroom- Urinal	Ceramic	White	Lead Based Paint
1	Interior Bathroom- Sink	Ceramic	White	Lead Based Paint
1	Interior Bathroom- Radiator	Metal	Grey	Lead Based Paint
2	Interior Men's Bathroom- Sink	Ceramic	White	Lead Based Paint
2	Interior Pantry- Coat Rack	Wood	Green	Lead Based Paint
Exterior	Exterior- Bumper Guard	Metal	Black	Lead Based Paint
Exterior	Exterior- Door Frame	Metal	White	Lead Based Paint

Laboratory analytical data sheets and chain of custody forms are provided in Attachment 1. Copies of H2M's licenses and certifications are provided in Attachment 2. Copies of EMSL's certifications are provided in Attachment 3. Photographic documentation is provided in Attachment 4. The lead inspection report is included in Attachment 5.

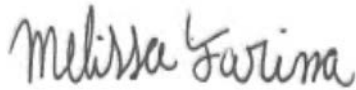
H2M certifies that the information contained herein is based on the physical data and visual inspections conducted by H2M and lab data collected during the inspection survey. All findings stated in this report are based upon facts and circumstances as they existed at the time of inspection and at the time that this report was prepared. A change in any of the site conditions, facts or circumstances upon which this report is based may affect the findings expressed in this report.

Mr. Edward Brancatti, Village Manager
Village of Mount Kisco
Mutual Fire Station
March 15, 2018
Page 4 of 4

If you have any questions, please do not hesitate to contact the undersigned at (631) 756-8000 extension 1637.

Very truly yours,

H2M architects + engineers

A handwritten signature in dark ink that reads "Melissa Farina". The signature is written in a cursive, flowing style.

Melissa L. Farina
Industrial Hygienist



ATTACHMENT 1

LABORATORY ANALYSIS
&
CHAIN OF CUSTODY FORM

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Attn: **Kyle Vanderschuyt**
H2M Architects and Engineers
538 Broad Hollow Road
4th Floor East
Melville, NY 11747

Phone: (631) 756-8000
 Fax:
 Received: 03/05/18 12:10 PM
 Analysis Date: 3/12/2018
 Collected: 3/5/2018

Project: 99 Main St-Mutual Station, Entire, MKIV1801

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 1A 061804367-0001		Description Homogeneity	Roof - Membrane Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Tan/Black	<1% Glass		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Tan/Black			None Detected
Sample ID 1B 061804367-0002		Description Homogeneity	Roof - Membrane Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Tan/Black	1.5% Glass		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Tan/Black			None Detected
Sample ID 1C 061804367-0003		Description Homogeneity	Roof - Membrane Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Tan			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Tan			None Detected
Sample ID 1D 061804367-0004		Description Homogeneity	Roof - Membrane Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Tan			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Tan			None Detected
Sample ID 1E 061804367-0005		Description Homogeneity	Roof - Membrane Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black	1.2% Glass		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black			None Detected

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Non Asbestos			Asbestos
		Color	Fibrous	Non-Fibrous	
Sample ID	1F	Description	Roof - Membrane		
	061804367-0006	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black	1.7% Glass		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black			None Detected
Sample ID	2A	Description	Roof - Flashing		
	061804367-0007	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black			None Detected
Sample ID	2B	Description	Roof - Flashing		
	061804367-0008	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black			None Detected
Sample ID	3A	Description	Roof - Caulk		
	061804367-0009	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray			None Detected
Sample ID	3B	Description	Roof - Caulk		
	061804367-0010	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray			None Detected
Sample ID	4A	Description	Exterior - Door Caulk		
	061804367-0011	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray			None Detected

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Non Asbestos		Asbestos
		Color	Fibrous Non-Fibrous	
Sample ID	4B	Description	Exterior - Door Caulk	
	061804367-0012	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray		None Detected
Sample ID	5A	Description	Interior 1st - Glaze Block Mort.	
	061804367-0013	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	3/12/2018	Gray	75.00% Quartz 10.00% Ca Carbonate 15.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	5B	Description	Interior 1st - Glaze Block Mort.	
	061804367-0014	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	3/12/2018	Gray	75.00% Quartz 10.00% Ca Carbonate 15.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	5C	Description	Interior 1st - Glaze Block Mort.	
	061804367-0015	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	3/12/2018	Gray	75.00% Quartz 10.00% Ca Carbonate 15.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	6A	Description	Interior 1st - CMU Block Mort	
	061804367-0016	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	3/12/2018	Gray	75.00% Quartz 5.00% Mica 20.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	6B	Description	Interior 1st - CMU Block Mort		
	061804367-0017	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	3/12/2018	Gray		75.00% Quartz 5.00% Mica 20.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID	6C	Description	Interior 1st - CMU Block Mort		
	061804367-0018	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	3/12/2018	Gray		75.00% Quartz 5.00% Mica 20.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID	7A	Description	Interior Dispatch Off. - 2x2 Ceiling Tile		
	061804367-0019	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	5.8% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White			None Detected
Sample ID	7B	Description	Interior Dispatch Off. - 2x2 Ceiling Tile		
	061804367-0020	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	12.5% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White			None Detected
Sample ID	7C	Description	Interior Dispatch Off. - 2x2 Ceiling Tile		
	061804367-0021	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	6.6% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White			None Detected
Sample ID	7D	Description	Interior Dispatch Off. - 2x2 Ceiling Tile		
	061804367-0022	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	9.1% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White			None Detected

Initial Report From 03/12/2018 17:22:46

Test Report 198VCM-7.30.0 Printed: 3/12/2018 5:22:46 PM

Page 4

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Non Asbestos		Asbestos
		Color	Fibrous	
Sample ID	8A	Description	Interior Dispatch Off. - Pipe Lagging	
	061804367-0023	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	3/12/2018	Gray	80.00% Cellulose	15.06% Non-fibrous (other)
				4.94% Chrysotile
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	8B	Description	Interior Dispatch Off. - Pipe Lagging	
	061804367-0024	Homogeneity		
PLM NYS 198.1 Friable	3/12/2018			Positive Stop (Not Analyzed)
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	8C	Description	Interior Dispatch Off. - Pipe Lagging	
	061804367-0025	Homogeneity		
PLM NYS 198.1 Friable	3/12/2018			Positive Stop (Not Analyzed)
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	9A	Description	Interior 1st-Dispatch - Pipe Fitting	
	061804367-0026	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	3/12/2018	Gray	69.20% Non-fibrous (other)	30.80% Chrysotile
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	9B	Description	Interior 1st-Dispatch - Pipe Fitting	
	061804367-0027	Homogeneity		
PLM NYS 198.1 Friable	3/12/2018			Positive Stop (Not Analyzed)
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	9C	Description	Interior 1st-Dispatch - Pipe Fitting	
	061804367-0028	Homogeneity		
PLM NYS 198.1 Friable	3/12/2018			Positive Stop (Not Analyzed)
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB				Not Analyzed
TEM NYS 198.4 NOB				Not Analyzed

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non Asbestos		Asbestos
Sample ID	10A 061804367-0029	Description Homogeneity	Interior Bathroom - Wall Tile Grout Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	White		40.00% Ca Carbonate 60.00% Non-fibrous (other)		None Detected
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID	10B 061804367-0030	Description Homogeneity	Interior Bathroom - Wall Tile Grout Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	White		40.00% Ca Carbonate 60.00% Non-fibrous (other)		None Detected
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID	11A 061804367-0031	Description Homogeneity	Interior Bathroom - Floor Tile Grout Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Gray		60.00% Quartz 15.00% Ca Carbonate 25.00% Non-fibrous (other)		None Detected
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID	11B 061804367-0032	Description Homogeneity	Interior Bathroom - Floor Tile Grout Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Gray		60.00% Quartz 15.00% Ca Carbonate 25.00% Non-fibrous (other)		None Detected
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID	12A 061804367-0033	Description Homogeneity	Interior Capt. Office - 2x4 Ceiling Tile Homogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	4.9% Min. Wool			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White				None Detected

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non Asbestos		Asbestos
Sample ID	12B 061804367-0034	Description Homogeneity	Interior Capt. Office - 2x4 Ceiling Tile Homogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	12.9% Min. Wool		Inconclusive: None Detected	
TEM NYS 198.4 NOB	3/12/2018	Gray/White	None Detected			
Sample ID	13A 061804367-0035	Description Homogeneity	Interior Capt. Office - Carpet Mastic Homogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Yellow	Inconclusive: None Detected			
TEM NYS 198.4 NOB	3/12/2018	Yellow	None Detected			
Sample ID	13B 061804367-0036	Description Homogeneity	Interior Capt. Office - Carpet Mastic Homogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Yellow	Inconclusive: None Detected			
TEM NYS 198.4 NOB	3/12/2018	Yellow	None Detected			
Sample ID	14A 061804367-0037	Description Homogeneity	2nd Floor-Bar - Floor Tile Grout Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Gray	30.00% Quartz 20.00% Ca Carbonate 50.00% Non-fibrous (other)		None Detected	
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID	14B 061804367-0038	Description Homogeneity	2nd Floor-Bar - Floor Tile Grout Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Gray	40.00% Quartz 20.00% Ca Carbonate 40.00% Non-fibrous (other)		None Detected	
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB						Not Analyzed
TEM NYS 198.4 NOB						Not Analyzed
Sample ID	15A 061804367-0039	Description Homogeneity	2nd Floor-Member Rm - Ceiling Tile Homogeneous			
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	13.3% Min. Wool		Inconclusive: None Detected	
TEM NYS 198.4 NOB	3/12/2018	Gray/White	None Detected			

Initial Report From 03/12/2018 17:22:46

Test Report 198VCM-7.30.0 Printed: 3/12/2018 5:22:46 PM

Page 7

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	15B 061804367-0040	Description Homogeneity	2nd Floor-Member Rm - Ceiling Tile Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	21.5% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White	None Detected		
Sample ID	16A 061804367-0041	Description Homogeneity	2nd Floor-Meeting Rm - Ceiling Tile Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	9.3% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White	None Detected		
Sample ID	16B 061804367-0042	Description Homogeneity	2nd Floor-Meeting Rm - Ceiling Tile Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Gray/White	20.6% Min. Wool		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Gray/White	None Detected		
Sample ID	17A 061804367-0043	Description Homogeneity	2nd Floor-Meeting Rm - Ceiling Tile Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Brown/White	Inconclusive: None Detected		
TEM NYS 198.4 NOB	3/12/2018	Brown/White	None Detected		
Sample ID	17B 061804367-0044	Description Homogeneity	2nd Floor-Meeting Rm - Ceiling Tile Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Brown/White	Inconclusive: None Detected		
TEM NYS 198.4 NOB	3/12/2018	Brown/White	None Detected		
Sample ID	18A 061804367-0045	Description Homogeneity	2nd Floor - 9x9 Floor Tile Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Green	6.4% Chrysotile 6.4% Total		
TEM NYS 198.4 NOB					Not Analyzed

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos		
Test		Color	Fibrous	Non-Fibrous
Sample ID	18B	Description	2nd Floor - 9x9 Floor Tile	Asbestos
	061804367-0046	Homogeneity		
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018			Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	18C	Description	2nd Floor - 12x12 Floor	
	061804367-0047	Homogeneity		
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018			Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	18D	Description	2nd Floor - 12x12 Floor	
	061804367-0048	Homogeneity		
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018			Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	18E	Description	2nd Floor - 12x12 Floor	
	061804367-0049	Homogeneity		
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018			Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	18F	Description	2nd Floor - 12x12 Floor	
	061804367-0050	Homogeneity		
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018			Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB				Not Analyzed
Sample ID	19A	Description	2nd Floor - Mastic	
	061804367-0051	Homogeneity	Homogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black		Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black		<1% Chrysotile <1% Total

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com> carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 19B 061804367-0052		Description Homogeneity	2nd Floor - Mastic Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black			Inconclusive : <1%Chrysotile Inconclusive - <1% Total
TEM NYS 198.4 NOB	3/12/2018	Black			<1% Chrysotile <1% Total
Sample ID 19C 061804367-0053		Description Homogeneity	2nd Floor - Mastic Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black			<1% Chrysotile <1% Total
Sample ID 19D 061804367-0054		Description Homogeneity	2nd Floor - Mastic Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Black			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Black			<1% Chrysotile <1% Total
Sample ID 20A 061804367-0055		Description Homogeneity	2nd Floor - Cove Base Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Brown			None Detected
Sample ID 20B 061804367-0056		Description Homogeneity	2nd Floor - Cove Base Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Brown			None Detected
Sample ID 21A 061804367-0057		Description Homogeneity	2nd Floor - CB Mastic Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Brown			None Detected

Initial Report From 03/12/2018 17:22:46

**EMSL Analytical, Inc.**

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>carleplacelab@emsl.com

EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID 21B 061804367-0058		Description 2nd Floor - CB Mastic Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	3/12/2018	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	3/12/2018	Brown			None Detected
Sample ID 22A-Joint Compound 061804367-0059		Description 2nd Floor - GWB and T and Joint Homogeneity Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Tan		20.00% Ca Carbonate 79.50% Non-fibrous (other)	0.50% Chrysotile
No tape layer present in sample.					
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 22A-Gypsum Wallboard 061804367-0059A		Description 2nd Floor - GWB and T and Joint Homogeneity Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Gray	10.00% Cellulose	50.00% Gypsum 40.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 22B-Joint Compound 061804367-0060		Description 2nd Floor - GWB and T and Joint Homogeneity Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Tan		30.00% Ca Carbonate 70.00% Non-fibrous (other)	<1% Chrysotile
No tape layer present in sample.					
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed
Sample ID 22B-Gypsum Wallboard 061804367-0060A		Description 2nd Floor - GWB and T and Joint Homogeneity Homogeneous			
PLM NYS 198.1 Friable	3/12/2018	Gray	10.00% Cellulose	50.00% Gypsum 40.00% Non-fibrous (other)	None Detected
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed



EMSL Analytical, Inc.

528 Mineola Avenue, Carle Place, NY 11514

Phone/Fax: (516) 997-7251 / (516) 997-7528

<http://www.EMSL.com>

carleplacelab@emsl.com


EMSL Order: 061804367

CustomerID: H2ML50

CustomerPO: MKIV1801

ProjectID:

Test Report: Asbestos Analysis of Bulk Material

Test	Color	Non Asbestos		Asbestos
		Fibrous	Non-Fibrous	
Analyst(s)				
<u>Alyssa McDonald</u>				
Daniel Clarke				
Jackson Li				
				
				Michelle McGowan, Laboratory Manager or other approved signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.

All samples examined for the presence of vermiculite when analyzed via NYS 198.1.

-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL.

EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

061804367

H2M architects + engineers

Bulk Sheet and Chain of Custody

Page 1 OF

H2M L50		Site Address 44 MAIN ST - MUTUAL STATION		Date Submitted: 3-5-18	
Address: 538 Broad Hollow Road 4 th Floor East Melville, NY 11747		Work Area ENTIRE		Turn Around Time: 1 WEEK	
		Fax Results to:		E-mail Results to: KVanderSchuyt@H2M.com	
Analytical Procedure: (Circle One)		NY ELAP Method 198.1 (friable in NY)		NY ELAP Method 198.6 (non-friable in NY)	
		NY ELAP Method 198.4 (REM)		Billing # MK1V1801	
Sample Number	Location	Sample Description	Comments		
1 A	ROOF	MEMBRANE	B		
1 B			1		
1 C			M		
1 D			1		
1 E			T		
1 F			1		
2 A		FLASHING			
2 B					
3 A		CAULK	H2AC		
3 B			2018 MAR -5		
4 A	EXTERIOR	DOOR CAULK	RECEIVED		
4 B			ANALYTICAL, INC.		
5 A	INTERIOR 1ST	GLAZE BLOCK MORT	REPLACE, NY		
5 B			12:10		
5 C					
6 A		CMU BLOCK MORT			
6 B					
6 C					
7 A	DISPATCH OFF	2X2 CEILING TILE	NEW		
7 B			1		
7 C			OLD		
7 D			1		
8 A		PIPE LAGGING			
8 B					
8 C					
Relinquished by (signature) [Signature]		Date 3/5/18	Time	Received by (signature) [Signature]	
Relinquished by (signature)		Date	Time	Received by (signature)	
				Date Agent of: 3/15/18 EMSL	

Auppa McDonald 3/12/18

061804367

H2M architects + engineers

Bulk Sheet and Chain of Custody

Page 2 OF 2

H2M L50		Site Address 99 MAIN ST - MUTUAL STATION		Date Submitted: 3-3-18	
Address: 538 Broad Hollow Road 4 th Floor East Melville, NY 11747		Work Area ENTIRE		Turn Around Time: 1 WEEK	
		Fax Results to:		E-mail Results to: KVanderSchuyt@H2M.com	
Analytical Procedure: (Circle One)		NY-ELAP Method 198.1 (friable in NY)		NY-ELAP Method 198.6 (non-friable-NY)	
		NY-ELAP Method 198.4 (TEM)		Billing # MKIV1801	
Sample Number	Location	Sample Description	Comments		
9 A	INTERIOR 1 st - DISPATCH	PIPE FITTING			
9 B					
9 C					
10 A	BATHROOM	WALL TILE GROUT			
10 B					
11 A		FLOOR TILE GROUT			
11 B					
12 A	CAPT. OFFICE	2x4 LEICING TILE			
12 B					
13 A		CARPET MASTIC			
13 B					
14 A	2ND FLOOR - BAR	FLOOR TILE GROUT			
14 B					
15 A	MEMBER RM	CEILING TILE	2x2 - TYPE 2		
15 B					
16 A	MEETING RM		2x2 - TYPE 1		
16 B					
17 A			1x1		
17 B					
18 A	2ND FLOOR	9x9 FLOOR TILE	GREEN BOTTOM		
18 B					
18 C		12x12 FLOOR	TAN		
18 D					
18 E			ORANGE		
18 F					
Relinquished by (signature) M. K. Kono		Date 3/5/18	Time	Received by (signature) 3-5-18	Agent of EMSL
Relinquished by (signature)		Date	Time	Received by (signature)	Agent of

Alyssa McDonald 3/12/18

TEM - 3/12/18

EMSL 528 Mineola Ave, Carle Place, NY 11514 Phone (516) 997-7251 Fax (516) 997-7528

061804367

H2M architects + engineers

Bulk Sheet and Chain of Custody

Page 3 OF 3

H2M L50		Site Address 99 MAIN ST - MUTUAL STATION		Date Submitted: 3-5-18							
Address: 538 Broad Hollow Road 4 th Floor East Melville, NY 11747		Work Area ENTIRE		Turn Around Time: 1 WEEK							
		Fax Results to:		E-mail Results to: KVanderSchuyt@H2M.com							
Analytical Procedure: (Circle One)		NY ELAP Method 198.1 (friable in NY)		NY ELAP Method 198.6 (non-friable-NY)							
		NY ELAP Method 198.4 (TEM)		Billing # MKIV1801							
Sample Number	Location	Sample Description		Comments							
19 A	2ND FLOOR	MASTIC		9x9							
19 B				1							
19 C				12x12							
19 D				,							
20 A		COVE BASE									
20 B		1									
21 A		CB MASTIC									
21 B		1									
22 A		GWB + T + JOINT		WALL FLANGE							
22 B				1							
* STOP @ 1 ST / ANALYZE LAYERS											
<div style="position: absolute; right: 0; bottom: 0; transform: rotate(-90deg); transform-origin: right bottom;"> RECEIVED EMSL ANALYTICAL, INC. CARLE PLACE, NY 2018 MAR - 5 P 12:10 </div>											
Relinquished by (signature) <i>[Signature]</i>		Date 3/5/18	Time	Received by (signature) <i>[Signature]</i>							
Relinquished by (signature)		Date	Time	Received by (signature)							
				Date 3/12/18							
				Agent of: EMSL							

Amy McDonald 3/12/18
TEM - 3/12/18

EMSL 528 Mineola Ave, Carle Place, NY 11514 Phone (516) 997-7251 Fax (516) 997-7528



ATTACHMENT 2

H2M'S PERSONNEL LICENSES AND CERTIFICATIONS

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

H2M Architects, Engineers, Land Surveying and
Landscape Architecture, D.P.C.
4th Floor East
538 Broad Hollow Road
Melville, NY 11747

FILE NUMBER: 00-0724
LICENSE NUMBER: 28582
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 11/09/2017
EXPIRATION DATE: 11/30/2018

Duly Authorized Representative – Debra Mattina:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.



Eileen M. Franko, Director
For the Commissioner of Labor

01213 004527481 87

EYES BRO
HAIR BRO
HGT 6' 01"

IF FOUND RETURN TO:
NYS DOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



KYLE P VANDERSCHUYT
CLASS(EXPIRES)
C ATEC(09/18) D INSP(09/18)
H PM (09/18)

CERT# 12-11293
DMV# 879283550

MUST BE CARRIED ON ASBESTOS PROJECTS



STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



MELISSA L FARINA

CLASS(EXPIRES)

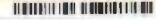
C ATEC(11/18) D INSP(11/18)

H PM (11/18)

CERT# 16-15108

DMV# 493769447

MUST BE CARRIED ON ASBESTOS PROJECTS





ATTACHMENT 3

EMSL'S CERTIFICATIONS

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. MICHELLE MCGOWAN
EMSL ANALYTICAL, INC.
528 MINEOLA AVE.
CARLE PLACE, NY 11514

NY Lab Id No: 11469

*is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:*

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 7000B

Sample Preparation Methods

EPA 3051A

Serial No.: 56030

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

MS. MICHELLE MCGOWAN
EMSL ANALYTICAL, INC.
528 MINEOLA AVE.
CARLE PLACE, NY 11514

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:

Lead, Total NIOSH 7082

Asbestos	40 CFR 763 APX A No. III YAMATE, AGARWAL GIBB NIOSH 7402
Fibers	NIOSH 7400 A RULES

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's participation status.

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-10

EMSL Analytical, Inc.
Carle Place, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2017-07-01 through 2018-06-30

Effective Dates



Peter S. Herman
For the National Voluntary Laboratory Accreditation Program



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL Analytical, Inc.
528 Mineola Ave.
Carle Place, NY 11514
Ms. Michelle McGowan
Phone: 516-997-7251 Fax: 516-997-7528
Email: mmcgowan@emsl.com
<http://www.emsl.com>

ASBESTOS FIBER ANALYSIS

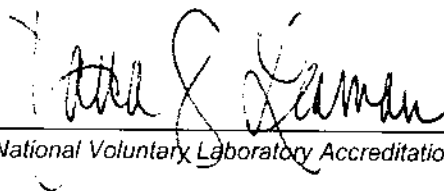
NVLAP LAB CODE 101048-10

Bulk Asbestos Analysis

<u>Code</u>	<u>Description</u>
18/A01	EPA -- Appendix E to Subpart E of Part 763 -- Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

<u>Code</u>	<u>Description</u>
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.


For the National Voluntary Laboratory Accreditation Program



ATTACHMENT 4

PHOTOGRAPHIC DOCUMENTATION



99 Main Street, Mount Kisco, New York- Mutual Station



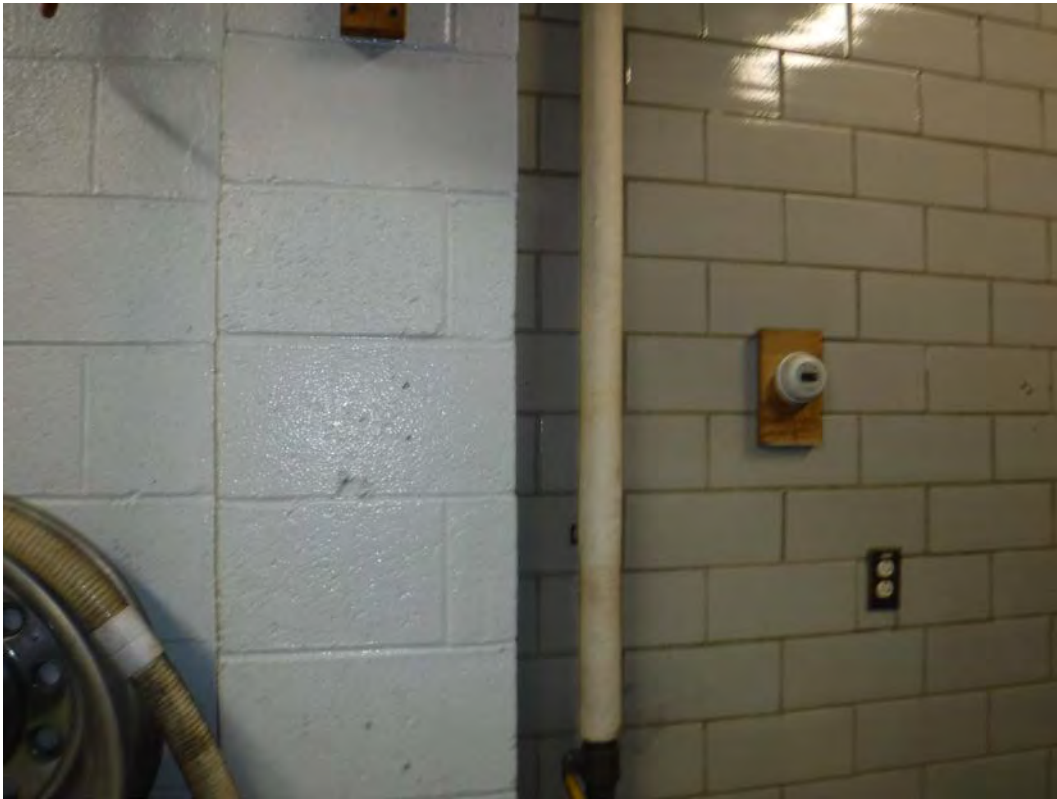
Exterior- non-asbestos containing door caulk



Non-asbestos containing roof membrane and flashing



Non-asbestos containing roof caulk



Interior- non-asbestos containing CMU block mortar and glass block mortar



Interior, 1st floor, dispatcher's office- non-asbestos containing 2'x2' ceiling tile



Interior, 1st floor, dispatcher's office closet- asbestos containing pipe lagging and fitting



Interior- non-asbestos containing wall tile and floor tile grout



Interior, captain's office- non-asbestos containing 2'x4' ceiling tile



Interior, captain's office- non-asbestos containing carpet mastic



Interior, 2nd floor, bar- non-asbestos containing floor tile grout



Interior, 2nd floor- asbestos containing floor tile



Interior, 2nd floor- non-asbestos containing ceiling tile



Interior, 2nd floor- non-asbestos containing cove base and associated mastic



Interior, 2nd floor- non-asbestos containing wallboard, tape, and joint compound



ATTACHMENT 5

LEAD INSPECTION REPORT



TESTING MECHANICS CORP.
ENVIRONMENTAL TESTING AND MONITORING
3770 Merrick Rd. Seaford LI New York 11783 (516) 221-3800

Testing Mechanics Corporation

Job Number: 18-134
Project Number: 269
Client Number: 05-1011

REPORT OF LEAD BASED PAINT XRF TESTING

FOR

H2M ARCHITECTS + ENGINEERS
290 BROAD HOLLOW ROAD
SUITE 400E
MELVILLE, NEW YORK 11747

AT

99 MAIN STREET
MOUNT KISCO, NEW YORK, 10549
(MUTUAL)

(This report contains a total of thirty-two (32) Pages)

March 13, 2018

TABLE OF CONTENTS

1.0	BACKGROUND:	1
2.0	SAMPLING PROTOCOL:	1
3.0	GUIDELINES/REGULATORY PUBLICATIONS:	2
4.0	RESULTS:	3
4.1	XRF CALIBRATION CHECKS:	3
4.2	FUNCTIONAL AREA SUMMARY:	4
4.3	XRF RESULTS - ALL DATA - BY LOCATION:	5
4.4	XRF RESULTS - LEAD BASED PAINT - BY LOCATION:	13
4.5	XRF RESULTS - LEAD BASED PAINT - BY COMPONENT:	15
5.0	NOTEWORTH COMMENTS:	17
6.0	CERTIFICATIONS AND SIGNATURES:	18
Appendix A	Floor Diagrams	
Appendix B	Licenses and Certifications	
Appendix C	Photographs	

CLIENT: H2M architects + engineers
290 Broad Hollow Road
Suite 400E
Melville, New York 11747

MATERIAL: Lead in paint testing

SAMPLING ADDRESS: 99 Main Street
Mount Kisco, New York, 10549
(Mutual)

DATE(S) OF TESTING: March 9, 2018

1.0 **BACKGROUND:**

Testing Mechanics Corporation performed lead based paint XRF testing at 99 Main Street Mount Kisco, New York, 10549 (Mutual) on March 9, 2018. The testing was performed by an EPA/New York State Certified Lead Based Paint Inspector.

All sample locations were chosen at random. This report is based only on conditions at the time the testing was conducted.

2.0 **SAMPLING PROTOCOL:**

The instrument utilized for the lead based paint testing is the LPA-1 Lead Paint Analyzer. The LPA-1 has two different modes of operation, the "Standard Mode" and the "Quick Mode". In Standard Mode, the user chooses the length of time of the measurement. In Quick Mode, the measurement time is determined by the LPA-1 Analyzer to achieve a 95% confidence measurement compared to an action level (1.0 mg/cm^2). Standard Mode is most useful in situations where the user may want a longer reading than may be required to validate a positive or negative lead condition. Since the Quick Mode can achieve the HUD required statistical confidence level of 95% in generally a much shorter time and with less chance of error, since calculations for such factors as the substrate material, action level, and age of the radioactive source, are being made automatically by the LPA-1, the Quick Mode has been utilized for this project. Results of any measurement made in this mode are reported as either Positive, Negative, or Inconclusive lead levels. Sample locations were selected at random, based on the most convenient area to obtain a sample.

3.0 GUIDELINES/REGULATORY PUBLICATIONS:

The “Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing” (“The Guidelines”) were issued pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, which is often referred to as Title X (“Title Ten”) because it was enacted as Title X of the Housing and community Development Act of 1992 (Public Law 102-550). The Guidelines are based on the concepts, definitions, and requirements set forth in Title X.

The Guidelines are not enforceable by law unless a Federal, State, or local statute or regulation requires that certain parts of the Guidelines be followed.

HUD prepared the Guidelines in close consultation with EPA, CDC, OSHA, and several other Federal agencies.

Title X redefines the concept of “lead-based paint hazards”. Under prior Federal legislation, a lead-based paint hazard was any paint with more than 1 mg/cm² of lead, regardless of paint condition or location. Title X states that a lead-based paint hazard is **“any condition that causes exposure to lead that would result in adverse human health effects”** and that comes from:

- Lead-contaminated dust
- Bare, lead-contaminated soil
- Lead-contaminated paint that is deteriorated or present on accessible surfaces, friction surfaces, or impact surfaces.

4.0 RESULTS:**4.1 XRF Calibration Checks:**

CALIBRATION "IN" RESULTS		
DATE: March 9, 2018		
CALIBRATION STANDARD	RESULT	INTERPRETATION
CALIBRATION CHECK - NIST BLOCK	1.0	ACCEPTABLE
CALIBRATION CHECK - NIST BLOCK	1.0	ACCEPTABLE
CALIBRATION CHECK - NIST BLOCK	1.0	ACCEPTABLE
CALIBRATION CHECK - BLANK	0.0	ACCEPTABLE
CALIBRATION CHECK - BLANK	0.0	ACCEPTABLE
CALIBRATION CHECK - BLANK	0.0	ACCEPTABLE
CALIBRATION "OUT" RESULTS		
CALIBRATION STANDARD	RESULT	INTERPRETATION
CALIBRATION CHECK - NIST BLOCK	0.9	ACCEPTABLE
CALIBRATION CHECK - NIST BLOCK	1.0	ACCEPTABLE
CALIBRATION CHECK - NIST BLOCK	1.0	ACCEPTABLE
CALIBRATION CHECK - BLANK	0.0	ACCEPTABLE
CALIBRATION CHECK - BLANK	0.0	ACCEPTABLE
CALIBRATION CHECK - BLANK	0.0	ACCEPTABLE

4.2 Functional Area Summary:

Sketches of the building were generated, and each individual area was given a four digit identification number. The first digit represents the story level. The following three digits represent a sequential space number, allowing for 999 potential spaces for each level. These numbers were chosen at random.

The following chart identifies space identification numbers and a common name, if applicable, for the space:

Floor	Room I.D. Number	Room I.D. Number
1	1001	Lobby & Staircase
1	1002	Apparatus Bay
1	1003	Office
1	1004	Under Stairs
1	1005	Bathroom
1	1006	Mechanical Equipment Room
1	1007	Laundry Room
1	1008	Office
1	1009	Storage Room
2	2001	Lobby & Staircase
2	2002	Meeting Room
2	2003	Men's Bathroom
2	2004	Women's Bathroom
2	2005	Kitchen
2	2006	Pantry
2	2007	Member Room
2	2008	Storage Room
2	2008	Storage Room
2	2009	Storage Room
2	2010	Staircase
---	EXT	Exterior

4.3 XRF RESULTS - ALL DATA - BY LOCATION:

The following results were obtained from our tests. Walls are labeled A through D with wall "A" being the wall representative of the front entrance to the building. Subsequent walls are labeled "B, C and D" clockwise.

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
1	1	1001	Lobby & Staircase	A	Wall	Intact	Ceramic	Grey	3.2	Lead Based Glazing or Pigmentation
2	1	1001	Lobby & Staircase	B	Wall	Intact	Ceramic	Grey	4.3	Lead Based Glazing or Pigmentation
3	1	1001	Lobby & Staircase	C	Wall	Intact	Ceramic	Grey	5.2	Lead Based Glazing or Pigmentation
4	1	1001	Lobby & Staircase	D	Wall	Intact	Ceramic	Grey	3.8	Lead Based Glazing or Pigmentation
5	1	1001	Lobby & Staircase	A	Door		Metal	Grey	0.0	Not Lead Based Paint
6	1	1001	Lobby & Staircase	A	Door Casing		Metal	Grey	-0.1	Not Lead Based Paint
7	1	1001	Lobby & Staircase	A	Stair Stringer	Intact	Metal	Grey	1.8	Lead Based Paint
8	1	1001	Lobby & Staircase	B	Radiator Cover		Metal	Grey	-0.2	Not Lead Based Paint
9	1	1001	Lobby & Staircase	D	Door		Metal	Brown	-0.0	Not Lead Based Paint
10	1	1001	Lobby & Staircase	D	Door Frame		Metal	Brown	0.1	Not Lead Based Paint
11	1	1001	Lobby & Staircase	C	Ceiling		Drywall	White	-0.3	Not Lead Based Paint
12	1	1001	Lobby & Staircase	C	Newell Post	Intact	Metal	Grey	3.2	Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
13	1	1001	Lobby & Staircase	C	Bannister	Intact	Metal	Grey	3.6	Lead Based Paint
14	1	1002	Apparatus Bay	A	Wall	Intact	Ceramic	Grey	3.1	Lead Based Glazing or Pigmentation
15	1	1002	Apparatus Bay	D	Wall	Intact	Ceramic	Grey	3.4	Lead Based Glazing or Pigmentation
16	1	1002	Apparatus Bay	B	Wall		Cinderblock	Grey	0.3	Not Lead Based Paint
17	1	1002	Apparatus Bay	C	Wall	Intact	Ceramic	Grey	3.2	Lead Based Glazing or Pigmentation
18	1	1002	Apparatus Bay	D	Floor		Concrete	Grey	-0.3	Not Lead Based Paint
19	1	1002	Apparatus Bay	A	Ceiling		Drywall	White	0.0	Not Lead Based Paint
20	1	1002	Apparatus Bay	C	Ceiling		Drywall	White	0.1	Not Lead Based Paint
21	1	1002	Apparatus Bay	A	Door Casing		Wood	Grey	0.2	Not Lead Based Paint
22	1	1002	Apparatus Bay	A	Door		Metal	White	-0.0	Not Lead Based Paint
23	1	1002	Apparatus Bay	A	Wall		Cinderblock	Grey	0.2	Not Lead Based Paint
24	1	1002	Apparatus Bay	B	Wall		Cinderblock	Grey	0.4	Not Lead Based Paint
25	1	1002	Apparatus Bay	A	Door		Metal	Grey	-0.2	Not Lead Based Paint
26	1	1002	Apparatus Bay	A	Door Casing		Metal	Grey	-0.3	Not Lead Based Paint
27	1	1003	Office	B	Wall		Drywall	Tan	-0.0	Not Lead Based Paint
28	1	1003	Office	D	Wall		Drywall	Tan	0.1	Not Lead Based Paint
29	1	1003	Office	C	Wall		Wood	Tan	0.0	Not Lead Based Paint
30	1	1003	Office	A	Door		Metal	Grey	0.1	Not Lead Based Paint
31	1	1003	Office	A	Door Casing		Metal	Grey	0.2	Not Lead Based Paint
32	1	1003	Office	C	Crown Molding		Wood	Brown	0.2	Not Lead Based Paint
33	1	1003	Office	C	Baseboard		Wood	Brown	0.1	Not Lead Based Paint
34	1	1004	Under Stairs	C	Support Column	Intact	Metal	Grey	1.8	Lead Based Paint
35	1	1004	Under Stairs	C	Ceiling	Intact	Metal	Grey	2.6	Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
36	1	1004	Under Stairs	D	Under Side of Stairs	Intact	Metal	Grey	3.2	Lead Based Paint
37	1	1004	Under Stairs	B	Floor		Concrete	White	0.4	Not Lead Based Paint
38	1	1004	Under Stairs	B	Door		Metal	Grey	-0.3	Not Lead Based Paint
39	1	1004	Under Stairs	B	Door Casing		Metal	Grey	-0.1	Not Lead Based Paint
40	1	1004	Under Stairs	B	Electric Box		Metal	Grey	-0.0	Not Lead Based Paint
41	1	1005	Bathroom	A	Wall		Ceramic	Grey	0.3	Not Lead Based Paint
42	1	1005	Bathroom	B	Wall		Ceramic	Grey	0.2	Not Lead Based Paint
43	1	1005	Bathroom	C	Wall		Ceramic	Grey	0.3	Not Lead Based Paint
44	1	1005	Bathroom	D	Wall		Ceramic	Grey	0.3	Not Lead Based Paint
45	1	1005	Bathroom	A	Door		Metal	Grey	-0.3	Not Lead Based Paint
46	1	1005	Bathroom	A	Door Casing		Metal	Grey	0.2	Not Lead Based Paint
47	1	1005	Bathroom	B	Toilet		Ceramic	White	0.3	Not Lead Based Paint
48	1	1005	Bathroom	B	Urinal	Intact	Ceramic	White	6.2	Lead Based Glazing or Pigmentation
49	1	1005	Bathroom	B	Sink	Intact	Ceramic	White	1.6	Lead Based Glazing or Pigmentation
50	1	1005	Bathroom	D	Floor		Ceramic	Blue	0.2	Not Lead Based Paint
51	1	1005	Bathroom	B	Stall Divider		Metal	Grey	0.3	Not Lead Based Paint
52	1	1005	Bathroom	C	Radiator	Intact	Metal	Grey	1.6	Lead Based Paint
53	1	1005	Bathroom	D	Ceiling		Drywall	Grey	0.1	Not Lead Based Paint
54	1	1006	Mechanical Equipment Room	A	Door		Metal	Grey	0.2	Not Lead Based Paint
55	1	1006	Mechanical Equipment Room	A	Door Casing		Metal	Grey	0.1	Not Lead Based Paint
56	1	1006	Mechanical Equipment Room	B	Boiler		Metal	Tan	-0.4	Not Lead Based Paint
57	1	1007	Laundry Room	A	Door		Metal	Grey	0.1	Not Lead Based Paint
58	1	1007	Laundry Room	A	Door Casing		Metal	Grey	0.2	Not Lead Based Paint
59	1	1007	Laundry Room	B	Wall		Cinderblock	White	-0.1	Not Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
60	1	1007	Laundry Room	C	Floor		Concrete	Grey	0.4	Not Lead Based Paint
141	1	1008	Office	C	Door		Metal	Grey	0.1	Not Lead Based Paint
142	1	1008	Office	C	Door Casing		Metal	Grey	-0.1	Not Lead Based Paint
143	1	1008	Office	B	Wall		Wood	Red	0.0	Not Lead Based Paint
144	1	1008	Office	B	Baseboard		Wood	White	-0.2	Not Lead Based Paint
145	1	1008	Office	D	Wall		Cinderblock	Blue	0.1	Not Lead Based Paint
146	1	1008	Office	B	I Beam		Metal	Red	0.0	Not Lead Based Paint
147	1	1008	Office	C	Wall		Wood	Red	-0.1	Not Lead Based Paint
148	1	1009	Storage Room	A	Wall		Cinderblock	Grey	0.2	Not Lead Based Paint
149	1	1009	Storage Room	B	Wall		Cinderblock	Grey	0.1	Not Lead Based Paint
150	1	1009	Storage Room	C	Wall		Cinderblock	Grey	0.1	Not Lead Based Paint
151	1	1009	Storage Room	D	Wall		Cinderblock	Grey	-0.2	Not Lead Based Paint
152	1	1009	Storage Room	C	Ceiling Duct		Metal	Grey	0.3	Not Lead Based Paint
153	1	1009	Storage Room	C	I Beam		Metal	Grey	0.2	Not Lead Based Paint
154	1	1009	Storage Room	C	Ceiling Q Deck		Metal	Grey	0.3	Not Lead Based Paint
155	1	1009	Storage Room	A	Door		Metal	Grey	0.3	Not Lead Based Paint
156	1	1009	Storage Room	A	Door Casing		Metal	Grey	0.2	Not Lead Based Paint
61	2	2001	Lobby & Staircase	A	Wall		Wood	Grey	0.1	Not Lead Based Paint
62	2	2001	Lobby & Staircase	D	Wall		Wood	Grey	0.0	Not Lead Based Paint
63	2	2001	Lobby & Staircase	D	Radiator		Metal	Grey	0.4	Not Lead Based Paint
64	2	2001	Lobby & Staircase	A	Door		Wood	Grey	0.3	Not Lead Based Paint
65	2	2001	Lobby & Staircase	A	Door Casing		Wood	Grey	0.2	Not Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
66	2	2002	Meeting Room	C	Radiator Cover		Metal	Brown	0.1	Not Lead Based Paint
67	2	2002	Meeting Room	C	Door		Metal	Brown	0.3	Not Lead Based Paint
68	2	2002	Meeting Room	C	Door Casing		Metal	Brown	0.2	Not Lead Based Paint
69	2	2002	Meeting Room	C	Door		Metal	Brown	0.2	Not Lead Based Paint
70	2	2002	Meeting Room	C	Door Casing		Metal	Brown	0.2	Not Lead Based Paint
71	2	2002	Meeting Room	C	Door		Metal	White	0.3	Not Lead Based Paint
72	2	2002	Meeting Room	C	Door Casing		Metal	Brown	0.2	Not Lead Based Paint
73	2	2002	Meeting Room	B	Door		Metal	Brown	0.3	Not Lead Based Paint
74	2	2002	Meeting Room	B	Door Casing		Metal	Brown	0.3	Not Lead Based Paint
75	2	2002	Meeting Room	B	Door		Metal	Brown	0.2	Not Lead Based Paint
76	2	2002	Meeting Room	B	Door Casing		Metal	Brown	0.1	Not Lead Based Paint
77	2	2002	Meeting Room	B	Radiator		Metal	Brown	0.3	Not Lead Based Paint
78	2	2002	Meeting Room	A	Radiator		Metal	Brown	0.2	Not Lead Based Paint
79	2	2002	Meeting Room	A	Window Frame		Metal	Black	0.1	Not Lead Based Paint
80	2	2002	Meeting Room	A	Window Sash		Metal	Black	0.3	Not Lead Based Paint
81	2	2003	Men's Bathroom	D	Lower Wall		Drywall	Grey	0.1	Not Lead Based Paint
82	2	2003	Men's Bathroom	D	Upper Wall		Ceramic	Grey	0.0	Not Lead Based Paint
83	2	2003	Men's Bathroom	B	Toilet		Ceramic	White	0.4	Not Lead Based Paint
84	2	2003	Men's Bathroom	B	Urinal		Ceramic	White	0.4	Not Lead Based Paint
85	2	2003	Men's Bathroom	C	Sink	Intact	Ceramic	White	>9.9	Lead Based Glazing or Pigmentation
86	2	2003	Men's Bathroom	C	Radiator Cover		Metal	Grey	-0.3	Not Lead Based Paint
87	2	2003	Men's Bathroom	B	Stall Divider		Metal	Grey	0.2	Not Lead Based Paint
88	2	2003	Men's Bathroom	D	Floor		Ceramic	Blue	0.4	Not Lead Based Paint
89	2	2003	Men's Bathroom	A	Door		Metal	Grey	-0.0	Not Lead Based Paint
90	2	2003	Men's Bathroom	A	Door Casing		Metal	Grey	-0.1	Not Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
91	2	2004	Women's Bathroom	A	Wall		Drywall	Yellow	-0.1	Not Lead Based Paint
92	2	2004	Women's Bathroom	B	Wall		Drywall	Yellow	0.0	Not Lead Based Paint
93	2	2004	Women's Bathroom	C	Wall		Drywall	Yellow	-0.0	Not Lead Based Paint
94	2	2004	Women's Bathroom	D	Wall		Drywall	Yellow	0.0	Not Lead Based Paint
95	2	2004	Women's Bathroom	B	Sink		Ceramic	White	0.3	Not Lead Based Paint
96	2	2004	Women's Bathroom	B	Toilet		Ceramic	White	0.4	Not Lead Based Paint
97	2	2004	Women's Bathroom	B	Stall Divider		Metal	Yellow	0.3	Not Lead Based Paint
98	2	2004	Women's Bathroom	B	Cove Base		Ceramic	Yellow	0.3	Not Lead Based Paint
99	2	2004	Women's Bathroom	A	Door		Metal	Brown	0.3	Not Lead Based Paint
100	2	2004	Women's Bathroom	A	Door Casing		Metal	Brown	0.2	Not Lead Based Paint
101	2	2004	Women's Bathroom	D	Floor		Ceramic	Yellow	0.3	Not Lead Based Paint
102	2	2005	Kitchen	A	Wall		Drywall	Green	0.1	Not Lead Based Paint
103	2	2005	Kitchen	B	Wall		Drywall	Green	0.2	Not Lead Based Paint
104	2	2005	Kitchen	C	Wall		Plaster	Green	-0.4	Not Lead Based Paint
105	2	2005	Kitchen	D	Wall		Plaster	Green	-0.3	Not Lead Based Paint
106	2	2005	Kitchen	C	Cabinet		Wood	Yellow	0.5	Not Lead Based Paint
107	2	2005	Kitchen	A	Door		Metal	Yellow	0.1	Not Lead Based Paint
108	2	2005	Kitchen	A	Door Casing		Metal	Yellow	0.2	Not Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
109	2	2005	Kitchen	B	Radiator Cover		Metal	Green	0.1	Not Lead Based Paint
110	2	2006	Pantry	A	Wall		Drywall	Grey	0.1	Not Lead Based Paint
111	2	2006	Pantry	B	Wall		Drywall	Grey	0.0	Not Lead Based Paint
112	2	2006	Pantry	C	Wall		Drywall	Grey	-0.1	Not Lead Based Paint
113	2	2006	Pantry	D	Wall		Drywall	Grey	0.0	Not Lead Based Paint
114	2	2006	Pantry	C	Coat Rack	Intact	Wood	Green	>9.9	Lead Based Paint
115	2	2006	Pantry	B	Door		Metal	Brown	0.3	Not Lead Based Paint
116	2	2006	Pantry	B	Door Casing		Metal	Brown	0.2	Not Lead Based Paint
117	2	2007	Member Room	D	Upper Wall		Drywall	Tan	0.3	Not Lead Based Paint
118	2	2007	Member Room	D	Lower Wall		Wood	Tan	-0.2	Not Lead Based Paint
119	2	2007	Member Room	A	Radiator		Metal	Tan	0.4	Not Lead Based Paint
120	2	2007	Member Room	C	Column		Wood	Tan	0.3	Not Lead Based Paint
121	2	2007	Member Room	A	Radiator		Metal	Tan	-0.1	Not Lead Based Paint
122	2	2007	Member Room	C	Upper Wall		Drywall	Tan	0.3	Not Lead Based Paint
123	2	2007	Member Room	C	Lower Wall		Wood	Tan	-0.2	Not Lead Based Paint
124	2	2007	Member Room	B	Door		Metal	Tan	0.0	Not Lead Based Paint
125	2	2007	Member Room	B	Door Casing		Metal	Tan	-0.1	Not Lead Based Paint
126	2	2007	Member Room	B	Door		Metal	Tan	0.1	Not Lead Based Paint
127	2	2007	Member Room	B	Door Casing		Metal	Tan	-0.1	Not Lead Based Paint
128	2	2007	Member Room	B	Radiator		Metal	Tan	0.3	Not Lead Based Paint
129	2	2007	Member Room	C	Floor (Bar Area)		Slate	Blue	-0.5	Not Lead Based Paint
130	2	2008	Storage Room	D	Door		Metal	Tan	0.1	Not Lead Based Paint
131	2	2008	Storage Room	D	Door Casing		Metal	Brown	0.0	Not Lead Based Paint
132	2	2008	Storage Room	B	Roof Ladder		Metal	Red	0.5	Not Lead Based Paint
133	2	2008	Storage Room	D	I Beam		Metal	Red	0.4	Not Lead Based Paint
134	2	2009	Storage Room	A	Door		Metal	Tan	0.4	Not Lead Based Paint
135	2	2009	Storage Room	A	Door Casing		Metal	Grey	0.3	Not Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
136	2	2009	Storage Room	B	Radiator Cover		Metal	Brown	0.2	Not Lead Based Paint
137	2	2010	Staircase	B	Wall		Cinderblock	Grey	0.1	Not Lead Based Paint
138	2	2010	Staircase	D	Wall		Cinderblock	Grey	0.0	Not Lead Based Paint
139	2	2010	Staircase	B	Stair Stringer		Metal	Grey	0.3	Not Lead Based Paint
140	2	2010	Staircase	D	Stair Stringer		Metal	Grey	0.3	Not Lead Based Paint
157	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	1.9	Lead Based Paint
158	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.3	Lead Based Paint
159	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.2	Lead Based Paint
160	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.6	Lead Based Paint
161	---	EXT	Exterior	D	Door Frame	Intact	Metal	White	2.8	Lead Based Paint
162	---	EXT	Exterior	D	Door Frame	Intact	Metal	White	2.6	Lead Based Paint
163	---	EXT	Exterior	D	Wall		Concrete	Tan	0.2	Not Lead Based Paint
164	---	EXT	Exterior	A	Wall		Concrete	Tan	0.1	Not Lead Based Paint
165	---	EXT	Exterior	A	Door		Vinyl	White	0.3	Not Lead Based Paint
166	---	EXT	Exterior	A	Pipe		Metal	Grey	0.2	Not Lead Based Paint
167	---	EXT	Exterior	A	Bumper Guard	Intact	Metal	Black	3.2	Lead Based Paint
168	---	EXT	Exterior	A	Bumper Guard	Intact	Metal	Black	2.8	Lead Based Paint
169	---	EXT	Exterior	A	Door		Metal	Black	-0.0	Not Lead Based Paint
170	---	EXT	Exterior	A	Door Casing		Metal	Black	0.0	Not Lead Based Paint
171	---	EXT	Exterior	B	Wall		Concrete	Tan	-0.2	Not Lead Based Paint
172	---	EXT	Exterior	B	Fuel Oil Tank		Metal	Grey	-0.3	Not Lead Based Paint
173	---	EXT	Exterior	B	LP Tank		Metal	Green	-0.2	Not Lead Based Paint

4.4 XRF RESULTS - LEAD BASED PAINT - BY LOCATION:

The following table exhibits XRF samples obtained that were determined to be positive for Lead Based Paint. The table presents the data by location.

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
1	1	1001	Lobby & Staircase	A	Wall	Intact	Ceramic	Grey	3.2	Lead Based Glazing or Pigmentation
2	1	1001	Lobby & Staircase	B	Wall	Intact	Ceramic	Grey	4.3	Lead Based Glazing or Pigmentation
3	1	1001	Lobby & Staircase	C	Wall	Intact	Ceramic	Grey	5.2	Lead Based Glazing or Pigmentation
4	1	1001	Lobby & Staircase	D	Wall	Intact	Ceramic	Grey	3.8	Lead Based Glazing or Pigmentation
7	1	1001	Lobby & Staircase	A	Stair Stringer	Intact	Metal	Grey	1.8	Lead Based Paint
12	1	1001	Lobby & Staircase	C	Newell Post	Intact	Metal	Grey	3.2	Lead Based Paint
13	1	1001	Lobby & Staircase	C	Bannister	Intact	Metal	Grey	3.6	Lead Based Paint
14	1	1002	Apparatus Bay	A	Wall	Intact	Ceramic	Grey	3.1	Lead Based Glazing or Pigmentation
15	1	1002	Apparatus Bay	D	Wall	Intact	Ceramic	Grey	3.4	Lead Based Glazing or Pigmentation
17	1	1002	Apparatus Bay	C	Wall	Intact	Ceramic	Grey	3.2	Lead Based Glazing or Pigmentation
34	1	1004	Under Stairs	C	Support Column	Intact	Metal	Grey	1.8	Lead Based Paint
35	1	1004	Under Stairs	C	Ceiling	Intact	Metal	Grey	2.6	Lead Based Paint
36	1	1004	Under Stairs	D	Under Side of Stairs	Intact	Metal	Grey	3.2	Lead Based Paint

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
48	1	1005	Bathroom	B	Urinal	Intact	Ceramic	White	6.2	Lead Based Glazing or Pigmentation
49	1	1005	Bathroom	B	Sink	Intact	Ceramic	White	1.6	Lead Based Glazing or Pigmentation
52	1	1005	Bathroom	C	Radiator	Intact	Metal	Grey	1.6	Lead Based Paint
85	2	2003	Men's Bathroom	C	Sink	Intact	Ceramic	White	>9.9	Lead Based Glazing or Pigmentation
114	2	2006	Pantry	C	Coat Rack	Intact	Wood	Green	>9.9	Lead Based Paint
157	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	1.9	Lead Based Paint
158	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.3	Lead Based Paint
159	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.2	Lead Based Paint
160	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.6	Lead Based Paint
161	---	EXT	Exterior	D	Door Frame	Intact	Metal	White	2.8	Lead Based Paint
162	---	EXT	Exterior	D	Door Frame	Intact	Metal	White	2.6	Lead Based Paint
167	---	EXT	Exterior	A	Bumper Guard	Intact	Metal	Black	3.2	Lead Based Paint
168	---	EXT	Exterior	A	Bumper Guard	Intact	Metal	Black	2.8	Lead Based Paint

4.5 XRF RESULTS - LEAD BASED PAINT - BY COMPONENT:

The following table exhibits XRF samples obtained that were determined to be positive for Lead Based Paint. The table presents the data by component type.

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
13	1	1001	Lobby & Staircase	C	Bannister	Intact	Metal	Grey	3.6	Lead Based Paint
157	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	1.9	Lead Based Paint
158	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.3	Lead Based Paint
159	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.2	Lead Based Paint
160	---	EXT	Exterior	D	Bumper Guard	Intact	Metal	Black	2.6	Lead Based Paint
167	---	EXT	Exterior	A	Bumper Guard	Intact	Metal	Black	3.2	Lead Based Paint
168	---	EXT	Exterior	A	Bumper Guard	Intact	Metal	Black	2.8	Lead Based Paint
35	1	1004	Under Stairs	C	Ceiling	Intact	Metal	Grey	2.6	Lead Based Paint
114	2	2006	Pantry	C	Coat Rack	Intact	Wood	Green	>9.9	Lead Based Paint
161	---	EXT	Exterior	D	Door Frame	Intact	Metal	White	2.8	Lead Based Paint
162	---	EXT	Exterior	D	Door Frame	Intact	Metal	White	2.6	Lead Based Paint
12	1	1001	Lobby & Staircase	C	Newell Post	Intact	Metal	Grey	3.2	Lead Based Paint
52	1	1005	Bathroom	C	Radiator	Intact	Metal	Grey	1.6	Lead Based Paint
49	1	1005	Bathroom	B	Sink	Intact	Ceramic	White	1.6	Lead Based Glazing or Pigmentation

ASSAY #	FLOOR	SPACE ID #	ROOM DESCRIPTION	WALL	COMPONENT	CONDITION	SUBSTRATE	COLOR	LEAD CONCENTRATION (MG/CM ²)	INTERPRETATION
85	2	2003	Men's Bathroom	C	Sink	Intact	Ceramic	White	>9.9	Lead Based Glazing or Pigmentation
7	1	1001	Lobby & Staircase	A	Stair Stringer	Intact	Metal	Grey	1.8	Lead Based Paint
34	1	1004	Under Stairs	C	Support Column	Intact	Metal	Grey	1.8	Lead Based Paint
36	1	1004	Under Stairs	D	Under Side of Stairs	Intact	Metal	Grey	3.2	Lead Based Paint
48	1	1005	Bathroom	B	Urinal	Intact	Ceramic	White	6.2	Lead Based Glazing or Pigmentation
1	1	1001	Lobby & Staircase	A	Wall	Intact	Ceramic	Grey	3.2	Lead Based Glazing or Pigmentation
2	1	1001	Lobby & Staircase	B	Wall	Intact	Ceramic	Grey	4.3	Lead Based Glazing or Pigmentation
3	1	1001	Lobby & Staircase	C	Wall	Intact	Ceramic	Grey	5.2	Lead Based Glazing or Pigmentation
4	1	1001	Lobby & Staircase	D	Wall	Intact	Ceramic	Grey	3.8	Lead Based Glazing or Pigmentation
14	1	1002	Apparatus Bay	A	Wall	Intact	Ceramic	Grey	3.1	Lead Based Glazing or Pigmentation
15	1	1002	Apparatus Bay	D	Wall	Intact	Ceramic	Grey	3.4	Lead Based Glazing or Pigmentation
17	1	1002	Apparatus Bay	C	Wall	Intact	Ceramic	Grey	3.2	Lead Based Glazing or Pigmentation

5.0 NOTEWORTH COMMENTS:

In the event that the on-site building is demolished in the future, the demolition debris must be tested for lead, at a minimum, utilizing the Toxicity Characteristic Leaching Procedure (TCLP). If the TCLP analysis indicates lead at a concentration of 5 mg/L or greater, then the debris must be managed as a hazardous waste in accordance with the USEPA Resource Conservation and Recovery Act (RCRA) regulations (40 CFR Parts 260 through 268) and the New York State Department of Environmental Conservation's (NYSDEC's) hazardous waste management regulations (6 NYCRR Parts 370 through 376). However, if the lead-based paint coated component is composed of metal, then the scrap metal exemption may be used and the component can be recycled in lieu of management as hazardous waste.

In the event that the on-site building is renovated in the future and will be used as a "child-occupied facility," then the requirements of USEPA's Lead-Based Paint Renovation, Repair and Painting Program Rule must be followed. In addition, if the buildings will be voluntarily abated and used as a "child-occupied facility," then the abatement work must be conducted in accordance with USEPA and HUD requirements. Also, if the buildings are sold or leased for housing, then the owner must notify the buyer or lessee of the hazards of lead-based paint in accordance with USEPA's requirements. Lastly, if the buildings will be used for HUD housing, then a certified lead Risk Assessor should be consulted to determine whether the lead-based paint identified in this report must be abated in accordance with USEPA and HUD requirements.

Whenever work is performed that disturbs paint with lead, workers must be protected in accordance with the United States Department of Labor Occupational Safety and Health Administration's (OSHA's) "Lead in Construction" Rule (29 CFR 1926.62).

EPA's Lead Renovation, Repair and Painting Rule (RRP Rule) requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their firm certified by EPA (or an EPA authorized state), use certified renovators who are trained by EPA-approved training providers and follow lead-safe work practices.

EPA's 2008 Lead-Based Paint Renovation, Repair and Painting (RRP) Rule (as amended in 2010 and 2011), aims to protect the public from lead-based paint hazards associated with renovation, repair and painting activities. These activities can create hazardous lead dust when surfaces with lead paint, even from many decades ago, are disturbed. The rule requires workers to be certified and trained in the use of lead-safe work practices, and requires renovation, repair, and painting firms to be EPA-certified. These requirements became fully effective April 22, 2010.



TESTING MECHANICS CORP.
ENVIRONMENTAL TESTING AND MONITORING
3770 Merrick Rd. Seaford LI New York 11783 (516) 221-3800

Testing Mechanics Corporation

Job Number: 18-134
Project Number: 269
Client Number: 05-1011

6.0 CERTIFICATIONS AND SIGNATURES:

We certify that this report is a true and authentic report of results obtained from our tests.

Respectfully submitted,

TESTING MECHANICS CORP.

Paul Calzolano
Technical Director

Carl Vernick, P.E.
President

Testing Mechanics Corporation is accredited by the New York State Department Of Health (Lab ID # 11018) for. TMC does not claim that The N.Y.S.D.O.H or any other agency endorses the accuracy of this report. The results contained in this report relate only to the items tested. This report shall not be reproduced except in full, without written approval of Testing Mechanics Corporation. This report may not be used by the client to claim product endorsement by the New York State D.O.H. or any other agency. Unless otherwise specified, all test items were received in an acceptable condition for analysis. Information contained herein is not to be used for reproduction except by special permission. The liability of Testing Mechanics Corporation with respect to the services charged for herein shall in no event exceed the amount of the invoice.

APPENDIX A
FLOOR DIAGRAMS

A-WALL

D-WALL

1002

B-WALL

1008

1001

1003

1005

1006

1007

1004

1009

C-WALL

TESTING MECHANICS CORPORATION

3770 MERRICK ROAD - SEAFORD, L.I, NEW YORK 11783
PHONE (516) 221-3800 FAX (516) 221-3810 E-MAIL: info@testingmechanics.com

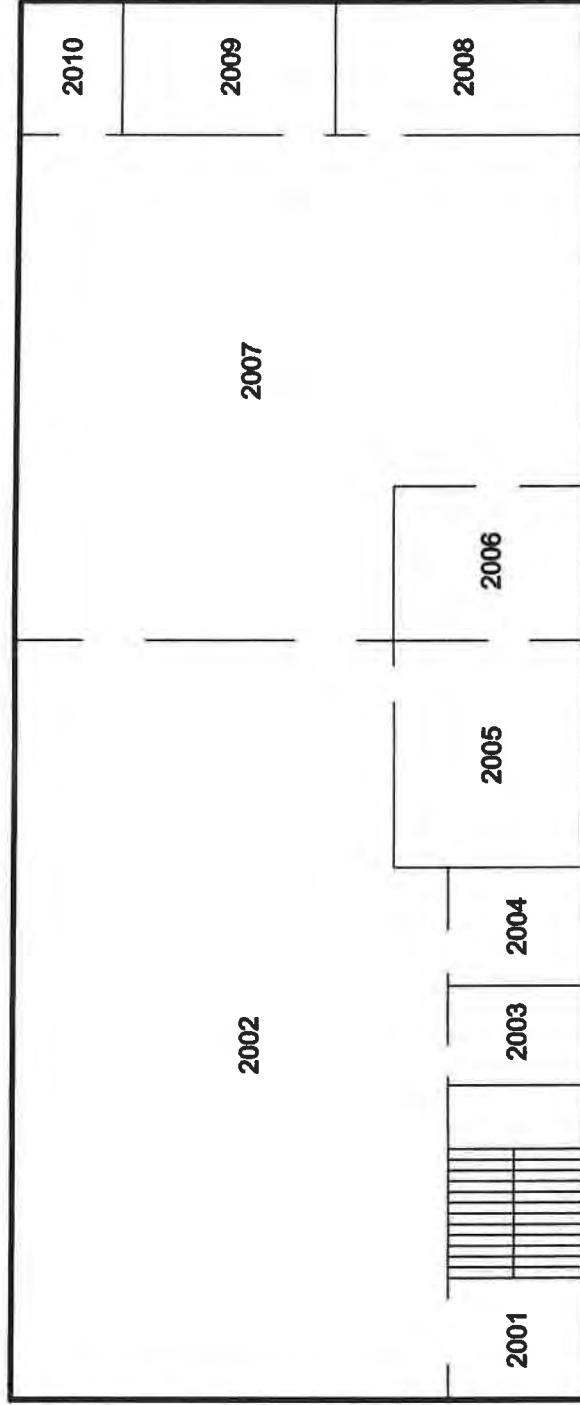
MT. KISCO FIRE DEPARTMENT MUTUAL FIREHOUSE

MT. KISCO, NEW YORK

LEAD BASED PAINT INSPECTIONS
FIRST FLOOR LEVEL

CLIENT: H2M ARCHITECTS & ENGINEERS	JMR	JOB NO. 18-134
SCALE: N.T.S.	DATE: MAR. 12, 2018	CLIENT No. 05-1011
		PROJECT NO. 269

A-WALL



C-WALL

TESTING MECHANICS CORPORATION

3770 MERRICK ROAD - SEAFORD, L.I, NEW YORK 11783
PHONE (516) 221-3800 FAX (516) 221-3810 E-MAIL: info@testingmechanics.com

MT. KISCO FIRE DEPARTMENT MUTUAL FIREHOUSE

MT. KISCO, NEW YORK

LEAD BASED PAINT INSPECTIONS
SECOND FLOOR LEVEL

CLIENT: H2M ARCHITECTS & ENGINEERS	JMR	JOB NO. 18-134
SCALE: N.T.S.	DATE: MAR. 12, 2018	CLIENT No. 05-1011
		PROJECT NO. 269

APPENDIX B

LICENSES AND CERTIFICATIONS

United States Environmental Protection Agency

This is to certify that

Joseph Anthony DeFilippis

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Risk Assessor

In the Jurisdiction of:

New York

This certification is valid from the date of issuance and expires August 16, 2018

NY-R-14035-4

Certification #

March 13, 2015

Issued On

John Gorman, Chief

Pesticides & Toxic Substances Branch

United States Environmental Protection Agency

This is to certify that

Testing Mechanics Corporation

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires October 12, 2019

LBP-10289-1

Certification #

September 13, 2016

Issued On

Michelle Price

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

APPENDIX C

PHOTOGRAPHS



Subject Property – Mutual Firehouse 99 Main Street
Mount Kisco, NY



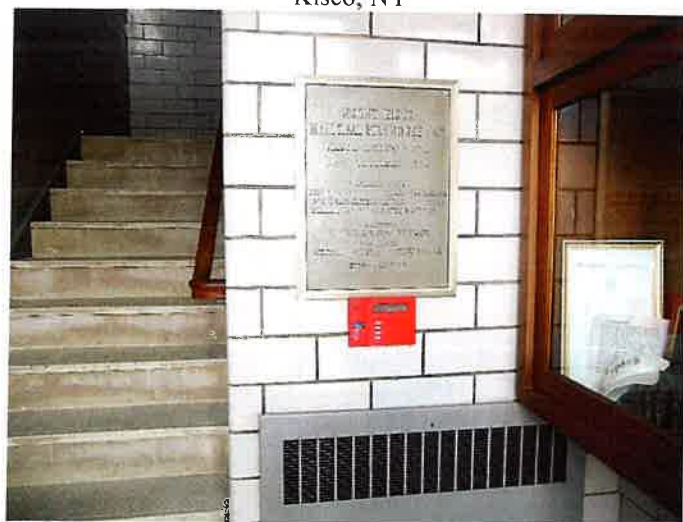
Space Identification # 1001 – assay # 7 - Staircase Stringer
(Lead Based Paint)



Subject Property – Mutual Firehouse 99 Main Street Mount
Kisco, NY



Space Identification # 1001 – Grey Metal Door and Casing



Space Identification # 1001 - assay # 1 - Grey Ceramic Wall
Tile (Lead Based Glazing)



Space Identification # 1001 – Brown Metal Door and Frame



Space Identification # 1001 – White Ceiling



Space Identification # 1002 – Apparatus Bay



Space Identification # 1002 – White Ceiling



Space Identification # 1004 – Assay # 34 - Metal Supports under Staircase (Lead Based Paint)



Space Identification # 1002 – Assay # 14 - Ceramic Wall Tile (Lead Based Glazing)



Space Identification # 1005 – Grey Metal Door and Door Casingf



Space Identification #1005 – Grey Ceramic Wall Tile



Space Identification #1005 – Blue Ceramic Floor Tile



Space Identification #1005 – assay #'s 48 & 49 - White Urinal and Sink (Lead Based Glazing)



Space Identification #1005 – assay # 52 - Grey Metal Radiator (Lead Based Paint)



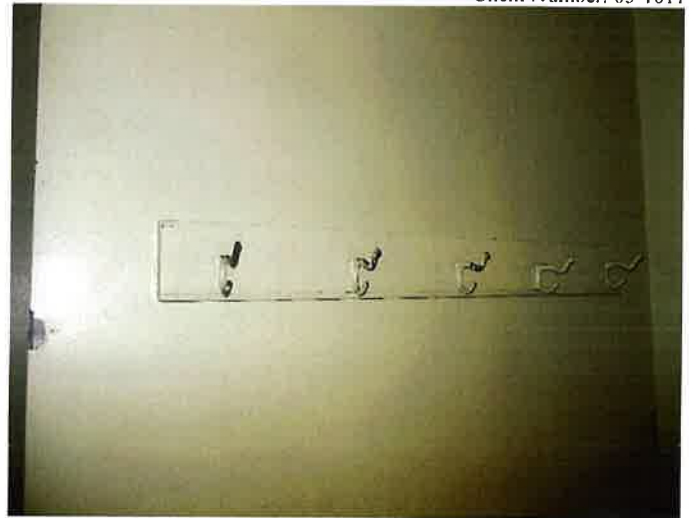
Space Identification #2002 – Meeting Room



Space Identification #2003 – assay # 85 - White Sink (Lead Based Glazing)



Space Identification #2003 - Blue Ceramic Floor Tile



Space Identification #2006 – assay # 114 - Green Wood Coat Rack (Lead Based Paint)



Space Identification #2003 – Grey Metal Radiator Cover



Exterior – White Metal Door and Tan Concrete Wall



Space Identification #2005 – Yellow Wood Cabinets



Exterior – Black Door and Door Frame



Exterior – Black Metal Corner Bumper (Lead Based Paint)



Exterior – Black Metal Corner Bumper (Lead Based Paint)



Exterior – Metal Grey Pipes



Exterior – assay # 161 - White Metal Bay Door Frame (Lead Based Paint)



Exterior – Black Metal Corner Bumper (Lead Based Paint)



Exterior – assay # 162 - White Metal Bay Door Frame (Lead Based Paint)

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes but is not limited to the following:
 - 1. Under slab on grade vapor retarder
 - 2. Crushed Stone under slabs on grade.
 - 3. Interior Catch Basins
 - 4. Concrete Formwork and Accessories
 - 5. Sleeves and Blockouts for Concrete Work
 - 6. Concrete Form Release Agent
 - 7. Waterstops in Concrete
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 033000 - Cast-in-Place Concrete
 - 2. Section 079200 - Sealants

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ACI 301 "Specifications for Structural Concrete"
- C. ACI 318 "Building Code Requirements for Structural Concrete".
- D. ASTM E96 "Standard Test Methods for Water Vapor Transmission of Materials:.
- E. 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".
- F. ASTM E1745 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data and installation instructions for the following:
 - 1. Apparatus Bay Catch Basins
 - 2. Vapor Retarders
 - 3. Concrete Form Release Agent
 - 4. Sleeves
 - 5. Waterstop
 - 6. Concrete Vertical Construction Joints
 - 7. Crushed Stone Gradation and Source
- D. Shop Drawings: Provide shop drawings for the following:
 - 1. Apparatus Bay Catch Basins.

2. Locations and details of vertical construction joints in cast-in-place concrete walls.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

PART 2 PRODUCTS

2.01 FORMWORK MATERIALS

- A. Description: In addition to ACI 301 requirements, provide forms that retain their shape and strength after exposure to severe weather conditions.

2.02 PLYWOOD FORMS

- A. Description:
 1. For natural concrete finish, smooth or rough form: APA B-B Plyform or better.

2.03 FORM ACCESSORIES

- A. Bevel (Chamfer) and Reveal (Rustication) Strips: Clear softwood, planed, not rough sawn. PVC or rubber may be used if held rigid and straight.
 1. Bevel size: 3/4 in. x 3/4 in. unless otherwise shown.
 2. Reveal size: 3/4 in. deep x 1-1/4 in. wide trapezoid at surface of concrete, unless otherwise shown.
- B. Stiffeners, Clamps, Frames, Walers, Strongbacks, Braces, Scaffolds, Ties, Bolts and Other Components of Formwork Assemblies: Provide as needed to produce formwork specified in ACI 301.
- C. Form Release Agent: Compound that will release forms without discoloring concrete, will not impart roughness of concrete and will not interfere with adhesion, color of coatings or other construction which is to be applied over concrete. Do not use oil. Agent must meet project VOC requirements.

2.04 EMBEDDED ITEMS

- A. Sleeves: Galvanized steel or plastic with wall thickness not less than 1/8 in.
- B. Block outs: Wood or rigid foam plastic; removable without damage to concrete.

2.05 SIDE FORMS

- A. Description: Use clean steel or wood forms with stakes or other supports which will withstand fluid, placing and finishing pressures without bowing, inclining or leaking.
 1. Top Edges: Smooth and straight, suitable for use as screeds in guiding strike offs without bumps or chatter.

2.06 JOINT FILLER AND SEALANT

- A. Non-extruding, Resilient, Preformed Fiber Joint Filler: Asphalt saturated cellulose fibers or cork particles encased between two (2) asphalt saturated glass felt liners.
 - 1. Cap: Provide plastic cap at top edge of joint filler strip to protect filler from dirt intrusion and as a bond breaker when sealant is applied.
 - 2. Sealant: See Section 079200 - Sealants.
 - 3. Referenced standard: ASTM D1751.
 - 4. Bond Breaker: 15 lb./sq. asphalt coated glass fiber base sheet cut in strips equal to full depth of joint.
 - a. Referenced standard for base sheet: ASTM D4601, Type I.

2.07 DRAINAGE FILL

- A. Description: 3/4 in. washed crushed stone or gravel, meeting the gradation requirements of ASTM 67 size stone, or as otherwise specified in Division 31 - Earthwork.

2.08 INTERIOR APPARATUS BAY CATCH BASINS

- A. Manufacturer: POLYDRAIN by ABT, Inc., Troutman, NC, 1-800-438-6057, or approved equivalent.
 - 1. Catch Basin No. 610 with knockouts.
 - 2. Provide galvanized steel trash bucket for each catch basin.
 - 3. Grates shall be slotted ductile iron - Class "E" Loading.

2.09 CONSTRUCTION JOINT (VERTICAL (WALL) APPLICATIONS)

- A. Key-Loc Joint System by Form-A-Key Products, Division of Cardinal Mfg. Co., Inc., Louisville, NY 40214, 502-361-1396; fax 502-363-5905 or approved equivalent.
- B. Metal keyway shall be 24-gauge galvanized steel with dowel knockouts at 6" centers.
- C. Wood forms for construction joints may be used in lieu of prefabricated metal keyways.
- D. Accessories include splice pieces, stakes and clips and stay-in-place cap Model #2137.

2.10 SLAB ON GRADE VAPOR RETARDER

- A. Slab on grade unheated slab
 - 1. Vapor Retarder
 - a. Vapor Retarder must have the following qualities:
 - 1) WVTR less than or equal to 0.006 gr/ft²/hr. as tested by ASTM E 96
 - 2) ASTM E 1745 Class A (Plastics)
 - 3) Vapor Retarder Products
 - (a) Stego Wrap (15 mil) Vapor Barrier by Stego Industries, LLC, San Juan Capistrano, CA 877-464-7834, www.stegoindustries.com .
 - (b) PERMINATOR® HP 15 mil Underslab Vapor Barrier (High Puncture Resistance) by W.R. Meadows, Inc., PO Box 338, Hampshire, IL 60140-0338 Phone: 800-342-5976
 - (c) Husky® Yellow Guard® 15 mil under slab vapor barrier by Poly-America, L.P., 2000 West Marshall Dr., Grand Prairie, TX 75051 800-527-3322
 - 4) Vapor Retarding Seam Tape
 - (a) Tape must have the following qualities:
 - (1) Water Vapor Transmission Rate: ASTM E 96 - 0.3 perms or lower
 - 5) Vapor Proofing Mastic

- (a) Mastic must have the following qualities:
 - (1) Water Vapor Transmission Rate: ASTM E 96 - 0.3 perms or lower
- 6) Pipe Boots
 - (a) Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturers' instructions.

2.11 WATERSTOP

- A. Sika Greenstreak® PVC Waterstop or Architect Approved Equivalent meeting Army Corp. of Engineers CRD-C 572-74 requirements.
 - 1. #703 6" x 3/16" ribbed with centerbulb.
 - 2. Accessories: Provide junction making material and factory formed T's, L's and X's.
- B. Hydrophilic Waterstop
 - 1. CETCO® Waterstop RX 101 or Architect Approved Equivalent.
 - 2. Adhesive: CETSEAL Sealant/Adhesive or manufacturer's recommended adhesive product.

PART 3 EXECUTION

3.01 APPARATUS BAY CATCH BASINS

- A. Catch Basins must be set to meet all tolerances as defined in Section 033500 - Concrete Finishing.
- B. Provide all required holes in catch basins for piping provided by PC.
- C. Catch Basins and encapsulating concrete should be isolated from the expansion and contraction stress of the adjacent slabs.
- D. Grout bottom of catch basin with non-shrink grout to provide positive slope to pipe invert. Grout layer to prevent any free-standing water in catch basin.

3.02 VAPOR RETARDER INSTALLATION

- A. General: Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour. Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
- B. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments (such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier). At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
- C. Lap joints 6 inches (150 mm) and tape continuously per manufacturer's installation instructions.
- D. Apply seam tape to a clean and dry vapor barrier.
- E. Seal all penetrations (including pipes) per manufacturer's instructions.
- F. Avoid the use of non-permanent stakes driven through vapor retarder. If non-permanent stakes are driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
- G. Once vapor retarder is installed limit traffic on vapor retarder to foot traffic necessary to install reinforcing, radiant tubing and concrete.

- H. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

3.03 WATERSTOP INSTALLATION

- A. PVC Waterstop:
 - 1. PVC Waterstop must be installed prior to concrete placement to ensure proper positioning and concrete consolidation around the waterstop.
 - 2. All transitions, intersections, and splices must be heat welded to maintain continuity.
 - 3. Factory made fabrications shall be used at all intersections and changes in direction.
 - 4. Support upper portion of waterstop with use of hog rings and wires to properly position the waterstop in the second pour.
 - 5. Follow waterstop manufacture's installation guidelines.
- B. Hydrophilic Waterstop;
 - 1. Install in accordance with manufacturer's installation instructions using recommended adhesive.
 - 2. Do not subject installed hydrophilic waterstop to submersion or remain in extended contact with water prior to encapsulation in concrete. If the waterstop exhibits swelling prior to encapsulation, it must be replaced with new material.

3.04 MODIFICATIONS TO ACI 301

- A. The following provisions modify (change, delete from or add to) ACI 301. Where any part of ACI 301 is modified by these provisions, the unaltered parts of ACI 301 shall remain in effect. Where "acceptable" is used or "subject to acceptance" is required in ACI 301, acceptance shall mean approval by Architect or Structural Engineer of record.
- B. Chapter 4, Formwork:
 - 1. ADD to Par. 4.1.3. Form sides of footings except in rock that has been cut to precise footing profile.
 - 2. ADD to Par. 4.2.7. Seal joints at temporary openings and between form pieces with compressible tape that will not leak grout or water; flush with exposed surface.
 - 3. ADD to Table Par. 4.3.1: 7.C. Slope toward nosing in step treads: 1/16 in. +/- 1/32 in. Treads shall not pond water at any point.
 - 4. Par. 4.4.2.1. DELETE "acceptable". No approval of form coating is required if the Specification for form release agent is met.
 - 5. ADD to Par. 4.5.5. Minimum strength of concrete in beams and slabs at time of form removal: 75% of specified f'_c as determined by cylinder compression tests. Re-shore until f'_c equals 100% of design strength.
- C. Chapter 6, Joints and Embedded Items.
 - 1. Par. 6.1.4. DELETE "When required or permitted, bond shall be obtained by ..." REPLACE with "Obtain bond by ...".
 - 2. ADD to Par. 6.2.2. When the Work is nearly complete, clean top of joint filler, install bond breaker and seal with self-leveling urethane sealant. Plastic cap at top of joint filler material may be used as bond breaker if depth of urethane will be equal to approximately half of joint width.
 - 3. ADD to Par. 6.3.2. Set waterstops in place with centerline of waterstop at centerline of joint. Secure waterstops in straight lines without twisting. Wire extreme outer edge of waterstop to reinforcing on each side, or, in the case of split flanges, nail fully spread against joint form. Carry waterstops around corners, without splicing.
 - 4. ADD to Par. 6.3.3. Use prefabricated Ts, Ls, and crosses so that all splices are butt joints.
 - 5. ADD Par. 6.3.4. Clean dust, dirt, and hardened concrete from waterstops, then vibrate fresh concrete around waterstops so that full bond with concrete is ensured, free of voids.

- D. Chapter 9, Repair of Surface Defects.
1. ADD Par. 9.1.1. Grind fins and projections as needed to allow smooth application of waterproofing and finishes.
 2. ADD Par. 9.1.2. Fill honeycomb, bugholes, and other voids or depressions as needed to allow smooth application of waterproofing and finishes.
- E. Chapter 10, Finishing of Formed Surfaces.
1. ADD to Par. 10.2.1. At surfaces to which waterproofing will be applied, provide rough form finish and prepare surface by grinding fins and projections, removing nails, and by filling honeycomb, bugholes, and other voids or depressions with firmly adhered grout.
 2. ADD to Par. 10.2.2. Provide smooth form finish at exposed surfaces, whether or not shown to receive architectural finish.
 3. ADD to Par. 10.4.2. In addition to walls, columns, ceilings, and soffits generally, surfaces exposed to public view include, but are not limited to, surfaces such as walls of interior and exterior stairways, elevator hoist ways, walls and ceilings in spaces or tunnels with 6 ft or greater headroom, and backs of parapet walls. Surfaces which will receive furring, contact plaster, or suspended ceiling are not exposed surfaces.
- F. Chapter 11, Slabs.
1. ADD to Par. 11.2.1. Place interior slabs on ground over a subbase course of drainage fill that has been compacted to a thickness of at least 8 in., or as indicated in drawings, whichever is greater.
 2. ADD the following to Par. 11.2:
 - a. 11.2.4 Place and seal vapor retarder under base course or other substrate.
 - b. 11.2.5 Lap vapor retarder sheet sides and ends 6 in. Turn sheets up 4 in. above top of sub-slab fill at walls and columns.
 - c. 11.2.6 Protect vapor retarder from puncture before and during sub-slab fill placement.
 3. ADD the following paragraphs to Par. 11.5:
 - a. 11.5.1. Wall Isolation Joints. Isolate edges of interior slabs on ground from concrete wall surfaces with 1 layer of bond breaker felt or joint filler strip except as shown in drawings.
 - b. 11.5.2. Column Isolation Joints. Form diamond-shaped area around each column, each side equal to 2'-6". After slabs have been cast, strip forms, install bond breaker at slab edges, then place concrete around columns.
 - c. 11.5.3. Contraction joints (control joints, sawed joints). Cut alternate wires or bars in reinforcement passing through joint. Saw joints to a depth of 1/3 slab thickness as soon as concrete will not ravel. Vacuum or blow groove clean immediately after sawing and insert backer rod to keep joint clean during construction. At least 90 days later, or just before time of Substantial Completion, remove rod, clean groove of debris, replace rod and fill with dead level urethane sealant.
 4. ADD the following paragraphs to Par. 11.9:
 - a. 11.9.1.1. Provide Class A tolerances at floor areas as shown.
 - b. 11.9.2.1. Finish all floor areas to Class B tolerance except as otherwise shown.
 - c. 11.9.3.1. Class C flatness tolerances may be provided at floor areas which will receive mortar beds for finish materials.
 5. ADD paragraph 11.10 Exterior Traffic Surfaces:
 - a. 11.10.1. Provide broom finish at exterior walks, aprons, man-door slabs and ramps.

END OF SECTION 031000

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to the work of this Section.

1.02 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 031000 - Concrete Forming and Accessories
 - a. Crushed Stone under SOG is specified in this Section.
 - 2. Section 033500 - Concrete Finishing

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. AISC - American Institute of Steel Construction
- C. NRMCA - National Ready Mix Concrete Association

1.04 STANDARDS

- A. Referenced Standards: These standards (latest edition or edition in force by AHJ) form part of this specification only to the extent they are referenced as specification requirements.
 - 1. ACI 117- "Specification for Tolerances for Concrete Construction and Materials".
 - 2. ACI 301 - "Specifications for Structural Concrete for Buildings".
 - 3. ACI 302.1R - "Guide to Concrete Floor and Slab Construction".
 - 4. ACI 304R - "Guide for Measuring, Mixing, Transporting, and Placing Concrete".
 - 5. ACI 305R - "Guide to Hot Weather Concreting".
 - 6. ACI 306R - "Guide to Cold Weather Concreting".
 - 7. ACI 308.1 - "Standard Specification for Curing Concrete".
 - 8. ACI 308R - "Guide to External Curing of Concrete".
 - 9. ACI 318 - "Building Code Requirements for Structural Concrete".
 - 10. ACI 347R - "Guide to Formwork for Concrete".
 - 11. ACI 303R - "Code of Standard Practice for Steel Buildings and Bridges".
 - 12. ASTM A615/A615M - "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".
 - 13. ASTM A775/A775M - "Standard Specification for Epoxy-Coated Steel Reinforcing Bars".
 - 14. ASTM A1064/A1064M - "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete".
 - 15. ASTM C33/C33M - "Standard Specification for Concrete Aggregates".
 - 16. ASTM C40 - "Standard Test Method for Organic Impurities in Fine Aggregates for Concrete".
 - 17. AASTM C94/C94M - "Standard Specification for Ready-Mixed Concrete".
 - 18. ASTM C150/C150M - "Standard Specification for Portland Cement".
 - 19. ASTM C260/C260M - "Standard Specification for Air-Entraining Admixtures for Concrete".
 - 20. ASTM C494/C494M - "Standard Specification for Chemical Admixtures for Concrete".

21. ASTM C881/C881M - "Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete".
22. ASTM C1077 - "Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation".
23. NYSDOT Standards and Specifications, latest edition.
24. ASTM E1155 - "Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers".

1.05 ACTION SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Product Data: For each type of product.
- C. Design Mixtures: For each concrete mixture required including designs for any mix design that may be placed by the use of a concrete pump. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warranting adjustments.
 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 2. Submit mix designs for each type of concrete to be used on the Project at least 30 calendar days prior to the first scheduled concrete pour. The Contractor's or Concrete supplier's testing laboratory shall develop concrete mix designs and test all materials and mixes for conformance with ACI 301 and these specifications. The costs associated with development of the design mixes and testing of samples shall be included in the bid price.
 3. Submit the following:
 - a. Name, address, and phone number of Contractor's or Ready Mix Supplier's testing laboratory.
 - b. Mix proportions for each different mix design required.
 - c. Source of cement and other proposed cementitious products (if any), type, brand, and certified copies of current mill test reports, including physical and chemical analysis.
 - d. Source of fine aggregates and results of tests made in accordance with ASTM C33 and ASTM C40.
 - e. Source of coarse aggregate and results of tests made in accordance with ASTM C33.
 - f. Catalog cuts of all admixtures.
 - g. Furnish test results for each mix design indicating slump, air-entrainment, water/cement ratio, admixtures included, fresh unit weight, temperature and test results (7, 28, 56 day results). Minimum two tests at each scheduled time period.
 - h. If the concrete is intended to be pumped, design mix accordingly and submit certification it has been tested for pumping.
 4. If adopted mix fails to produce concrete meeting requirements for strength, air content and workability, the Architect may order additional cement or adjustments to mix proportions at no extra cost to the Owner.
- D. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bend bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 1. Shop drawings shall be at 1/4" per foot scale and shall include elevation views of all walls and piers.
- E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 1. Location of construction joints is subject to approval of the Architect.

1.06 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds and membranes.
 - 6. Floor and slab treatments.
 - 7. Adhesives.
 - 8. Semirigid joint filler.
 - 9. Joint-filer strips.
- B. Welding Certificates
- C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- D. Furnish ready mix delivery slips to the Special Inspector indicating all batches weights, admixtures, water amounts, batch times, start and end discharge times and drum revolutions at mixing speed.

1.07 QUALITY ASSURANCE

- A. For all work in the NYSDOT Right of Way, all work shall be in accordance with the latest NYSDOT Standards and Specifications.
- B. Manufacturer Qualifications: A firm experienced in manufacturing and delivering ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" or a New York State Department of Transportation currently approved plant.
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain coarse aggregate from single source, obtain fine aggregate from a single source, and obtain admixtures from single source from single manufacturer. To further insure consistency, coloration, finish and quality; all aggregates, cementitious materials, water and other ingredients shall each be secured from the same source for the duration of the project. All sub-contractors shall utilize the same source and utilize the same mix designs. Multiple suppliers will not be allowed.

1.08 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Contractor or ready mix supplier shall engage a qualified, independent testing agency to perform preconstruction testing on concrete mixtures. Tests shall have been conducted within nine months of the submission date.

1.09 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306R and as follows: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40° F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in concrete mix designs.
- B. Hot-Weather Placement: Comply with ACI 305R and as follows:
 - 1. Maintain concrete temperature below 90° F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

PART 2 PRODUCTS

2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with the most current editions of the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

2.02 FORM-FACING MATERIALS

- A. Smooth-formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in large practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. B-B (Concrete Form), Class 1 or better; mill oiled, and edge sealed.
 - 3. Overlaid Finnish birch plywood.
- B. 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.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, ¾ by ¾ inch, minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

- E. Form ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

2.03 STEEL REINFORCEMENT

- A. Reinforcing Bars:
 - 1. ASTM A615, Grade 60, deformed.
 - 2. ASTM A775, Grade 60, deformed, epoxy coated (where specified on Contract Drawings).
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.04 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire or plastic according to CRSI's "Manual of Standard Practice," and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless steel bar supports.

2.05 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type I, Type II or Type I/II gray.
 - a. Fly Ash: ASTM C618, Class F. Use an amount that equals 15 percent of the total cement plus fly ash weight.
- C. Normal-Weight Coarse Aggregates: ASTM C33/C33M, No.57 or 67 coarse aggregate or better, graded. Provide coarse aggregates from a single source.
- D. Normal-Weight Fine Aggregate: ASTM C33/C33M, Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
- E. Air-Entraining Admixture: ASTM C260/C260M.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Certified by manufacturer to contain no harmful effects on pex radiant tubing in heated concrete slabs. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.

2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Plasticizing and Retarding Admixture: ASTM C1017, Type II.
4. High Range, Water-Reducing Admixture ASTM C494/C494M, Type F.

G. Water: ASTM C94/C94M. Clean and drinkable. Maximum chloride ion content 0.1%.

2.06 CURING MATERIALS

- A. Wet curing blankets for use on concrete flatwork: Polyethylene sheet backed with absorptive fibrous cellulose or other synthetic material.
1. Products:
 - a. PNA Construction Technologies; Hydracure™.
 - b. Raven Industries Inc.; Konkure™.
 - c. Universal Forest Products; UltraCure.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating for use on concrete surfaces **other than flatwork**.
1. Products:
 - a. Euclid Chemical Company (The); Kurez DR VOX.
 - b. Kaufman Products, Inc.; Thinfilm 420.
 - c. Lambert Corporation; Aqua Kure-Clear.

2.07 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Structural Bonding Agent: AASTM C881/C881M, Type II
1. Qualities: Structural bonding adhesive, suitable for adhering freshly-mixed concrete to hardened concrete, moisture tolerant structural epoxy adhesive.
 2. Products:
 - a. Sikadur 32 by Sika Corporation.
 - b. Architect approved equivalent.

2.08 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.

2.09 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Piers, Grade Beams, and Foundation Walls: Normal-weight concrete.
1. Minimum Compressive Strength: 4,000 psi at 28 days.
 2. Maximum Slump Limits: 3 inches, plus or minus 1 inch.
 3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-1/2 nominal maximum aggregate size.
- B. Slabs-on-Grade; Interior slabs on metal deck; interior slabs on grade; exterior aprons; sidewalks; man door slabs: Normal-weight concrete.
1. Minimum Compressive Strength: 4,500 psi at 28 days.

2. Maximum Slump Limit (Conventional Mix): 3 inches, plus or minus 1 inch.
3. Maximum Slump Limit (Pump Mix): 6 1/2 inches, plus or minus 1 inch.
4. Interior Slab Air Content: 3 percent max at point of delivery for 3/4 inch nominal maximum aggregate size. Do not use air entrainment admixture at interior concrete slabs.
5. Exterior Concrete Air Content: 6 percent max, plus or minus 1.0 percent at point of delivery for 3/4 inch nominal maximum aggregate size.

2.10 FABRICATING REINFORCEMENT

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

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and furnish batch ticket information.
 1. When air temperature is between 80° and 90° F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90° F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 .
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Remove water from forms and excavations and divert water flow to avoid washing over, under or thru freshly placed concrete.
- F. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- G. 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.
- H. 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.

- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
 - 1. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the form release agent.

3.02 EMBEDDED ITEM INSTALLATION

- 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 303.
 - 2. Ensure that all inserts and embedded items are not disturbed during concrete placement.

3.03 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° F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting 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 that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Use reinforcing splices at minimum of locations and only at locations of minimum stress. Splice locations shall be approved during shop drawing review phase. Rebar splice lengths shall be in accordance with ACI 318.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Take necessary measures to ensure that reinforcement is not disturbed during the placement of radiant tubing and/or during the placement of concrete.

3.05 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 H2M.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
 - 3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Contraction Joints for elevated framed slabs and elevated mezzanine slabs.
 - 1. Form joints by sawing joints to a depth equal to one-third of slab thickness (2 inches maximum).
 - 2. Joints in elevated framed slabs and elevated mezzanines, when not shown on the contract documents, should be cut to create nearly square panels, or 20' - 0" o.c. in each direction, which ever yields smaller panels.
 - 3. Saw joints as soon as possible without raveling concrete.
- E. Isolation Joints in Slab-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. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 - Sealants are indicated.
- F. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Correct alignment and lubrication is essential for proper joint function. Lubricate one-half of dowel length to prevent concrete bonding to one side of joint. Rotate dowel after concrete placement to loosen bond.
1. Speed Dowel® System by Sika® Greenstreak, 3400 Tree Court Industrial Blvd., St Louis, MO 63122 Phone: 800-325-9504 is an acceptable alternative to lubricating dowels.

3.06 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery to project site or during placement unless water has been held back from the mix at the batch plant. This amount of water must clearly be shown on the computerized batch ticket. In no case shall the amount of water exceed the amount withheld or the total batch amount in the mix design. Add water on site only in the presence of and with the permission of the Owner's representative. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.07 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.08 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. See Section 033500 - Concrete Finishing.

3.09 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling in: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. All exposed horizontal and vertical wall and slab corners shall have a 3/4 inch chamfered edge.
- C. Equipment Bases and Housekeeping Pads:
 - 1. Coordinate sizes and locations of concrete bases and housekeeping pads with Owner and Architect.
 - 2. Construct concrete bases and pads 6 inches high unless otherwise indicated; and extend bases/pads not less than 6 inches in each direction beyond the maximum dimension of supported equipment unless otherwise indicated.

3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain in moist condition at a relatively constant temperature for a period of time necessary for hydration of cement and attainment of design strength. Comply with ACI 306R for cold-weather protection and ACI 301 and ACI 305R for hot-weather protection during curing.
 - 1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
- 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 remainder of curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308R and ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12 inch lap over adjacent absorptive covers.
2. Wet curing Blanket: Cover concrete slab surfaces in widest practicable width, with sides and ends lapped at least 12 inches. Cure for not less than seven days. Immediately repair any holes or tears during curing period.
 - a. Cure interior slabs only with wet curing blankets.
 - b. Curing compounds may be used at exterior slabs.
3. Curing Compound: Do not use on slabs or other concrete flatwork. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subject to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

E. Liquid sealer/hardener: See Section 033500 - Concrete Finishing.

3.11 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 one month. 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 joints clean and dry.

3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform test and inspections and to submit reports.
- C. Inspections:
 1. Steel reinforcement placement.
 2. Headed bolts and studs.
 3. Verification of use of required design mixture.
 4. Concrete placement, including conveying and depositing.
 5. Curing procedures and maintenance of curing temperature.
 6. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. Yd., but less than 25 cu. Yd., plus one set for each additional 50 cu. Yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143; one test at point of placement for each truck delivery and for each composite sample, but not less than one test for each day's

- pour of each concrete mixture. Perform additional tests when concrete consistency appears to change. Test the slump at the delivery truck.
3. Air Content: ASTM C231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture. Test the air content at the point of concrete deposit into the formwork (i.e. at the pump hose discharge).
 4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40° F and below or 80° F and above, and one test for each composite sample. Test the temperature at the delivery truck.
 5. Compression Test Specimens: ASTM C31.
 - a. Cast and laboratory cure three sets of two standard cylinder specimens for each composite sample. Cast the cylinder specimens with concrete taken at the point of concrete deposit into the formwork (i.e. at the pump hose discharge).
 6. Compressive-Strength Tests: ASTM C39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days. Reserve one set of two specimens and test at 56 days when concrete fails to meet the design strength at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 7. Strength of each concrete mixture will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 8. Test results shall be reported in writing to Architect, 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 mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28-day tests.
 9. 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 C42 or by other methods as directed by Architect.
 10. Additional testing and inspection, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E1155 within 48 hours of finishing.

END OF SECTION 033000

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.
- B. Section 031000 - Concrete Forming and Accessories.
- C. Section 033000 - Cast-In-Place Concrete.

1.02 SCOPE

- A. Finishing slabs on grade, elevated slabs and monolithic floor slabs.
- B. Finishing exposed concrete interior and exterior walls (Formed Surfaces).
- C. Testing for floor flatness.
- D. Repair of defective concrete.
- E. Surface treatment with concrete hardener and sealer.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards, manufacturer's recommendations and the ACI Manual of Concrete Practice.
- B. ACI 301 "Specifications for Structural Concrete for Buildings".
- C. ACI 302.1R "Guide for Concrete Floor and Slab Construction"
- D. ACI 303 "Guide to Cast-In-Place Architectural Concrete Practice".
- E. ASTM E1155 "Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: Submit manufacturer's product data for each type of concrete sealer, clearly indicating locations each type of sealer will be used.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations, ACI 301 and industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

PART 2 PRODUCTS

2.01 CONCRETE SEALER

- A. Exterior Concrete
 - 1. AQUAPEL from L&M Construction Chemicals, a product brand of Laticrete International or Architect approved equivalent.
 - 2. Apply to all exterior concrete pavement, slabs, stoops, aprons, sidewalks, exposed concrete retaining walls and patios.
 - 3. Handle and apply according to manufacturer's recommendations.
 - 4. Apply sealer to slabs that are a minimum of 28 days old, have been thoroughly moist cured and have been allowed to air dry.
- B. Exposed Interior Concrete Slabs and Stair Treads
 - 1. Seal Hard from L&M Construction Chemicals, a product brand of Laticrete International or Architect approved equivalent.
 - 2. Apply two coats in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.01 FINISHING UNFORMED SURFACES (SLABS)

- A. Floated Finish: (Apparatus bays, mezzanines and adjacent rooms)
 - 1. After placing, consolidating, and striking-off slabs, level surface to a tolerance not exceeding 1/8 in. in 2 ft when tested with a 2 ft straight-edge. Slope surfaces uniformly to drains. Do not work surface until ready for floating.
 - 2. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding 1/4 in. in 10 ft when tested with a 10 ft straightedge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
 - 3. See Paragraph 3.03 for additional tolerance requirements. The more stringent tolerance dictates.
 - 4. These slabs should be finished with a mild, soft broom finish in the direction of drainage.
 - a. The Contractor will prepare a 24" x 24" test panel or similar sample of the finish for approval by the Owner and Architect.
 - b. Said sample will remain on the job site during finishing operations and will be used as a guide for the slab finish.
- B. Troweled Finish: (Non-Bay Areas, rooms to receive tile or carpet)
 - 1. After floating, steel-trowel slab surface to a smooth, even, impervious finish free from trowel marks. For exposed to view concrete slabs, give slab surface a second steel troweling to a burnished finish, uniform in texture and appearance. Grind smooth surface defect which would telegraph through applied floor covering system.
- C. Slip Broom Finish: (Exterior Concrete)
 - 1. After placing, consolidating, and striking-off slabs, level surface to a tolerance not exceeding 1/8 in. in 2 ft when tested with a 2 ft straightedge. Slope surfaces uniformly to drain. Do not work surface until ready for floating.
 - 2. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding 1/4 in. in 10 ft when tested

- with a 10 ft straightedge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
3. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom in straight, parallel lines perpendicular to main traffic route. Coordinate required final finish with the Architect before application.

D. Caution: Do not use jitterbugs at any time.

3.02 FINISHING FORMED SURFACES (INTERIOR & EXTERIOR)

- A. Exposed to view surfaces: Patch all form tie holes and rub to produce a smooth, uniform finish. Patching material to match concrete in color and texture.

3.03 TOLERANCES (INTERIOR SLABS)

- A. An independent testing agency, as specified in Section 014523 - Testing and Inspection Services, will inspect finished slabs for flatness.
- B. Measure for F(F) and F(L) tolerances for floors in accordance with ASTM E1155, within 72 hours after slab installation.
- C. Finish concrete to achieve the following tolerances:
 1. Exposed to View and Foot Traffic: F(F) 20 and F(L) 15.
 2. Slabs to be Covered with Thin Floor Coverings (i.e., resilient flooring, ceramic flooring): Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17.
 3. Slabs to be Covered with Wood Flooring: Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17.
 4. Slabs to be Covered with Carpet, Carpet Tile, Rubber Flooring and Other Slabs: Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 20; with minimum values of flatness, F(F) 17; and of levelness, F(L) 15.
 5. The F(L) values listed above are not applicable to elevated slab on deck. Only F(F) values apply to elevated slabs.
- D. Correct the slab surface if tolerances are less than specified.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process. Costs for re-measurement testing will be borne by the Contractor.

3.04 REPAIR OF DEFECTIVE WORK

- A. Repair of Unformed Surfaces (Slabs): Test unformed surfaces, such as monolithic slabs, for smoothness and to verify that surface planes conform to tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
 1. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects include crazing, cracks in excess of 0.01 in. wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
 2. Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 in. clearance all around.

- a. Dampen concrete surfaces in contact with patching concrete and apply specified bonding compound. Place patching concrete after bonding compound has dried. Mix patching of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 3. Repair isolated random cracks and single holes not over 1 in. in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles.
 4. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
 5. Correct low areas in unformed surfaces during, or immediately after completion of, surface finishing operations by cutting out low areas and replacing with fresh concrete if floor is exposed or self-leveling cement-based product approved by the Architect. Self-leveling product used must be compatible with all types of finished flooring being used. Finish repaired areas to blend into adjacent concrete. Use specified bonding or patching compound.
- B. Repair of Formed Surfaces (Walls).
1. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects include crazing, cracks in excess of 0.01 in. wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
 2. Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 in. clearance all around.
 - a. Dampen concrete surfaces in contact with patching concrete and apply specified bonding compound. Place patching concrete after bonding compound has dried. Mix patching of same materials to provide concrete of same type, color and/or class as original concrete. Cure in same manner as adjacent concrete.
 3. Repair isolated random cracks and single holes not over 1 in. in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles.
- C. Make structural repairs with prior approval of Architect as to method and procedures, using structural patching mortar.

3.05 SEALER APPLICATION

- A. Clean concrete of all dirt, laitance, contaminants, oil, existing coatings or membrane curing compounds before application.
- B. Install sealers in accordance with manufacturer's written instructions and recommendations.

END OF SECTION 033500

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.
- B. Section 040513 - Mortar
- C. Section 042113 - Brick Masonry
- D. Section 042200 - Concrete Unit Masonry
- E. Section 079200 - Sealants

1.02 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following reference standards:
 - 1. Design Procedure and Allowable Stresses: Building Code Requirements for Reinforced Concrete ACI 318 of the American Concrete Institute.
 - 2. Prestressed Concrete Institute MNL 117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products" - 4th Edition, primarily Appendix J.
 - 3. Prestressed Concrete Institute's "Architectural Precast Concrete Design Manual, Latest Edition".
 - 4. ASTM standard as stated herein.

1.03 DEFINITIONS

- A. Architectural Precast Concrete: Plant cast, architecturally finished, precast concrete units generally referred to in this Section as precast units.

1.04 SUMMARY

- A. This specification covers all labor, materials and services for the furnishing and setting of the integrally colored architectural precast concrete units as indicated on the drawings and specifications herein. All units must be of the same manufacturer.

1.05 SUBMITTALS

- A. Submit pursuant to Section 0133000 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Shop Drawings:
 - 1. Prepared by an experienced professional detailer, showing complete information for fabrication and installation of precast concrete units.
 - a. Show layout, dimensions and identification of each precast unit corresponding to sequence and procedure of installation.
 - b. Show anchors and their locations to back-up CMU.
 - c. Make design modifications only as necessary to meet field conditions and to ensure proper fitting of the work and only as acceptable to the Architect.
 - 2. The fabricator shall submit the shop drawings to the GC who shall verify all drawing dimensions and coordinate the shop drawings with field conditions and other trades. The GC shall submit the shop drawings to the Architect for approval. The fabricator shall not

start production until the shop drawings and color are approved by the Architect and GC in writing.

- D. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions. Provide product data on Lithochrome stain if required.
- E. Quality Control Submittals:
 - 1. Manufacturer's Qualifications Data: Architectural precast concrete manufacturer's name and address, and names and addresses of 5 similar projects where the proposed manufacturer's precast units have been in service for 5 years.
- F. Samples:
 - 1. Minimum size - 6" x 6" x 2" to illustrate the quality, color and surface finish texture.
 - 2. Color: Fabricator must develop a custom colored mix to match a colored sample provided by the Architect. The color sample to match would either be an earth tone color shade (such as Indiana limestone color, off-white, buff, brown, brick orange, brick red, light gray, dark gray, dull yellow) or pure white. Painted, stained or coated precast is not acceptable. Unless otherwise noted, all the precast units on the project will be the same color and of the same mix design.
 - a. Provide Lithochrome stain color samples for color selection by Architect.
 - 3. Texture: Smooth, dense, fine-grained texture achieved by acid etching to thoroughly remove all surface cement paste.

1.06 QUALITY ASSURANCE

- A. Manufacture: Precast units shall be plant fabricated.
- B. The fabricator shall have a minimum of 5 years successful experience in fabrication of architectural precast concrete units, similar to units required for this project. Fabricator must be an APA (Architectural Precast Association) Certified Plant or a PCI Prestressed/Precast Concrete Institute) certified Plant for category AT or A1 (Architectural Precast). Fabricator must adhere to procedure that are applicable to the manufacturing of Architectural Precast Concrete trim pieces as outlined in Appendix J of PCI MNL-117 (3rd Edition) and the PCI Design manual (2nd Edition).

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Load, transport, and unload precast units by methods that will prevent damage.
- B. Storage: Store precast units on firm surfaces off the ground. Protect from dirt and staining. Upon removal from the casting plant, protect precast units from freezing temperatures and rapid loss of moisture for a minimum period of 4 days.
- C. Handling: Lift and support precast units at design support points.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: ASTM C 150, Type I, Type II or Type III Portland cement, except as otherwise indicated.
 - 1. Cement for Exposed Surfaces/Facing: White, buff, light gray or dark gray Portland cement as necessary to match required color of concrete and mortar.
- B. Aggregates: ASTM C 33, except as otherwise indicated.

1. Exposed/Facing Aggregates: Clean, hard, durable, non-staining, selected and graded aggregate of required appearance, uniform in quality, and free from thin and elongated pieces.
- C. Mortar: ASTM C 270, Type S, except as otherwise indicated.
 1. Exposed Mortar Joints:
 - a. Mortar: Match Color of precast unit.
- D. Water: Fresh, clean, and free from injurious amounts of oils, acids, alkalis, salts, organic material, and other deleterious substances.
- E. Air-entraining Admixture: ASTM C 260.
- F. Reinforcing Steel:
 1. Bars: ASTM A 615, deformed.
 2. Welded Wire Fabric: ASTM A 185, galvanized.
 3. Tie Wire: Galvanized.
- G. Metal Accessories: Anchors, plates, clip angles, seat angles, inserts, bolts, shims, and other necessary devices and accessories required for a complete installation. Unless otherwise indicated, metal accessories shall be 300 series stainless steel.
- H. Source of Materials: Individual materials shall be obtained from a single source for all similar precast units.

2.02 MANUFACTURED UNITS

- A. Date Stone
- B. Window Surrounds at Front Windows
- C. Parapet Cap at Training Roof
- D. Medallion (Alternate)

2.03 CONCRETE MIXES

- A. Concrete shall be proportioned to comply with the following, except as otherwise indicated:
 1. Compressive Strength: Minimum 5000 psi at 28 days.
 2. Air-Entrainment: 5% to 8% (by volume) total air content. Use air-entraining admixture, not air-entrained cement.
 3. Color: to match existing window surrounds.
- B. The quantity of water used shall not exceed 5 gallons per 94-pound bag of cement.
- C. Freeze-Thaw Resistance: Freeze-thaw test specimens shall have a minimum durability factor of 70 when tested in accordance with ASTM C 666, Procedure B.
- D. Water Absorption: Facing mix absorption test specimens shall have an average water absorption of 6% (by dry weight) or less when tested in accordance with ASTM C 67 for a 24-hour submersion test.

2.04 FABRICATION

- A. Forms shall conform to the shape, lines, and dimensions of the precast units to be produced, be sufficiently tight to prevent leakage of cement paste, and be constructed to prevent damage to

the concrete. Forms shall be rigidly assembled, braced, and stiffened as required to produce castings within the specified tolerances.

- B. Steel reinforcement shall be accurately positioned and securely held in place by devices that will not be exposed on or mar the appearance of exposed surfaces on the precast units.
- C. Build-in metal accessories at the time units are cast and, wherever practicable, fasten anchors and inserts to the steel reinforcement.
- D. Parapet caps shall have an exposed "drip notch" on the underside of each side of the cap.
- E. Place concrete, facing and backing, in a continuous operation for each unit until the full thickness is reached and the unit is completely cast. Place concrete in a manner which will avoid segregation.
- F. Consolidate concrete by vibration so that the concrete is thoroughly worked around the steel reinforcement and other embedded items, and into corners and angles of the forms.
- G. Finishes for Exposed Surfaces:
 - 1. Surfaces Without Exposed Aggregate Facing: Smooth form finish or floated finish as applicable.
- H. Finishes for Concealed Surfaces: Form finish or screeded finish as applicable.
- I. Curing: Cure precast units in the forms for 16 to 20 hours after casting. Prevent loss of moisture from the units, and supply additional moisture and heat as required by environmental conditions. Continue curing after removal from the forms by moist or steam curing for a minimum of 48 hours unless otherwise approved. Maintain units above 50 degrees F during curing.
- J. Shop Painting: Apply one coat (minimum 3.0 mils wet film thickness) of shop paint to surfaces of metal accessories, except surfaces to be field welded and contact surfaces of high-strength bolted connections (if any).
- K. Lettering and/or Artwork Staining: All cut or engraved letters or other artwork shall be stained with a Lithochrome Stain. Color as selected by the Architect.

2.05 SOURCE QUALITY CONTROL

- A. Tests for Air Content: Determine air content of each batch of concrete in accordance with ASTM C 173. Record results of tests and furnish a copy of test results to the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine surfaces to receive precast units for defects that will adversely affect the execution and quality of the Work. Check location and condition of required bearing surfaces, anchors, and inserts. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Surface Preparation: Thoroughly clean surfaces of adjoining construction of loose and foreign matter.

3.03 INSTALLATION

- A. Install precast units in their designed positions and in accordance with the approved setting drawings.
 - 1. Adjust units true to line, with uniform joint width.
 - 2. Anchor precast units securely to supporting construction.
 - 3. Mortar joints to be 3/8" unless noted otherwise.

3.04 ADJUSTING

- A. Touch-up of Metal Accessories: Clean and repair welded and abraded surfaces of galvanized metal with a 2 mil (dry) minimum thick coating of cold galvanizing compound; comply with compound manufacturer's application instructions. Touch-up shop paint with same type of paint used for shop coat; include marred surfaces, field bolts, and field welds.
- B. Corrective Patching: Patch and refinish minor damage to match adjacent surfaces. Cure patches.

3.05 CLEANING

- A. Remove excess sealant and mortar and droppings immediately after soiling.
- B. After completion of installation and other activities liable to soil the precast units, clean exposed surfaces of the units with soap powder in clean water applied by scrubbing with stiff fiber brushes. If recommended by the precast unit manufacturer, a cleaning solution which will not be harmful to the units or the joints may be used in lieu of soap and water. Immediately after cleaning, thoroughly rinse units with clean water.

3.06 PROTECTION

- A. Protect precast units from damage during construction.

3.07 PERFORMANCE REQUIREMENTS

- A. Applicable standards for inspection and quality control shall be Appendix J (Architectural Trim Requirements) in PCI MNL - 117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products" (4th Edition) and PCI's Architectural Precast Concrete Design Manual, Latest Edition".
- B. The Architectural Precast Concrete units shall show no obvious repairs or imperfections other than minimal color variations when viewed with the unaided eye at a 20-foot distance in good typical daylight illumination.
- C. Any unacceptable precast units that cannot be repaired to the Architect's satisfaction in accordance with the aforementioned criteria are deemed unacceptable and are to be replaced by the Contractor.

END OF SECTION 034500

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SCOPE

- A. This Section includes grouting of the following:
 - 1. Base plates, leveling plates, bearing plates and sleeves.
 - 2. Concrete masonry unit (CMU) cores where specified or shown on Contract Drawings.
 - 3. Concrete masonry unit (CMU) cores where other items are attached or secured to CMU whether indicated on Contract Drawings or not.
 - 4. Concrete masonry bond beams.
 - 5. Hollow metal door frames located in concrete, precast and/or CMU walls.
 - 6. Other miscellaneous grouting as shown on Contract Drawings or required by individual specifications.
 - 7. Adhesive type epoxy grout for dowel and/or fastener anchorage.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 051200 - Structural Steel Framing
 - 2. Section 055000- Metal Fabrications

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM C33 - "Standard Specification for Concrete Aggregates".
- C. ASTM C109 - "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or [50 mm] Cube Specimens)".
- D. ASTM C150 - "Standard Specification for Portland Cement".
- E. ASTM C476 - "Standard Specification for Grout for Masonry".
- F. ASTM C494 - "Standard Specification for Chemical Admixtures for Concrete".
- G. ASTM C827 - "Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures".
- H. ASTM C1107 - "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Manufacturer's product data for pre-mixed non-shrink grout and adhesive type epoxy grouts.

- D. Submit mix designs with test reports for all field mixed or ready mix supplied grouts. Provide source reports for all grout components i.e. cement, sand, admixtures (if any), water and any other ingredients.
- E. Certificates of Compliance for all grout products used on the project.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

PART 2 PRODUCTS

2.01 NON-METALLIC, NON-SHRINK GROUT

- A. Description: Premixed, non-staining, non-gassing grout, requiring only the adding of water, suitable for use as plastic, flowable, or fluid mix with no shrinkage in either the plastic or the hardened state.
 - 1. Compressive strength at 28 days, from flowable mix: pass ASTM C109; 5000 lb./sq. in. minimum.
 - 2. Volume change from plastic to hardened state: pass ASTM C827; -0%, to +2% maximum.
- B. Producers:
 - 1. Euclid NS Grout, by The Euclid Chemical Company.
 - 2. Five Star Grout, by Five Star Products, Inc.
 - 3. MasterFlow 885 by Master Builders.
 - 4. Architect approved equivalent.

2.02 GROUT FOR CONCRETE UNIT MASONRY

- A. Cement: Portland cement shall be ASTM C150 Type I or Type II, containing less than 0.6 percent alkali.
- B. Aggregate:
 - 1. General: Aggregate shall be non reactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the material from the new source prior to commencing grout work.
 - 2. Fine Aggregate: Fine aggregate shall be washed natural sand conforming to ASTM C33 Fine Aggregate Spec.
 - a. Use fine grout for spaces up to 1 1/2" wide or to fill cells up to 4" in size.
 - 3. Coarse Aggregate (Coarse grout only): Washed crushed stone conforming to the gradation requirements of ASTM C33 Size No. 8 (3/8" to No. 8).
 - a. Use coarse grout only to fill cells having larger dimensions.
- C. Admixtures:
 - 1. Water Reducing Retarder: Water reducing retarder shall comply with ASTM C494, Type D.
- D. Water:

1. Water for mixing and curing shall be potable, shall not contain more than 1000 mg/l of chlorides as Cl, nor more than 1300 mg/l of sulfates as SO₄, and shall not contain impurities which may change the setting time by more than 25 percent or a reduction of more than 5 percent of the compressive strength of the grout at 14 days when compared to the results for grout made with distilled water.
- E. Compressive strength at 28 days: 3,000 psi.
- F. Mix Ratio:
1. 1 part Portland cement
 2. 0.1 part hydrated lime or lime putty
 3. Aggregate as follows:
 - a. For fine grout, use fine aggregate in a volume of 2.2 to 3.0 times the sum of the volumes of the cementitious materials.
 - b. For a course grout with fine aggregate, use aggregate in a volume of 2.25 to 3.0 times the sum of the volumes of the cementitious materials.
 - c. For a course grout with course aggregate, use aggregate in a volume of 1 to 2 times the sum of the volumes of the cementitious materials.
 - d. Maintain a slump of 8 to 10 inches.

2.03 ADHESIVE RESIN FOR DOWEL OR FASTENER ANCHORAGE

- A. ICC approved, structural epoxy; prepackaged in cartridges for manually or pneumatically operated caulk gun and automatically mixed thru the nozzle.
1. Hilti HIT-HY 200-R Adhesive Anchoring System.
 2. Hilti HIT-RE500 V3 Injectable Epoxy Mortar.
 3. Architect approved equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Prepare surfaces, install non-shrink grout, and cure pursuant to manufacturer's recommendations.
- B. Holes required for grouting or adhesive resin application shall be; brushed clean; blown clean with compressed air and are to be free of dust and/or water.
- C. Install grout in driest, stiffest possible mix, pursuant to manufacturer's published mixing instructions, that will assure filling of voids. Fill space between structural support member and bearing structure and work the grout so as to assure full contact and no voids. Trim and seal exposed edges.
- D. Install adhesive resin in accordance with manufacturer's instructions. Verify components are within expiration dates.

3.02 FIELD QUALITY CONTROL

- A. Owner will engage the services of an independent testing agency to perform special inspections of all grout placement and random compressive strength testing of grout in accordance with the Special Inspection requirements.

END OF SECTION 036000

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes mortar for all concrete unit masonry, brick masonry, glass unit masonry, and precast concrete units.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 034500 - Precast Architectural Concrete
 - 2. Section 036000 - Grouting
 - 3. Section 040523 - Masonry Accessories
 - 4. Section 042113 - Brick Masonry
 - 5. Section 042200 - Concrete Unit Masonry
 - 6. Section 042300 - Glass Unit Masonry
 - 7. Section 079200 - Sealants

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendation.
- B. ASTM C91 "Standard Specifications for Masonry Cement".
- C. ASTM C109 "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars".
- D. ASTM C144 "Standard Specification for Aggregate for Masonry Mortar".
- E. ASTM C150 "Standard Specification for Portland Cement".
- F. ASTM C207 "Standard Specifications for Hydrated Lime for Masonry Purposes".
- G. ASTM C270 "Standard Specifications for Mortar for Unit Masonry".
- H. ASTM C780 "Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry".
- I. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete".
- J. ASTM C1506 "Standard Test method for Water Retention of Hydraulic Cement-Based Mortars and Plasters".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Submit certificates of compliance and manufacturer's technical data describing: cement, lime, sand and admixture products specified.
- D. Submit manufacturer's technical data describing integral coloring specified.

- E. Submit small mortar samples depicting integral coloring. Provide manufacturer's entire range of available colors. Plastic samples representing available colors are not acceptable.
- F. Mortar mix designs for each type of mortar. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
- G. Submit results of tests of field specimens.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

PART 2 PRODUCTS

2.01 MORTAR MATERIALS

- A. Portland Cement: ASTM C150, Type I or Type II.
 - 1. Provide white cement for integral coloring where required to obtain desired mortar color.
- B. Sand: ASTM C144; local mason sand.
- C. Water: Clean, potable and salt free.
- D. Lime: ASTM C207, Type S mortar.
- E. Provide all cement products from one manufacturer.

2.02 ADMIXTURES

- A. Admixtures containing calcium chlorides are prohibited.
- B. All mortar for exterior concrete masonry applications shall contain an integral water-repellent admixture such as:
 - 1. BLOCKTITE Mortar Admixture by Euclid Chemical Company.
 - 2. DRY-BLOCK® System by GCP Applied Technologies, Inc.
 - 3. MasterPel® 210E by Master® Builders Solutions.
- C. Mortar water-repellent admixture shall be same water-repellent admixture used in the manufacture of the concrete masonry units.
- D. Apply at dosage recommended by the manufacturer.
- E. Do not use integral water repellent mortar admixture with clay masonry applications.

2.03 INTEGRAL COLORING

- A. Product: dry mixture of pure, non-fading, alkali-resistant iron-oxide pigments possessing uniform dispersion characteristics specifically intended for mixing into mortar and complying with ASTM C979.
- B. Color selection by Architect.

2.04 MORTAR MIX

- A. Prepare mortar mixes pursuant to "Property Specification Requirements" of ASTM C270 for types indicated on Drawings and herein specified. Do not exceed manufacturer's recommended pigment to cement ratio in colored mortar.
- B. Exterior Concrete Unit Masonry (above grade)
 - 1. Mortar:
 - a. Type S (minimum average compressive strength at 28 days: 1,800 lb./sq. in.).
 - b. Mix: Portland cement/lime/sand.
 - 2. Admixture:
 - a. Coloring pigments, color as selected by Architect.
 - b. Must contain admixture for waterproofing
 - 1) Submittals must specify water repellent agent.
 - 2) Submit product literature for approval prior to using mortar on any finished area.
- C. Exterior Brick Masonry (above grade)
 - 1. Mortar:
 - a. Type N
 - 1) Proportion Portland cement, Lime and Sand in a 1:1:6 ratio
 - 2. Admixture:
 - a. Coloring pigments, color as selected by Architect.
 - b. Submit product literature for approval prior to using mortar on any finished area
- D. Interior Concrete Unit Masonry
 - 1. Mortar:
 - a. Type S (minimum average compressive strength at 28 days: 1,800 lb./sq. in.).
 - b. Mix: Portland cement/lime/sand.
 - c. Color: Standard gray
 - 1) Standard gray at CMU to be painted.
 - 2) Integral coloring at interior ground face ACMU. Mortar color as selected by Architect.
- E. Tests
 - 1. Prepare mix designs and conduct tests using a recognized laboratory.

PART 3 EXECUTION

3.01 MIXING

- A. Mix mortar by methods that will ensure accurate proportioning of all required ingredients to a uniform consistency.
- B. Mechanically mix between 3 to 5 min. Hand mixing is prohibited.
- C. Select ingredients that are compatible.

- D. Do not combine two air entraining materials within same mortar mix.

3.02 RETEMPERING

- A. Use mortar within 2-1/2 hours of initial mixing.
- B. Discard unused mortar after it has begun to set. Do not re-temper mortar that has begun to set.

3.03 ADMIXTURES

- A. Mix admixtures into mortar pursuant to manufacturer's published instructions.

3.04 INTEGRAL COLORING

- A. Provide integral coloring to mortar for all exterior walls and interior glass block window.
- B. Mix into mortar pursuant to manufacturer's published instructions.

3.05 FIELD QUALITY CONTROL

- A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work area, as needed to perform inspections.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests, inspections and prepare test reports:
 - 1. Payment for these services will be made by Owner.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM 780, testing with same frequency as masonry samples.
 - 1. Test three samples for each 5,000 square feet of wall area or portion thereof; test one sample at 7 days and two samples at 28 days for each set.

END OF SECTION 040513

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Specifications, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following masonry related items:
 - 1. Metal horizontal joint reinforcement for masonry.
 - 2. Masonry vertical cell reinforcing.
 - 3. Masonry bond beam reinforcing.
 - 4. Wall weep and ventilation for masonry veneer.
 - 5. Masonry veneer anchors.
 - 6. In wall cavity mortar netting with insect barrier.
 - 7. Thru wall flashing.
 - 8. Masonry Control Joints.
 - 9. Masonry Partition Anchors and Z Ties.
 - 10. Grout Screen.
 - 11. Masonry anchorage to steel columns and beams.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 040513 - Mortar
 - 2. Section 042200 - Concrete Unit Masonry
 - 3. Section 042300 - Glass Unit Masonry
 - 4. Section 076200 - Sheet Metal Flashing and Trim

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM A82 "Standard Specification for Steel Wire, Plain, for Concrete Reinforcement".
- C. ASTM A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".
- D. ASTM A641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".
- E. ASTM A951 "Standard Specification for Masonry Joint Reinforcing".
- F. ASTM D2287 "Standard Specification for Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds".
- G. "Building Code Requirements and Specification for Masonry Structures" and Companion Commentaries (latest edition) (ACI-530/530.1; ASCE-5; TMS-402/602).
- H. ACI 315R "Guide to Presenting Reinforcing Steel Design Details".

1.04 DEFINITIONS

- A. ACMU(s): Architectural concrete masonry unit(s).
- B. CMU(s): Concrete masonry unit(s).
- C. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.05 SUBMITTALS

- A. Submit pursuant to 013300 - Submittal Procedures.
- B. Submit pursuant to 016000 - Product Requirements.
- C. Product Data: Provide manufacturer's cut sheets clearly hi-lighting or otherwise indicating choices in size, gauge, color, material, etc. for the following products:
 - 1. Horizontal joint reinforcing.
 - 2. Veneer anchors.
 - 3. Masonry anchors to structural steel.
 - 4. Movement joint products.
 - 5. Grout screen.
 - 6. Through-wall flashing, drip edge and termination bar.
 - 7. Cell vents.
 - 8. Mortar netting.
 - 9. Rigid ties.
 - 10. Partition top anchors.
 - 11. Expansion and adhesive anchors.
 - 12. Reinforcing steel mill test reports.
- D. Shop Drawings: For the following:
 - 1. Reinforcing Steel; Detailed bending and placement of unit masonry reinforcing bars. Comply with ACI 315R, "Guide to Presenting Reinforcing Steel Design Details".
 - 2. Coordinate masonry vertical reinforcing shop drawings with foundation rebar shop drawings that show vertical dowels into masonry cores.
 - 3. Anchor sections of masonry anchors for connecting to steel columns, steel lintel beams, and steel edge angles.
- E. Submit certificates of compliance and manufacturer's technical data for but not limited to: horizontal joint reinforcing, movement joints products, anchors, thru-wall flashing, mortar netting, wall ventilation and rigid ties.

1.06 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.
- C. Store masonry accessories to prevent corrosion and accumulation of dirt, oil or any other foreign substances.

PART 2 PRODUCTS

2.01 HORIZONTAL JOINT REINFORCEMENT WITH TIES OR ANCHORS

- A. Description: Two or more parallel longitudinal deformed rods, weld connected with transverse cross rods which forms a ladder design.

- B. Provide with out-to-out longitudinal rod spacing two inches less than out-to-out of CMU wythe width.
- C. Exterior Application:
 - 1. Side Rods: Two rods, 3/16-inch diameter.
 - 2. Cross Rods: 9 gauge.
 - 3. Finish: hot dip galvanized 1.5 oz. per sq. ft., ASTM A153, Class B-2.
 - 4. Pintle: super-heavy-duty eyelets, pintles are flattened and serrated.
 - a. Embed pintles (hooks) in the mortar joint and extend into the veneer a minimum of 1 1/2", with at least 1" cover to the outside face.
- D. Products: #270 ML Adjustable Eye-Wire by Hohmann & Barnard, Inc., (www.h-b.com) or Architect approved equivalent.

2.02 HORIZONTAL JOINT REINFORCEMENT WITHOUT TIES OR ANCHORS

- A. Description: two or more parallel longitudinal deformed rods weld connected to a continuous diagonally oriented cross rod which forms a "ladder" design.
- B. Provide with out-to-out side rod spacing two in. less than out-to-out total wall system width.
 - 1. Lap side rods minimum of 6" at splices u.o.n.
- C. Exterior Application:
 - 1. Side Rods: 2 min., 3/16-inch diameter.
 - 2. Cross Rods: 9 gauge.
 - 3. Finish: hot dip galvanized 1.5 oz. Per sq. ft., ASTM A153, Class B-2.
- D. Interior Application:
 - 1. Side Rods: 2 min., 3/16-inch diameter.
 - 2. Cross Rods: 9 gauge.
 - 3. Finish: mill galvanized minimum of .10 oz. psf.
- E. Products: #220 Ladder Mesh by Hohmann & Barnard, Inc. (www.h-b.com), or Architect approved equivalent.

2.03 VENEER ANCHORING SYSTEM (HB-213)

- A. Description: vertically adjustable mechanical anchoring system for anchoring masonry veneer to metal stud wall construction.
- B. Provide 14-gauge HB-213 with 3/16-inch diameter 2X-Hook as manufactured by Hohmann & Barnard, Inc. or Architect approved equivalent.
 - 1. Embed 2X-Hook in the veneer mortar joint a minimum of 2", with at least 1" cover to the outside face.
- C. Install at wall studs through exterior gypsum wall board.
 - 1. Space mechanical ties at 24" o.c. horizontally and 16" o.c. vertically when wall studs are 24" o.c.
 - 2. Space mechanical ties at 16" o.c. horizontally and 24" o.c. vertically when wall studs are 16" o.c.
 - 3. At openings in veneer (windows, doors, louvers, etc.) that exceed 16" in any direction, place additional mechanical ties around the perimeter of the opening at 36" o.c. maximum and shall be placed within 12" of the perimeter of the opening.
 - 4. Anchor veneer anchor back plate to steel stud with two (2) polymer-coated, steel drill screws: ASTM C954 except manufactured with hex washer head and neoprene washer,

No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B117.

- D. Finish: hot dip galvanized.

2.04 MASONRY ANCHORING SYSTEM (MASONRY ANCHORED TO STRUCTURAL STEEL)

- A. Description: vertically adjustable mechanical anchoring system for masonry to steel construction. All columns that face and are adjacent (within 2 inches) to masonry shall have masonry anchors on those sides for full height of masonry. All steel beams that face masonry shall have masonry anchors on the web of the beam facing the masonry for the full length of the beam.
- B. For vertical applications (faces of columns): Provide #317 (1/4-inch diameter) continuous wire rod anchor welded to steel members. Use #316's when CMU is parallel with steel. Use #318 triangular ties when CMU is perpendicular to steel. All as manufactured by Heckmann Building Products, Inc. or approved equivalent. Where face of columns are covered by insulation, use Hohmann & Barnard HB-213-2x (12 ga. backplate) adjustable veneer anchors welded or mechanically fastened to steel columns.
- C. For horizontal applications (webs of beams): Provide #315 (1/4-inch diameter) wire rod anchors welded to steel members. The veneer ties are to be a triangular wire, 3/16-inch diameter. Use #316's when CMU is parallel with steel. Use #318 triangular ties when CMU is perpendicular to steel. All as manufactured by Heckmann Building Products, Inc. or approved equivalent.
- D. Install as indicated on the drawings. When not indicated space triangular ties at 16 inches on center for vertical applications and space anchors and triangular ties at 16 inches on center for horizontal applications.
- E. Finish: #315's and #317's furnish plain or galvanized, painted with steel in shop. #316's and #318's hot dip galvanized 1.5 oz. per sq. ft. ASTM A153, Class B-2.

2.05 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

2.06 MOVEMENT JOINT PRODUCTS

- A. Hohmann & Barnard or approved equivalent
1. Control joint - RS Series Rubber Control Joint
 - a. Preformed Control Joint Gaskets: Rubber - ASTM D2000
 - b. Designed to fit standard sash block and to maintain lateral stability
 - c. Install in as continuous piece vertically as possible.
 2. Joint Stabilization Anchors
 - a. Slip-Set Stabilizer
 - b. Finish: hot dip galvanized.
 - c. Install at masonry vertical control joints at 2'-0" o.c. vertically.
 3. Veneer Control Joint at existing structure interface:
 - a. 3/8" x 3" NS Closed Cell Neoprene Sponge
 - b. Slip-Set Stabilizers at 2'-0" o.c. vertically - field bend one end ninety degrees and attach to existing structure.

2.07 GROUT SCREEN

- A. Hohmann & Barnard or approved equivalent

1. MGS Mortar/Grout Screen based on CMU thickness.
2. Use where required to maintain grout in filled cells.

2.08 THROUGH-WALL FLASHING (BASE FLASHING, THRU-WALL FLASHING)

- A. Flexible Flashing: For flashing not exposed to the exterior, use the following self adhesive (clear), non-asphalt composite membrane with a minimum thickness of 40 mils, unless otherwise indicated:
 1. Textroflash™ Flashing by Hohmann & Barnard, Inc.
 2. Flex-Flash® Flashing by Hohmann & Barnard, Inc.
 3. Architect approved equivalent guaranteed not to "drool" when exposed to UV or heat.
- B. Flashing Primer: Use water-based self-adhering flashing primer as recommended by flashing manufacturer.
- C. Stainless Steel Drip Edge (Drip Plate):
 1. 26-gauge Type 304 stainless steel drip plate, 2-1/2" wide with a 3/16" hemmed drip.
 2. Provide factory formed inside and outside corners.
- D. Termination Bar (top):
 1. 26 gauge x 1-1/2", 304 stainless steel with 3/8" flange on top to receive field applied sealant.

2.09 WALL DRAINAGE AND VENTILATION

- A. Description: Cell ventilation and weep units.
 1. Provide "Quadro Vent™" as manufactured by Hohmann & Barnard, Inc. or approved equivalent.
 2. Install directly on top of through wall flashings and at highest point in cavity at 24" o.c. in brick veneer conditions and 32" o.c. in cast stone and ACMU veneer.
 3. Color: to be selected by Architect.
 4. If cell vent appears in profiled unit (Bullnose, chamfered, etc.) trim cell vent to profile shape.

2.10 IN WALL CAVITY MORTAR NETTING

- A. Description: 90% open polymeric mesh with insect barrier to allow unobstructed passage of air and water as base of wall cavity.
- B. Product: Mortar Net® with Insect Barrier, by Mortar Net Solutions™, 10" high by thickness required.
- C. Match product size to cavity size. Cavity should be no more than 1/4" wider than 1" thick material and 2" thick material, and 0.4" thick material should touch both the outer wythe and the inner wall. For cavities larger than 2", place rigid insulation of sufficient height to extend at least 6" above the top of the Mortar Net® with Insect Barrier against the outside of the inner wythe and of appropriate thickness to reduce the cavity to the appropriate size or add additional layers of Mortar Net® to fill width of cavity.

2.11 COMPRESSIBLE FILLER

- A. Premolded filler strips complying with ASTM D1056, Grade 2A 1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Products:
 1. NS Closed Cell Neoprene Sponge as manufactured by Hohmann & Barnard, Inc.

2. #3300 Expansion Joint as manufactured by Wire-Bond.

2.12 EXPANSION BOLTS (ATTACHING STEEL MEMBERS TO MASONRY WALLS)

- A. Description: Stud type with a single piece three section wedge and zinc plated in accordance with ASTM B633 or where specified, type 304 or type 316 stainless steel. See Contract Drawings for locations where stainless steel is required. Anchors shall be installed in drilled holes per manufacturer's recommendations.
- B. Product: Hilti Kwik Bolts, diameter as specified, by Hilti Corp. or Architect approved equivalent.

2.13 ADHESIVE ANCHOR BOLTS (ATTACHING STEEL MEMBERS TO MASONRY ELEMENTS)

- A. Description: Threaded anchor rods, nut and washer, a cylindrical mesh screen tube and an injectable adhesive (components A and B) material. Screen tube and anchors shall be installed in drilled holes and per manufacturer's recommendations. Anchor rods supplied in accordance with ASTM A 36, or if required: ASTM F 593 (AISI 304 stainless steel). Nuts shall be furnished to meet the requirements of the above anchor rod specifications. Anchor rods (non-stainless steel), nuts and washers to be zinc plated in accordance with ASTM A 153.
- B. Product: Hilti HIT-HY 10 PLUS, diameter as specified, by Hilti Corp. or Architect approved equivalent.

2.14 RIGID TIES (ATTACHING INTERSECTING MASONRY WALLS TOGETHER WHEN TOOTHING IS UNATTAINABLE)

- A. Description: Mild steel "Z" ties, 1/4" thick, 1 1/2" wide x 24" long, with 2" long bent legs, hot dip galvanized. Install at 16" o.c. vertically into fully grouted cores. Adjust overall length when field conditions do not permit use of 24" length. Use longest possible length that permits bent legs to fall in grouted cores.
- B. Product: Rigid Partition Anchor Type #344 by Hohmann & Barnard, Inc. or Bent Anchor Type 140 by Heckmann Building Products, Inc. or Architect approved equivalent.

2.15 PARTITION TOP ANCHOR

- A. Description: Mild steel, 12 gauge, 8" long with 2" long bent legs, hot dip galvanized. Install at 24" o.c. horizontally. Provide NS-Neoprene sponge in gap between top of CMU and bottom of anchor.
- B. Product: PTA Type #422 by Hohmann & Barnard, Inc. or Architect approved equivalent.

PART 3 EXECUTION

3.01 GENERAL

- A. If more than one value or requirement is specified, see Contract Drawings for location.

3.02 HORIZONTAL JOINT REINFORCEMENT

- A. Place horizontal joint reinforcing as follows:
 1. In solid wall panels, for interior and exterior walls, place at a vertical spacing of 16 in. on center vertically.
 2. In exterior parapets, place at a vertical spacing of 8 in. on center vertically.
- B. Place horizontal joint reinforcement in:

1. All concrete unit masonry walls.
- C. Place horizontal joint reinforcing in the two (2) bed joints above and below window, louver, door wall openings, and training openings extending a minimum of 24" beyond the opening (except at vertical control joints). At other special conditions, place horizontal joint reinforcement as described in manufacturer's published instructions and as illustrated on Contract Drawings.
- D. Lap side rods at each end joint a minimum of 6 in. for normal shrinkage stresses.
- E. Install prefabricated corner and tee assemblies at each wall corner and intersection.
- F. Miter and butt end joints are prohibited.
- G. Place horizontal joint reinforcement in approximate center of out-to-out wall assembly and assuring a 5/8 in., minimum, mortar coverage on exterior face.
- H. Install horizontal joint reinforcement continuous, terminating only at vertical control joints.
- I. Cut, form and seal all inside and outside corners.

3.03 THROUGH-WALL FLASHING INSTALLATION

- A. Install flashing, drip edge, and termination bar in accordance with manufacturer's printed instructions at all exterior conditions.
 1. Use primer as recommended by flashing manufacturer.
 2. Install flashing in sections of 8' or less into primed surfaces.
 3. Use a roller to firmly press flashing onto surface without air pockets.
 4. Seal all non water shedding edges as recommended by flashing manufacturer.
 5. Do not leave flashing exposed to UV light for more than 60 days.
- B. Mortar shall be bedded above and below the flashing.
- C. Flash all shelf angles including but not limited to lintels, bond beams, sills, wall bases and any other obstructions to natural flow of water within the wall cavity.
- D. Install end dams a minimum of 2" high U.N.O. at all shelf angles, sills and other ends.
- E. Lap all flashing joints a minimum of 3" and seal with manufacturers approved mastic. Lap all drip edge a minimum of 3" with sealant beads as recommended by manufacturer.
- F. Any penetration of the flashing must be sealed.
- G. All thru wall flashings to rise a minimum of 12" to the interiors. Use termination bar and sealant at exterior sheathing and CMU.
- H. Fasten termination bar to stud wall construction at 16" o.c. maximum and at 8" o.c. maximum for CMU back-up wall construction.

3.04 REINFORCED VERTICAL CELLS (VERTICAL REINFORCEMENT)

- A. Place vertical reinforcement in concrete masonry cells as indicated on Drawings using wire-tying or prefabricated bar positioners. Wet-setting reinforcement is not permitted. Comply with requirements in ACI 530.1/ASCE 6/TMS 402/602.

- B. Fill concrete masonry cells with fine or coarse gravel concrete grout (not mortar) as described in Section 042200 "CONCRETE UNIT MASONRY". Grout is specified in Section 036000 "GROUTING".
- C. Place, tie, secure and lap reinforcement pursuant to Section 042200. Vertical bars must be placed within 1/2 inches of the location required within the thickness (out of plane) of the wall. For 12" CMU walls or pilaster, this tolerance can be increased to 3/4 inch.
- D. Reinforcement Bars shall be lapped at splices as follows:

Bar Size	Min. Lap Distance
#4	24 inches
#5	30 inches
#6	36 inches
#7	42 inches

3.05 BENDING, CUTTING AND SPLICING REINFORCEMENT

- A. Make bends and splices in reinforcement only where indicated, or prior-approved by Architect. Bend reinforcement only when cold, and prior to any placement in construction, forming around a steel pin of diameter at least 6 times the reinforcement size. Cut bars only by approved sawing, shearing or welding methods. Make ends of reinforcement straight, square, clean and free of defects before splicing. Do not heat or weld bends and splices at points of maximum stress. Clip and bend any tie wires as required to direct the ends away from external surfaces of masonry walls.
- B. Where welding is necessary, provide materials and perform welding in accordance with AWS requirements.

3.06 MORTAR NET

- A. Install as per manufacturer's instructions.
- B. Install continuous length of mortar net immediately above all through-wall flashings in masonry veneer applications.

3.07 EXPANSION/CONTROL JOINTS IN MASONRY VENEER

- A. Install Joint Stabilization Anchors at 2'-0" o.c. vertically in veneer expansion/control joints. Field bend joint stabilization anchors where CJ/EJs occur at perpendicular veneer. Provide NSTA - Closed Cell Neoprene Sponge in veneer control joints.

END OF SECTION 040523

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Brick Masonry
- B. Related Sections: The following Sections contain requirements that relate to the Section.
 - 1. Section 034500 – Precast Architectural Concrete
 - 2. Section 036000 – Grouting
 - 3. Section 040513 – Mortar
 - 4. Section 040523 – Masonry Accessories
 - 5. Section 042200 – Concrete Unit Masonry
 - 6. Section 042300 – Glass Masonry Units
 - 7. Section 055000 – Metal Fabrications
 - 8. Section 079200 – Sealants

1.03 STANDARDS

- A. ASTM C62 "Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)".
- B. ASTM C67 "Standard Test Methods of Sampling and Testing Brick and Structural Clay Tile".
- C. ASTM C216 "Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)".
- D. BIA Technical Notes on Brick and Tile Construction.

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 – Submittal Procedures
- B. Product Data:
 - 1. Submit product data including test results on each type of brick required.
 - 2. Submit product data for proposed cleaning product including instruction for proper application and use.
- C. Samples for Verification & Approval
 - 1. 5 -brick strap for each type or color of brick specified showing extremes of variation in color and texture.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with Technical Notes on Brick and Tile Construction, by Brick Institute of America (BIA), except as more stringently required in the Contract Documents.

1.06 SAMPLE PANEL

- A. Before commencing masonry work, erect a sample panel at job site for each separate exposed concrete masonry wall and brick wall. Locate panels where directed by Architect.

- B. Sample panel size for each wall or partition: not less than 6 ft wide by 4 ft high. Construct each sample panel representative of color and texture of the brick, bond, reinforcement, jointing, mortar and workmanship. Modify panel as required by Architect.
- C. Do not start brick work until each sample panel has been approved by Architect. Leave approved sample panel in place during erection of masonry work. Protect approved sample panel against weather and damage. Remove sample panel from site when so directed by Architect.

1.07 STORAGE AND PROTECTION

- A. Store brick off ground, under cover, to prevent wetting and contamination by weather, mud, dust and materials likely to cause staining.

1.08 PROJECT/SITE CONDITIONS

- A. At end of day, or during a shutdown, protect top surface of all masonry to prevent rain from entering the masonry. Install protection, adequately anchored, to prevent water intrusion to cover top surface and extend a minimum of 2 ft down all sides of masonry.
- B. Brace walls according to NCMA and ANSI.
- C. Prevent and remove immediately any mortar, grout and soil droppings that come in contact with masonry.
- D. Protect base of walls from rain-splashed mud and mortar by means of coverings on ground and over wall surface.
- E. Cold Weather Requirements: Comply with National Concrete Masonry Association (NCMA) TEK Spec #3-1C "All Weather Concrete Masonry Construction."

PART 2 PRODUCTS

2.01 FACING BRICK

- A. Qualities:
 - 1. Dimensions: Standard Modular 3-5/8" x 2-1/4" x 7-5/8"
 - 2. Texture: One finished face and one finished end; provide two finished ends and finished faces where visible in the Work.
 - 3. Visible flat side: Provide uncured, unfrosted units with one flat side matching finished face for use at locations where flat side is visible in the Work.
 - 4. Shapes: Provide shapes as indicated on Drawings, with finished faces at all locations where they will be visible in the Work. Do not cut brick to make shapes.
 - 5. Regional Materials: Brick shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
 - 6. Brick Colors: For bid purposes--final brick colors to be confirmed with Owner and Architect
 - a. Brick Color #1: Glen-Gery 100-M Restore Series, Extruded Face Brick, Modular
 - b. Brick Color #2: Sioux City Brick Carbon Black Velour, Extruded Face Brick, Modular
- B. Referenced Standards: ASTM C216, Grade SW, Type FBS.

2.02 BRICK CLEANER

- A. Non-Acidic cleaner specific for cleaning brick and removing efflorescence as recommended by brick manufacturer for brick being supplied.
- B. Masonry cleaner if used, must be tested on masonry sample panel.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine other construction, which supports or connects with masonry work. Where such construction as footings and shelves are not sound or level, where anchorage devices have not been installed, where interferences exist, or where there are other conditions unsuitable for proper installation or performance of the masonry, do not start masonry work until defective earlier construction has been completed or corrected.

3.02 CONDITIONING BRICK

- A. Wet brick with absorption rate greater than 20 grams/min/30 sq. in., as determined by ASTM C67, so that rate of absorption when laid does not exceed this amount.
- B. Do not dip individual brick in water before laying. Instead, play a hose on piled brick until water runs from brick. Wet down 1 day before brick are to be used. In hot weather, wet down 2 to 4 hours before brick are to be used.

3.03 COURSING AND BOND

- A. Course brick as shown on Drawings.
- B. Layup brick with approximately 3/8 in. bed joints, uniformly adjusted to produce the specified coursing. Make head joints the same width as bed joints.
- C. Layup brick in stretcher, header, rowlock, bull header (stretcher rowlock), soldier, or sailor position with only good faces and good ends showing. Cut brick to make headers in veneer and show good end only.
- D. Shapes: Provide shapes as indicated on Drawings, with finished faces at all locations where they will be visible in the Work. Do not cut brick to make shapes.
- E. Finish visible brick joints using non-rusting tools to form hard impervious surface by hard tooling to a concave profile "U" joint.
- F. Compress joints and cut flush in unexposed work except at joints below grade. Hard tool joints below grade to a concave profile.

3.04 INSTALLATION

- A. Lay brick plumb and true to lines, with level courses. Line up head joints vertically. Use no more than one cut closure in any length of wall. Line up closures vertically.
- B. Layup brick with completely filled mortar joints. Do not furrow bed joints. Butter end of brick with sufficient mortar to fill head joint, then shove in place. Rock closures in place with head joints thrown against two adjoining brick in place.

- C. Tap each unit to line and level as it is placed. Do not disturb any unit once in place except to completely remove and set in a fresh bed of mortar.
- D. Do not pound corners and jambs to fit stretcher units after they have been set in position. Where an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar.
- E. Make all cuts with power masonry saw. Do not use Sawcut faces in exposed work.
- F. Lay up only brick, which have no chipped, cracked or discolored exposed faces. Layup with good face showing, lip (if any) always down, frog (if any) always up. Where flat side is shown, provide a brick with flat un-torn side matching other brick faces, without frog, or core holes.
- G. Tool joints when thumbprint hard, compressing mortar tightly against both sides of joint. Make head joints match profile of bed joints.

3.05 ANCHORING

- A. Anchor exterior brick walls facing or abutting concrete members with dovetail or wire anchors inserted in slots built into concrete. Maximum anchor spacing: 16 in. vertically, 24 in. horizontally.
- B. Maintain at least 1/2 in. space between masonry and structural concrete beam or wall faces. Keep space free of mortar and other rigid material to permit differential movement. Anchor brick with dovetail or wire anchors 16 in. on center, inserted into dovetail slots in concrete.
- C. Maintain at least 1/2 in. space between masonry and steel or concrete columns. Place 1/2 in. semi-rigid fiberglass board over steel before laying masonry. Do not mortar space between masonry and steel or concrete columns.
- D. Where bearing walls or non-bearing partitions abut a concrete or steel column, anchor wall to column with dovetail or wire anchors 16 in. on centers, inserted into dovetail slots in concrete or welded to steel.
- E. In brick veneer work over cold-formed steel framing, install anchors as specified in Section 040523 – Masonry Accessories.

3.06 WALL INTERSECTIONS

- A. At intersecting bearing or shear walls, which are carried up separately, regularly block vertical joints 3 courses at a time, with 8 in. maximum offsets. Provide joints with rigid steel anchors. Space anchors 48 in. maximum vertically.
- B. At non-bearing partitions, which abut or intersect other walls or partitions, anchor with cavity wall ties at 24 in. maximum vertical intervals. Alternative method: carry wall reinforcement through intersection, and lap at least 8 in.

3.07 HORIZONTAL REINFORCEMENT

- A. Place horizontal masonry wall reinforcement in bed joints 16 in. on center vertically, with an additional piece above and below openings, extending at least 24 in. beyond each side of opening.
 - 1. At parapet walls with CMU back-up, place horizontal masonry wall reinforcement in bed joints 8 in. on center vertically.

- B. Embed side rods full length of wall, with 5/8 in. minimum mortar cover on exterior side, 1/2 in. cover elsewhere.
- C. Lap reinforcement 6 in. at ends. Do not carry reinforcement through expansion joints and control joints.
- D. Carry reinforcement around corners by cutting one side rod and bending other rod to form a corner angle.
- E. Where masonry walls or partitions intersect, bond together by lapping wall reinforcement. Exception: Do not bond at expansion or control joints.
- F. Tie plumbing walls together with wall reinforcement 16 in. on center, or hooked steel bars providing equal cross-sectional steel area, placed so as not to interfere with plumbing.
- G. At cavity walls place drip pointing downward within cavity.

3.08 FLEXIBLE IN WALL FLASHING

- A. Place wall flashing over a thin bed of mortar, always sloping flashing slightly to exterior. Place mortar over flashing to bed brick course above it.
- B. Turn wall flashing at least 8 in. up behind brick and anchor top edge as per detail shown in drawings.
- C. Tape, or seal with asphalt cement, all penetrations in wall flashing. Extend wall flashing around outside of structural columns. Extend wall flashing at least 4 in. beyond lintels and sills and turn up ends to form a pan, which directs moisture to exterior. Lap wall flashing joints at least 4 in. Extend wall flashing to within 1/4 in. of exterior of mortar joint.

3.09 WEEP HOLES

- A. See Section 040523 – Masonry Accessories for Wall Drainage and Ventilation.

3.10 OTHER WORK

- A. Build in lintels, door frames, windows, flashing, insulation, reglets, inserts, anchors, blocking, sleeves, boxes, cabinets, piping, conduit, and other items whether provided as part of masonry work, as preparation for other work, or furnished by other trades.
- B. Fill steel door frames in masonry walls with grout.
- C. Provide passage for electrical and mechanical lines. Allow and aid placement in walls where lines would be exposed. Cut neat holes for in wall switches and cabinets. Make provisions for passage of lines, and other chases and openings, during laying up of masonry so that later cutting is not necessary. Fill holes after lines and boxes are in place.
- D. Maintain sealant clearances at door, window, and other openings.
- E. Provide lintels at all openings in masonry work, as needed to form openings for windows, louvers, frames, in--wall equipment, through wall ducts and piping, and as otherwise needed to support heads of all openings over 8 in. wide.

3.11 CONTROL OF MOVEMENT

- A. For expansion joints, leave full width of joint free of masonry, mortar and reinforcement, ready for backup material and sealant.
- B. For control joints, insert control joint material and leave joint free of masonry and reinforcement.
- C. If control joints are not shown, place them vertically not more than 24 ft on center, within 2 ft of building corners, and at lines of weakness such as at steel columns, changes in building height, and at each side of openings over 8 ft high.
- D. Do not butter masonry units to steel members, except where masonry bears on steel. Maintain 1/2 in. clearance. Fill vertical clearances with 1/2 in. semi-rigid fiberglass or other sort, incombustible board material.
- E. Build non-bearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or slate wedges and fill top joint with mortar.
- F. Straighten and position anchors and protruding reinforcement, which were placed in, reinforced brick lintel concrete to bond fine grout to concrete beam.

3.12 PROTECTION

- A. Wall covering:
 - 1. Cover tops of partially completed walls with strong, non--staining, waterproof membrane, securely held in place, extending at least 24 in. down both sides of wall at start of rain, and at end of each day's work on wall.
 - 2. Clamp protective membrane in place using spring wire clamps.
- B. Load application:
 - 1. Do not apply dead, live floor, or roof loading for at least 24 (twenty-four) hours after building masonry columns or walls.
 - 2. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.
- C. Staining:
 - 1. Prevent mortar, grout, and cleaning agents from adhering to, staining or deteriorating masonry and other surfaces to be left exposed or painted.
 - 2. Remove mortar, grout, and cleaning agents from masonry and other surfaces daily. Remove them from sensitive surfaces such as aluminum and glass immediately.
 - 3. Protect sills, ledges, and projections from mortar droppings by means of taped paper guards or a layer of sand.
 - 4. Protect door and window frames during masonry construction. Maintain in plumb, square, true position.

3.13 REPAIR OF DEFECTIVE WORK

- A. Remove stained and damaged brick and replace with new units in fresh mortar bed, of color and tooling matching surrounding work. Repair voids and other defects in mortar joints.

3.14 CLEANING BRICK

- A. Start cleaning late in the work, after mortar is thoroughly cured.

- B. Dry clean walls before wetting. Remove large particles of mortar with wood paddles and scrapers. Use chisel or wire brush only when wood implements do not work.
- C. Soak wall with copious amounts of clean water from hose, flushing off loose mortar and dirt in the process.
- D. Scrub walls with detergent cleaning agent, using stiff fiber brush.
- E. Rinse off all detergent, dirt, and mortar crumbs using clean water from hose.
- F. Do not use any acid or acid compounds in cleaning brick masonry.
- G. No air blast or sand blast cleaning of masonry shall be allowed.

END OF SECTION 042113

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Specifications, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes Concrete Masonry Units (CMU) as shown on the Contract Drawings and specified herein.
- B. This Section also includes masonry bond beam lintels.
- C. Mortar, grout and masonry accessories are specified elsewhere.
- D. Related Sections: Sections that contain requirements that relate to this Section include, but are not limited to, the following:
 - 1. Section 034500 - Precast Architectural Concrete
 - 2. Section 036000 - Grouting
 - 3. Section 040513 - Mortar
 - 4. Section 040523 - Masonry Accessories
 - 5. Section 042113 - Brick Masonry
 - 6. Section 042300 - Glass Unit Masonry

1.03 STANDARDS

- A. ACI-530/ASCE5/TMS402 "Building Code Requirements for Concrete Masonry Structures and Commentary".
- B. ACI 530.1/ASCE 6/TMS 602 "Specification for Masonry Structures".
- C. ASTM A615 "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".
- D. ASTM C55 "Standard Specification for Concrete Building Brick".
- E. ASTM C90 "Standard Specification for Loadbearing Concrete Masonry Units".
- F. ASTM C140 "Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units".
- G. ASTM C426 "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units".
- H. ASTM C1634 "Standard Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units".
- I. ASTM E119 "Standard Test Methods for Fire Tests of Building Construction and Materials".
- J. ASTM E514 "Standard Test Method for Water Penetration and Leakage Through Masonry".
- K. National Concrete Masonry Association (NCMA) "TEK Notes".
- L. Portland Cement Association (PCA) "Recommended Practices for Laying Concrete Block".
- M. UL 263 "UL Standard for Safety Fire Tests of Building Construction and Materials".

- N. UL 618 "UL Standard for Safety Concrete Masonry Units".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data:
 - 1. Material Certificates for each type and size of masonry units:
 - a. Include material test reports substantiating compliance with requirements.
 - b. For masonry units include data and calculations establishing average net-area compressive strength of units.
 - 2. CMU cleaning agents if any.
 - 3. Reinforcing Steel: Submit steel producers' certificates of mill analysis, tensile and bend tests for reinforcement steel required for masonry reinforcing.
- D. Certification of Compliance: Furnish test reports attesting to compliance with UL-263 or certificates attesting to compliance with UL-618, each or both of which acknowledge compliance with fire ratings specified and strength requirements specified.
- E. Shop Drawings: Submit shop drawings for fabrication, bending and placement of reinforcement bars. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.

1.05 QUALITY ASSURANCE

- 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 a single source, a single production run, and from a single manufacturer for each product required.
- B. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 402/602 unless modified by requirements in the Contract Documents.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage
- C. Deliver and handle materials in such a manner as to prevent damage. Store concrete unit masonry and packaged material above ground on wood pallets or blocking and protect from weather until used. Do not double stack. Immediately remove from job site all damaged or otherwise unsuitable material. If units become wet, do not install until they are dry.
- D. Receive, store, and protect construction materials in ways that prevent water from entering materials.
- E. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- F. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- G. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.07 SPECIAL INSPECTIONS

- A. The Owner will engage the services of a Special Inspector for this project. The Special Inspector will provide inspection and testing requirements as necessary in accordance with the provisions of the Building Code.
- B. In accordance with the Statement of Special Inspections, the Special Inspector shall provide, and coordinate inspections and verifications as noted on Contract Drawings.
- C. The Special Inspector shall submit copies of reports to Architect, Engineer, Owner's Site Representative and Contractor on day that tests are made. Include date of testing, weather conditions, building location and test location.

1.08 SAMPLE PANEL

- A. Before commencing concrete unit masonry work, erect a sample panel at job site for each separate exposed concrete masonry wall or partition. Locate panels where directed by Architect.
- B. Sample panel size for each wall or partition: not less than 6 ft wide by 4 ft high or size shown on Contract Drawings. Construct each sample panel representative of color and texture of the concrete unit masonry and veneer masonry, cavity insulation, bond, reinforcement, jointing, mortar, flashing, weeps and workmanship. Build in conjunction with brick sample panel. Modify panel as required by Architect.
- C. Do not start **any** concrete unit masonry work until sample panel has been approved by Architect **in writing**. Leave approved sample panel in place during erection of masonry work. Protect approved sample panel against weather and damage. Remove sample panel from site when so directed by Architect.
- D. Sample panel should be used for testing of cleaning methods.

1.09 PROJECT/SITE CONDITIONS

- A. At end of day, or during a shut-down, protect top surface of all masonry to prevent rain from entering the masonry. Install protection, adequately anchored, to prevent water intrusion to cover top surface and extend a minimum of 2 ft down all sides of masonry.
- B. Brace walls according to NCMA and ANSI requirements.
- C. Prevent and remove immediately any mortar, grout and soil droppings that come in contact with CMU and/or brick.
- D. Protect base of walls from rain-splashed mud and mortar by means of coverings on ground and over wall surface.
- E. Protect sills, ledges, and projections from mortar droppings.

- F. Turn scaffold boards near the wall on edge at the end of the day to prevent rain from splashing mortar and dirt onto completed masonry.
- G. Cold Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- H. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 402/602.
- I. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS, GENERAL

- A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates, cement, and cement replacement products (i.e. flyash, etc.) that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the Project site.

2.02 INTERIOR CONCRETE MASONRY UNITS

- A. Hollow load bearing, normal weight, Type I, conforming to ASTM C90, Type 1. Specified concrete masonry strength, $f'm = 2,000$ psi. (masonry unit net area compressive strength = 2,800 psi.).
- B. Hollow non-load bearing, normal weight, Type I, conforming to ASTM C129, fire resistance rating: 2 hour conforming to UL 618, as indicated on Drawings.
- C. Unit Thickness: as indicated on drawings using longest standard units compatible with coursing. See Drawings for unit heights.
- D. When more than one combination of criteria is specified, see Drawings for locations.

2.03 MASONRY LINTELS

- A. General:
 - 1. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
 - 2. Steel Lintels: Install multiple Steel angle lintels as indicated on the drawings. Provide Hot-dip galvanized lintels for exterior installations.

2.04 REINFORCEMENT

- A. Uncoated, deformed steel reinforcing bars: Complying with ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).
 - 1. Shop-fabricate reinforcement bars which are shown to be bent or hooked.

- B. Horizontal masonry joint reinforcing is specified in Section 040523 - Masonry Accessories.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine all surfaces to receive parts of the Work specified herein. Verify all dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the adjacent and underlying construction.
1. Verify that foundations are within tolerances specified.
 2. Verify that reinforcing dowels in foundation walls are properly placed.
- B. In cavity wall construction, verify all masonry veneer anchors extending thru cavity wall insulation are clean of any foreign substances. Any required cleaning of masonry eyelets, plates, etc. must be completed **before** the start of veneer construction. Verify cleaning method has not damaged or bent veneer anchors.

3.02 GENERAL WORKMANSHIP

- A. Provide all masonry construction aligned, plumb and true in required layout, making straight level courses, unless otherwise specifically indicated. Construct masonry to full thickness as shown with masonry units of sizes as noted and specified, using whole units wherever possible. Cut masonry neatly by power saw to obtain sharp edges without damage, as approved for providing required bond pattern and proper fit at all adjoining construction. Build-in items and leave accurate openings necessary to accommodate installation of other work, in a manner to maintain required strength and appearance of masonry construction. Fill solidly and neatly around conduits and pipes passing through masonry, using mortar unless escutcheons will be used.
- B. No CMU smaller than 4" shall be installed in any wall or work area.
1. The mason shall contact the Architect for interpretation if it appears that smaller than 4" CMU is required.
 2. If the mason installs CMU smaller than 4", he, she or they shall bear the responsibility to remove and replace all effected work.
- C. All exposed CMU at corners to be return corner block.
- D. Exposed outside corners of interior CMU to be bullnose.

3.03 CONSTRUCTION TOLERANCES

- A. Construct unit masonry within following tolerances:
1. Maximum variation from plumb in vertical lines and surfaces of columns, walls, and arises and in alignment of head joints:
 - a. 1/4 in. in 10 ft.
 - b. 3/8 in. in a story height not to exceed 20 ft.
 - c. 1/2 in. in 40 ft or more.
 2. Maximum variation from plumb for external corners, expansion joints and other conspicuous lines:
 - a. 1/4 in. in any story or 20 ft maximum.
 - b. 1/2 in. in 40 ft or more.
 3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves, joints, and other conspicuous lines:
 - a. 1/4 inches in any bay or 20 feet.
 - b. 1/2 in. in 40 ft or more.

4. Maximum variation from plan location of related portions of columns, walls and partitions:
 - a. 1/2 in. in any bay or 20 ft.
 - b. 3/4 in. in 40 ft or more.
5. Maximum variation in cross-sectional dimensions of columns and thicknesses of walls from dimensions shown on Drawings:
 - a. Minus 1/4 in.
 - b. Plus 1/2 in.

3.04 COURSING

- A. Lay walls/partitions as shown on Drawings.

3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow units with full mortar coverage on horizontal and vertical face shells. Bed webs in all courses of piers, columns, and pilasters, and in starting course on footings and solid foundation walls, and where adjacent to cells or cavities to be reinforced or filled with grout or concrete. Lay solid units with full head and bed joints.
- B. Mortar joints: 3/8 thick except where otherwise indicated.
 1. Exposed joint profile: concave.
 2. Concealed joint profile: flush
 - a. All CMU to receive ceramic tile shall have all joints in that face finished flush and smooth.
 3. Locations of different joint widths and profiles are shown on the Contract Drawings.
- C. Bond intersecting non-load bearing walls together in same manner as load bearing walls, except that non-load bearing partitions 8 in. or less in thickness may be anchored to each other and to other walls with Architect approved types of accessories specified in Section 040523 Masonry Accessories.
- D. Provide preformed resilient filler strips specified, minimum 3/8-inch thick, between tops of walls and undersides of slabs, or decks, or against abutting construction. Set filler strips in joints as masonry is laid up with lengths of strips butted together and all strips firmly compressed. Use solid masonry units, solidly filled units, or end units at such locations.
- E. At steel and/or structural concrete columns, provide anchors specifically designed and suited to each condition encountered and as specified in Section 040523 - Masonry Accessories as applicable.
- F. At steel columns and elsewhere as indicated, provide preformed resilient filler strips specified. Completely cover all surfaces of columns to be encased in masonry. Neatly fold and fit covering tightly against flange and web surfaces and secure against displacement by taping or tying in place as applicable.
- G. Where masonry units abut steel and/or structural concrete columns where such joints are exposed to view, use corner block units to create a straight line joint/interface between the two materials.
- H. Lintels:
 1. Install loose lintels in all required locations (masonry openings wider than 18 inches). Note that not all openings requiring loose lintels are detailed on the Contract Drawings. Provide steel angle lintels itemized in the loose lintel schedule on the Contract Drawings. Lintels at exterior openings and where otherwise indicated shall be galvanized.
 2. Provide minimum 8 inches bearing at each jamb, U.N.O. and bed lintels in mortar.

- I. Refer to Section 040523 - Masonry Accessories for information on thru-wall flashing.
- J. Grout hollow metal frames in masonry walls solidly with grout. Perform grouting without clogging holes, boxes, or spaces, required for the proper installation, or operation of hardware.
- K. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat, uniform appearance.
- L. Set precast concrete trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Allow cleaned surfaces to dry before setting.
 - 3. Wet joint surfaces thoroughly before applying mortar.

3.06 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. Install flashing in accordance with NCMA TEK 19-04A, *Flashing Strategies for Concrete Masonry Walls*; NCMA TEK 19-05A, *Flashing Details for Concrete Masonry Walls*; and details shown on the Contract Drawings.
- B. General: Install embedded flashing and weep holes in masonry at base of wall, shelf angles, lintels, ledges, other obstructions to the downward flow of water in the cavity, and where shown on the Contract Drawings.
- C. Install flashing as follows, unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping mortar bed and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At multiwythe masonry walls, including cavity walls and at masonry veneer walls extend flashing through veneer, across air space behind veneer, and up the face of the sheathing or inner masonry wall a minimum of 8 inches or as shown on the Contract Drawings which ever is greater. Install stainless steel termination bar at top of all flashings unless noted otherwise. Apply sealant to top edge of termination bar.
 - 3. Install stainless steel drip plate at exterior termination of flashing. Seal through-wall flashing to top of drip plate.
 - 4. At lintels, shelf angles, heads, sills, etc. provide end dams at ends of all through-wall flashing.
 - 5. Lap all joints in flashing in accordance with flashing manufacturers recommendations.
 - 6. At inside and outside corners where through wall flashing is required provide preformed flashing corners or neatly cut and fold flashing, adding additional material where required and sealing all joints in accordance with manufacturer's recommendations to form a continuous waterproof membrane.
- D. Provide weep capability in mortar joints at 24" on center horizontally at base of each exterior wall by means of a manufactured insert installed in accord with manufacturer's published instructions.
- E. Provide weep capability in mortar joints at 24" on center (or spacing as shown on the Contract Drawings) horizontally at base of all through wall flashings at sills, lintels, shelf angles and any other location of through wall flashing.

- F. Provide vent capability in mortar joints at 24" on center horizontally at the tops of all cavity walls by means of a manufactured insert installed in accordance with manufacturer's published instructions.

3.07 INSTALLATION

- A. Lay out walls in advance for accurate spacing of bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and where possible at other locations. Where required to provide bond pattern, dry cut units with saw and then thoroughly clean to remove cementitious sawings. Install to fit adjoining work neatly, all with clean, sharp, unchipped edges.
- B. Use only dry CMU - do not wet.
- C. Build walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- D. Install door frames, interior hollow metal window frames, lintels and other items furnished by other sections designed to be anchored into CMU construction as CMU is built.
- E. Construct recesses in interior CMU walls to accommodate recessed or semi-recessed cabinets and/or equipment.
- F. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Space anchors 48" o.c. unless otherwise indicated. In some instances, structural edge angles may be used on each side of CMU wall at intersection with floor/roof.
 - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078400 - Firestopping.
- G. Lay masonry in a one-half running bond pattern with vertical joint in each course centered on units in courses above and below unless indicated otherwise on Contract Drawings.
- H. All masonry shall be laid on a full bed of mortar coverage or horizontal and vertical face shells and webs. All head and bed joints to be tooled.
- I. Fill cores in hollow CMUs with grout a minimum 24" under bearing plates, beams, lintels, posts, and similar items unless otherwise noted.
- J. When stopping and resuming work, in each course rack back 1/2-unit length. Do not tooth. Clean exposed surfaces of set masonry and remove loose CMU and mortar prior to laying new CMU.

3.08 PLACING REINFORCEMENT

- A. Provide joint reinforcement of types required for locations indicated or specified. Remove all deleterious matter from surfaces before placement, including loose rust and scale adversely affecting bond to mortar or grout. Install reinforcement in accurate position, aligned true and secured against displacement, with a minimum mortar cover of 5/8 in. at exterior face of walls and 1/2 in. at other locations.
- B. Provide deformed steel bars as vertical or horizontal reinforcement in masonry construction where indicated or specified. Place vertical bar reinforcing in as continuous lengths as

practicable, inserting after laying of masonry and before grouting. Use approved devices to support vertical reinforcement at top, bottom, and intervals not exceeding 160 bar diameters. Wet-setting reinforcement is not permitted. Install horizontal bars as masonry is laid up. Lap all bar reinforcement by distance equal to 48 diameters.

- C. Vertical bars must be placed within 1/2 inch of the location required within the thickness (out of plane) of the wall. For 12" CMU walls or pilaster, this tolerance can be increased to 1 inch.
- D. Reinforce bond beams with two (2) #5 bars unless otherwise noted.
- E. Provide minimum vertical reinforcing of one #4 bar in window and door jambs, at ends of walls, corners, and each side of vertical control joints. Locate bar a maximum of 16 inches from end of CMU. If typical vertical wall reinforcing noted is larger than #4, use the larger size.

3.09 GROUTING OF WALL CONSTRUCTION

- A. Use specified "fine" grout mixture to fill wall spaces up to 1-1/2 in. wide or to fill cells up to 4 in. size in hollow masonry units, and use specified "coarse" grout mixture only to fill spaces or cells having larger dimensions at all locations. Grout walls only after setting mortar has stiffened, and columns or pilasters have been braced or tied, as required to prevent displacement of masonry and reinforcement or ties due to pressure of grout pours. Clean and wet surfaces of preceding pour before placing new grout. Provide grouting in continuous manner, with not less than 30 minutes nor more than 1 hr between lifts of any given pour. If grouting is stopped more than 1 hr, form a horizontal construction joint by stopping pour 2 in. below top of uppermost masonry course. Remove all debris, mortar droppings or other matter from cavities and cells before grouting. Consolidate each grout lift with a rod to provide uniform flow into all spaces or voids.
 - 1. Low-lift Grouting Method: Provide low-lift grouting as the laying of masonry and placement of reinforcement progresses. For grouting of wall spaces, first lift may be placed up to 16 in. high but limit all subsequent pours to maximum 12 in. lifts placed before masonry coursing is 24 in. higher than preceding pour. For grouting of cells in adjacent hollow masonry units, allow setting mortar to cure at least 4 hr after laying masonry, and place grout in cells up to top masonry course at a maximum 48 in. height above preceding pour.

3.10 CONTROL JOINTS

- A. Refer to Section 040523 - Masonry Accessories for information on products.
- B. Install control joints at locations shown on the Drawings. If locations of control joints are not shown, provide vertical control joints spaced not to exceed 28 feet; locate joints at points of natural weakness in the masonry Work. This would include doors, windows, overhead doors and changes in heights of walls.
- C. Mortar Control Joints: Fill abutting cells of masonry units with mortar after installing asphalt felt at one side of joint to break the bond. Rake out joints to a depth of 3/8 inch.
- D. Pre-molded Control Joint Strips: Provide sash block units as required. Install joint strip as the Work progresses. Compress strips as masonry units are laid.
- E. Build non-bearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or slate wedges and fill top joint with mortar.
- F. Do not butter masonry units to steel members, except where masonry bears on steel. Maintain 1/2 inch clearance. Fill vertical clearances with 1/2 inch semi-rigid fiberglass or other sort, incombustible board material.

- G. Straighten and position anchors and protruding reinforcement which were placed in reinforced brick lintel concrete so as to bond fine grout to concrete beam.

3.11 REPAIR MASONRY

- A. At completion of the Work, fill with mortar and suitably tool all holes in joints of masonry surfaces to be exposed or painted. Repair any cracks in masonry. Cut out and repoint defective joints.
- B. Repair masonry construction as required due to damaged or defective work and where required to accommodate adjacent materials in an approved manner so that patching is not visually apparent.
- C. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match and install in fresh mortar, pointed to eliminate evidence of replacement.
- D. When pointing, tool all joints required to enlarge any voids or holes, except weep holes, and then completely fill with mortar. Point up all joints including corners, openings and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

3.12 CLEANING

- A. Shall commence after mortar is thoroughly set and cured. Remove large mortar particles by hand with wooden or non-metallic tools. Test cleaning methods on sample wall panel, leaving 1/4 panel uncleaned for comparison purposes.
- B. Obtain Architect's approval of sample cleaning before proceeding with cleaning of CMU.
- C. Clean CMU using ProSoCo Enviro Klean® 2010 All Surface Cleaner or approved equivalent recommended and approved by the CMU supplier.. Handle and apply per manufacturer's written instructions.
- D. No acid or acid based cleaners shall be used. Follow cleaning methods as per National Concrete Masonry Association TEK Spec 08-4A *Cleaning Concrete Masonry*.
- E. Dry brush CMU walls at end of each day's work and after final pointing. Leave clean and free from mortar spots and droppings.

3.13 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site and legally dispose of off Owner's property.

END OF SECTION 042200

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes, but not limited to, the following:
 - 1. Interior Glass Block Units, hollow or solid.
 - 2. Integral Joint Reinforcement.
 - 3. Mortar for glass block units.
 - 4. Accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 040513 - Mortar
 - 2. Section 042200 - Concrete Unit Masonry
 - 3. Section 079200 - Sealants

1.03 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: Catalog sheets, specifications, and installation instructions for glass blocks and accessories specified. Provide product data sheets for reinforcement, panel anchors, expansion joint material.
- D. Certifications: Provide certifications for glass block requiring a fire resistance rating, thermal properties, light transmission, and/or other specified properties.
- E. Samples:
 - 1. Glass Block: Full size units, each type required.
 - 2. Reinforcement: 12-inch-long, full section.
 - 3. Expansion Strip: 12-inch-long, full section.
 - 4. Panel Anchor: One (1).
 - 5. Color Mortar Sample: 5-inch square or 5-inch diameter sample.

1.04 QUALITY ASSURANCE

- A. Fire performance Characteristics: Fire resistance rated glass unit masonry assemblies are required. Provide materials and construction that are identical to those of window assemblies tested for fire endurance in accordance with ASTM E 163 and that are listed for fire rating indicated by UL or other acceptable testing and inspecting agency, meeting one (1) hour requirements.
- B. Single Source Responsibility for Glass Unit Masonry Assemblies: Obtain each type and pattern of glass unit masonry from a single source with resources to furnish products of consistent quality in appearance and physical properties without delaying the progress of the Work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver glass block for use in exposed work on pallets. Handle by mechanical means, by hand or tongs. Dumping will not be permitted.
- B. Store glass block off the ground in unopened cartons to prevent contamination by mud, dust or other materials likely to cause staining or other defects.
- C. Cover glass block, when necessary, to protect from the elements.
- D. Protect accessories from the elements.

1.06 PROJECT CONDITIONS

- A. Proceed with installation of glass unit masonry assemblies only when ambient and material temperatures are 40 degrees F and rising for the first 48 hours after construction.
- B. Sequence and coordinate completion of glass unit masonry so that sealants and joint fillers can be installed immediately after mortar has attained final set.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Seves Glass Block Inc., 10576 Broadview Rd., Broadview Hts, OH 44147, Phone: (877) 738-3711, or Architect approved equivalent.

2.02 GLASS BLOCK

- A. THICKSET 90 Glass Block, 8" x 8" x 4", classified by UL® for use as 60 minute-rated window assemblies, NUBIO pattern.
- B. Physical Properties for Straight Units:
 - 1. Sound Transmission Glass: 50 or higher.
 - 2. Thermal Resistance R Value (hr. ft²F/Btu): 1.95 or higher.
 - 3. Visible Light Transmission: Minimum 72 percent.

2.03 GLASS UNIT MASONRY ACCESSORIES

- A. Panel Reinforcement: Ladder-type, welded-wire units prefabricated with deformed, continuous side rods and plain cross rods into straight lengths of not less than 10 feet, and complying with the following requirements:
 - 1. Stainless-Steel Wire: ASTM A 580, Type 304 or 316, for use in reinforcement of exterior panels.
 - 2. Wire Size: 0.148-inch diameter.
 - 3. Spacing of Side Rods: 2 inches o.c.
 - 4. Spacing of Cross Rods: Not more than 16 inches apart.
- B. Panel Anchors: Glass block manufacturer's standard stainless-steel perforated steel strips, 22 gauge by 1-3/4 inches wide by 19 inches long. Type 304 stainless steel.
- C. Asphalt Emulsion: Water-based asphalt emulsion of type recommended by glass block manufacturer.

- D. Glass-Fiber Expansion Strips: Glass-fiber strips, yellow in color, complying with requirements of glass block manufacturer, 3 pound per cubic foot density, and 3/8-inch-thick by 4 inches wide by 24 inches long.
- E. Plastic-foam Expansion Strips: Polyethylene foam, white in color, complying with requirements of glass block manufacturer, and 3/8-inch-thick by 4 inches wide by 24 inches long.
- F. Sealant: Use fire retardant type sealant.

2.04 MORTAR MIXES

- A. Comply with referenced standards and with manufacturer's written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 - 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, and antifreeze compounds, unless otherwise indicated. Do not use calcium chloride.
 - 2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Mortar for Glass Unit Masonry Assemblies: Comply with ASTM C 270, Proportion Specification for Type S mortar. Limit cementitious materials in mortar to Portland cement and lime.
- C. Mortar for Glass Unit Masonry Assemblies: Provide mortar, mixed according to glass block manufacturer's listing with testing and inspecting agency, for fire-resistance rating indicated.
 - 1. Mix mortar to produce a stiff but workable consistency that is drier than mortar for brick or concrete masonry.
 - 2. For mortar in exterior panels, include waterproofing admixture in mortar mix according to written instructions of admixture manufacturer.
 - 3. For pointing mortar in exterior panels, include waterproofing admixture in mortar mix according to written instructions of admixture manufacturer.
- D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
 - 1. Color: As selected by Architect.
 - 2. Limit mineral-oxide pigments to not more than 10 percent of cement content by weight.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Examine sills, jambs, and heads surrounding glass unit masonry assemblies for compliance with requirements for installation tolerances and other conditions affecting performance of glass unit masonry assemblies. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Advise installers of other construction about specific requirements for placement of dovetail slots and other inserts required to anchor and support glass unit masonry

assemblies. Furnish installers of other construction with drawings or templates showing locations of these items.

- C. Construction Tolerances: Set glass block to comply with the following tolerances:
 - 1. Variation from Plumb: For lines and surfaces of vertical elements and arris, do not exceed $\frac{1}{4}$ inch in 10 feet, $\frac{3}{8}$ inch in 20 feet, or $\frac{1}{2}$ inch in 40 feet or more.
 - 2. Variation from Level: For bed joints, and other conspicuous lines, do not exceed $\frac{1}{4}$ inch in 20 feet or $\frac{1}{2}$ inch in 40 feet or more.
 - 3. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed $\frac{1}{2}$ inch in 20 feet or $\frac{3}{4}$ inch in 40 feet or more.
 - 4. Variation in mortar-Joint Thickness: Do not vary from joint thickness indicated by more than plus or minus $\frac{1}{16}$ inch.
- D. Sill, Head, and Jamb Preparation: Apply a heavy coat of asphalt emulsion to sill; allow drying before placing mortar. Place expansion strips at jambs and heads, taking care to extend them to sill. Trim expansion strips to produce width required to fit glass-block construction indicated.
 - 1. Adhere expansion strips to heads and jambs with asphalt emulsion.

3.02 CONSTRUCTING GLASS UNIT MASONRY ASSEMBLIES

- A. Set glass block with completely filled bed and head joints, with no furrowing.
- B. Install glass block to comply with dimensional tolerances specified, with courses accurately spaced and coordinated with other construction.
- C. Install panel reinforcement in horizontal joints at spacing indicated and to run continuously from end to end of panels; comply with the following requirements:
 - 1. Do not bridge expansion joints with panel reinforcement.
 - 2. Place panel reinforcement in joints immediately above and below all openings within glass unit masonry assemblies.
 - 3. Lap panel reinforcement not less than 6 inches if more than one length necessary.
 - 4. Embed panel reinforcement in mortar bed by placing lower half of mortar bed first, pressing panel reinforcement into place and covering with upper half of mortar bed, and then trowel it smooth.
- D. Install panel anchors at locations indicated and in same horizontal joints where panel reinforcement occurs. Extend panel anchors at least 12 inches into joints and bend within expansion joints at edges of panels and across the head. Attach panel anchors as follows:
 - 1. For in-place unit masonry assemblies, attach panel anchors with $\frac{1}{4}$ inch diameter expansion anchors, 2 per panel anchor.
 - 2. For new unit masonry assemblies, embed other ends of panel anchors, after bending portions crossing expansion joint, in horizontal mortar joints closet in elevation to joints in glass unit masonry assemblies containing panel anchors.
 - 3. For steel members, attach panel anchors with $\frac{1}{4}$ inch diameter steel bolts in tapped holes in steel members.
- E. Use rubber mallet to tap units into position. Do not use steel tools, and do not allow units to come into contact with metal accessories and frames.
- F. Use wedges in mortar joints of lower courses where needed to prevent mortar from being squeezed out of joints.

- G. Keep expansion joints free of mortar.
- H. Rake out joints indicated to be pointed to a uniform depth sufficient to accommodate pointing material, but not less than joint width.
 - 1. Point joints at exterior face of exterior panels with mortar.
 - 2. Point joints at both faces of exterior panels with mortar.
 - 3. Point joints at exterior faces of exterior panels with sealant.
 - 4. Point joints at both faces of exterior panels with sealant.
 - 5. Point joints at both faces of both exterior and interior panels with sealant.
- I. Fill raked joints and voids with pointing mortar. Place and compact pointing mortar in layers not greater than 3/8 inch thick. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- J. Tool exposed joints slightly concave when pointing mortar is thumbprint hard. Use a smooth jointer larger than joint width.
- K. Remove wedges or spacers, if used, and fill voids with mortar.
- L. Clean glass unit masonry assemblies as work progresses. Remove mortar fins and smears before tooling joints, while mortar is still plastic, using a clean, wet sponge or a scrub brush with stiff fiber bristles. Do not use harsh cleaners, acids, abrasives, steel wool, or wire brushes when removing mortar or cleaning glass unit masonry assemblies.

3.03 CLEANING

- A. On surfaces adjacent to glass unit masonry assemblies, remove mortar and other residue resulting from installation of glass block, in a manner approved by manufacturers of materials involved.
- B. Remove excess sealants with commercial solvents of type recommended by sealant manufacturer. Exercise care not to damage sealant in joints.
- C. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Start at top of panel using generous amounts of clean water. Remove water with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION 042300

PAGE INTENTIONALLY BLANK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Grout.
 - 3. Base Plates.
- B. Related Requirements:
 - 1. Division 01 - "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Section 053100 - "Metal Decking" for field installation of shear connectors through deck.
 - 3. Section 055000 - "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame not defined as structural steel.
 - 4. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" and for surface-preparation and priming requirements.

1.03 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches (38 mm).
 - 2. Welded built-up members with plates thicker than 2 inches (50 mm).
 - 3. Column base plates thicker than 2 inches (50 mm).

1.04 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.05 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.06 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.

1. Shop drawings and required calculations shall bear the seal and signature of a registered Professional Engineer licensed in the state in which the project is located. Structural steel shop drawings will not be reviewed without said seal and signature.
 - a. A full set of engineered calculations for all beam to column moment connections shall be submitted to the engineer of record for approval. The steel fabricator drawings shall not be reviewed without said engineering calculations affixed with a seal and signature of a professional engineer licensed in the state in which the project is located.
 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 3. Include embedment Drawings.
 4. Indicate profiles, sizes, spacing and locations of structural members, openings, attachments, fasteners, connections, cambers, holes and other pertinent data. Include locations of structural members, openings, attachments and loads.
 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 7. For structural steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.07 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer / fabricator.
- B. Welding certificates: Submit certificates certifying that welders employed in the work have met AWS qualifications within in the previous 12 months.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties. Indicate structural strength, destructive and non-destructive test analysis.
- E. Product Test Reports: For the following:
 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Non-shrink grout.

1.08 QUALITY ASSURANCE

- A. Fabricator shall have a minimum of five (5) years documented experience with performing the work of this section.
- B. Installer Qualifications: A qualified installer specializing in performing the work of this section with a minimum of three (3) years of documented experience.

- C. Delegated Connection Designer: Connections not fully detailed on the contract drawings shall be designed under the direct supervision of a professional structural engineer experienced in the design of this work and licensed in the state in which the work is located. The shop drawings shall bear the seal and signature of same professional engineer.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
 - 2. Welders who are welding structural members fabricated in the shop or in the field, in the five boroughs must have a NYCDOB issued welder licence.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges - AISC 303.
 - 2. AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings - AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts."

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products to/at the site under the supervision of Division 01 of this Project Manual.
- B. Schedule deliveries of materials to the site at intervals which will ensure uninterrupted progress of the work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and experience. who bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F1852 fasteners and for retesting fasteners after lubrication.

1.10 COORDINATION

- A. Coordinate the work under Division 01 specification of this Project Manual.
- B. Coordinate the selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturer's recommendations to ensure that shop primers and topcoats are compatible with one another.
- C. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions and directions for installation.
- D. Coordinate the work of this section with utility installations and all other adjacent work.

- E. Coordinate the work of this section such that general progress of the Work is not interrupted.

1.11 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on the plans and approved shop drawings.
- B. The contractor is responsible for the proper location and elevations of the work.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated where beam end reactions are not shown on drawings. Connection designer shall design shear connections to resist the reaction resulting from the maximum allowable uniform load of the beam found in the AISC Specification being applied along its full length.
 - 1. Select and complete connections using AISC 360.
 - 2. Use Load and Resistance Factor Design; data are given at factored-load level.
- B. Moment Connections: Type FR, fully restrained. Provide design and details of moment connections to resist forces shown on the contract drawings.
- C. Construction: Moment frame and Braced frame.

2.02 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. W-Shapes: ASTM A 992/A 992M.
- C. Channels, Angles, M-Shapes: ASTM A 36/A 36M.
- D. Plate and Bar: ASTM A 36/A 36M.
- E. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C, seamless structural tubing.
- F. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
 - 1. Weight Class: as indicated on the contract documents.
 - 2. Finish: Black except where indicated to be galvanized.
- G. Welding Electrodes: Comply with AWS requirements.

2.03 BOLTS, CONNECTORS, AND ANCHORS

- A. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.

2. Direct-Tension Indicators: ASTM F959/F959M, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490 (A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers with plain finish.
 1. Direct-Tension Indicators: ASTM F959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 1. Finish: Plain.
- E. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Anchor Bolts: ASTM A307, Grade C for non-moment resisting anchor rods. ASTM F1554, 36 and 55 ksi yield strength for moment resisting anchor rods.
 1. Nuts: ASTM A563 heavy-hex carbon steel.
 2. Plate Washers: ASTM A36/A36M carbon steel.
 3. Washers: ASTM F436/F436M, Type 1, hardened carbon steel.
 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- G. Threaded Rods: ASTM A 36/A 36M.
 1. Nuts: ASTM A563 ASTM A563M heavy-hex carbon steel.
 2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 3. Finish: Plain.
- H. Clevises: Made from cold-finished carbon steel bars, ASTM A108, Grade 1035.
- I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1030.
- J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1018.

2.04 PRIMER

- A. Primer: Comply with Division 09
- B. Primer: SSPC-Paint 15, Type I, red oxide.
- C. Ensure primer is compatible with required topcoat.
- D. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.05 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

- B. Grout shall consist of a premixed compound with cement, water reducing and plasticizing additives capable of developing a minimum compressive strength of 7000 psi at 28 days.

2.06 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A6/A6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. All wide flange structural steel members shall be fabricated in accordance with ASTM A992/A992M. All miscellaneous steel members including channels, angles, S, HP, and M shapes shall be fabricated in accordance with ASTM A36/A36M.
 - 6. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 - 7. All shop connections shall be welded or high strength bolted.
 - 8. Bearing surfaces shall be planed true to provide full bearing over the entire surface.
 - 9. Continuously seal joined members by intermittent welds and plastic filler. Grind welds smooth where exposed or where interference with other building materials is encountered.
 - 10. Splicing is not permitted unless indicated on the Contract Documents or accepted on the final approved Shop Drawings.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces. Mechanically thermal cut bolt holes shall not be permitted unless prior approval by the Architect is obtained in writing.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning," unless a more stringent cleaning method is required for selected primers and / or other coatings.
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Shop prime non-exposed steel members after fabrication in accordance with SSPC- PA. Do not prime surfaces that will be fireproofed, field welded or are in contact with concrete or high strength bolts.
- H. Paint exposed structural steel members in accordance with the applicable Division 09 Specification section.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning unless approved by the Architect in writing.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.07 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened unless otherwise shown on the contract documents or required by the connection designer.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.08 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.09 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 - 1. Inspection and Tests will not relieve the contractor of responsibility for providing materials, fabrication and erection procedures in compliance with the specified requirements. The contractor shall verify that all materials meet or exceed the requirements specified in these specifications, Contract drawings and related references. Materials not in compliance with the specified requirements will be rejected and required to be removed from the site.
- C. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M , Grade A325 or Grade A490 Bolts."
- D. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M type required for materials being welded and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3. Ultrasonic Inspection: ASTM E164.
 - 4. Radiographic Inspection: ASTM E94.
- E. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other drawings for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other drawings showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation will indicate that the erector accepts the conditions which exist.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
 - 2. Clean bearing surfaces and other surfaces which will be in permanent contact with the work.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Proceed with the installation only after unsatisfactory conditions have been corrected. Commencement of installation will indicate that the erector accepts the conditions which exist.
- C. Allow for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Coordinate placement of anchors in concrete or masonry construction for securing bearing plates.
- E. Erect all components in accordance with the approved shop drawings.
- F. Field weld components and shear studs as indicated on approved shop drawings and in accordance with AWS D1.1/D1.1M.
- G. Do not field cut or alter structural members without written approval of the Engineer.
- H. Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
 - 5. Coordinate placement of anchors in concrete or masonry construction for securing base plates.
- I. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- J. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- K. Splice members only where indicated.
- L. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- M. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

- N. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- O. Erect all components in accordance with approved shop drawings. After erection, prime welds, abrasions and surfaces not shop primed or galvanized as required, except surfaces to be in contact with concrete.
- P. Field weld components and shear studs as indicated on the approved shop drawings and in accordance with AWS D1.1/D1.1M.

3.04 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened Pretensioned unless specifically identified as pretensioned or slip-critical on the contract documents or calculations by the Delegated Connection designer.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
 - 4. Connections and abrasions shall be cleaned, prepared and finished in the same manner and with the same materials used in shop finishing.

3.05 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test high strength bolted connections according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94.

- E. Post Installed Mechanical Anchors, Adhesive Anchors and Screw Anchors: Comply with 2020 New York State Building Code Table 1705.3.
 - 1. The special inspection shall include the verification of compliance with approved construction documents and standards established by the Commissioner pursuant to Section 28-113.2.2 of the Administrative Code.
- F. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 TOLERANCES

- A. All members shall be installed within AISC tolerances and as follows:
 - 1. Maximum variation from plumb: 1/4" (6mm) per story, non-cumulative.
 - 2. Maximum offset from true alignment: 1/4" (6mm).

3.07 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Touchup Priming: Cleaning and touchup priming as specified in Division 9 "High-Performance Coatings" or compatible primer established at the fabricators shop to be compatible with the final finish.

3.08 ADJUSTING

- A. All misfits due to errors in location, fabrication, inaccuracies in the setting of anchor bolts or other items of attachment or support shall be immediately reported to the Engineer and corrected in a manner subject to the approval of the Engineer.
- B. Submit method of correction to the Architect under Division 01 Specification provisions.
- C. Proceed with corrective work only after receiving written approval from the Architect.
- D. All corrections shall be made at no additional cost to the Owner.

END OF SECTION 051200

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Open web steel joists with bridging.
 - 2. Joist Girders with bridging.
 - 3. Loose bearing plates and anchors for site placement.
 - 4. Framed openings greater than 18 inches.
 - 5. Joist accessories.

1.03 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."
- C. Fabricator: Company specializing in performing the work of this section with a minimum of five (5) of documented experience.
- D. Erector: Company specializing in performing the work of this section with a minimum of three (3) of documented experience.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, structural steel paint, high strength bolts including nuts and washers.
- B. Shop Drawings:
 - 1. Include layout, designation, number, type, location, and spacing of joists.
 - 2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
 - 3. Indicate locations and details of bearing plates to be embedded in other construction.
 - 4. Indicate welded connections with AWS D2.0 welding symbols. Indicate weld lengths.
 - 5. Design of connections not detailed on the drawings shall be accomplished under the direct supervision of a professional structural engineer experienced in the design of this work and licensed in the state in which the project is located.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and professional engineer.
- B. Welding certificates.
 - 1. Submit certificates certifying that welders employed on the project have met AWS Qualification within the last 12 months.
- C. Manufacturer certificates: Certify that products meet or exceed specified requirements..

- D. Mill Certificates: For each type of bolt.
- E. Qualification Data: For Manufacturer. Company specializing in performing the work of this section with minimum of 5 years documented experience.
- F. Erector: Company specializing in performing the work of this section with minimum of three (3) documented experience.
- G. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the project is located.
- H. Field quality -test and inspection reports.
- I. Research / Evaluation Reports: For Joists.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
 - 1. Maintain one copy of document on site.
 - 2. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications and under the provisions of Section 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING.
- B. Schedule deliveries of materials to the site at intervals which will ensure uninterrupted progress of the work.
- C. Do not store or handle joists in a manner which will damage or distort the joists or supporting structures.
- D. Do not store joists directly on the ground.
- E. Store materials in a manner which will permit easy access for inspection and identification.
- F. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.08 SEQUENCING

- A. Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

1.09 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on the drawings and approved shop drawings and as required by the manufacturer.
- B. The contractor is responsible for the proper locations and elevations of all work involved in this section.

1.10 COORDINATION

- A. Coordinate the work under provisions of Division 01 specification of the contract documents.
- B. Coordinate the work of this section with utilities and mechanical work installation and all other adjacent work.
- C. Coordinate the placement of anchor bolts with the installation of masonry work.
- D. Coordinate the work of this section such that the progress of the construction work is not interrupted.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.
 - 1. Use ASD; data are given at service-load level.
 - 2. Design special joists to withstand design loads with live-load deflections no greater than the following:
 - a. Floor Joists: Vertical deflection of 1/360 of the span.

2.02 K, LH-SERIES, AND JOIST GIRDERS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series", "Standard Specifications for Longspan Steel Joists, LH-series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists. Size as indicated on the drawings.
 - 2. Joist Type: LH series steel joists. Size as indicated on the drawings.
 - 3. Joist Girders: Size as indicated on the drawings.
 - 4. Acceptable manufacturers:
 - a. Vulcraft Nucor Group.
 - b. Canam.
 - c. Architect/Engineer approved equivalent.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds and methods used in correcting the welding work.
- D. Welding Materials: AWS D1.1/D1.1M; type required for the materials being welded.
- E. Provide holes in chord members for connecting and securing other construction to joists.
- F. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications" - ASTM A36/A36M.
- G. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications" - ASTM A36/A36M.
- H. Camber joists according to SJI Standard Specifications.

- I. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).
- J. Weld threaded lugs to chords for attachment of wood nailers
- K. Frame special sized openings in joist chord framing member configurations as detailed.
- L. Design and fabricate top and/or bottom chord bridging for net uplift on steel roof joists as per design loads provided on the contract drawings and in accordance with the New York State Building Code and SJI Standard Specifications.
- M. Bolts, Nuts and Washers: ASTM A325; galvanized to ASTM A153/A153M for galvanized members; thread excluded from the shear plane; beveled washers for connection to members with flange slope greater than 1:20.

2.03 PRIMERS

- A. Primer: SSPC-Paint 15, Type 1, red oxide or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.04 FINISHES

- A. Prepare joist surfaces in accordance with SSPC-SP 2 or SSPC-SP 3.
- B. Shop prime joists after fabrication in accordance with SSPC-PA 1. Do not prime surfaces that will be fireproofed, field welded or in contact with concrete.
- C. Field welds, connections, and abrasions shall be cleaned, prepared and finished in the same manner and with the same materials used for shop finishing.

2.05 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Fabricate steel bearing plates from ASTM A36/A36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface unless otherwise indicated.
 - 1. Finish: Plain; uncoated.
- D. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy hex steel structural bolts galvanized to ASTM A153/A153M; threads excluded from the shear plane; beveled washers for connection to members with flange slope greater than 1:20; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.
- E. Welding Electrodes: Comply with AWS standards.
- F. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20, ASTM A780/A780M.
- G. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.06 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories. Shop prime joists after fabrication in accordance with SSPC-PA 1. Do not prime surfaces scheduled to be fireproofed, field welded or to be in contact with concrete.
- C. Field weld, connections and abrasions shall be cleaned, repaired and finished in the same manner and with the same materials used for shop finishing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify existing conditions under the provisions of Section 013100 - PROJECT MANAGEMENT AND COORDINATION.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications joist manufacturer's written recommendations, and requirements in this Section."
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Clean joist bearing surfaces of any debris or foreign matter.
 - 3. Verify bearing surface is smooth and flat.
 - 4. Coordinate placement of anchors in concrete or masonry construction for securing bearing plates.
 - 5. Field weld components and shear studs as indicated on approved shop drawings in accordance with AWS D1.1/D1.1M.
 - 6. Space, adjust, and align joists accurately in location before permanently fastening.
 - 7. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction and remain plumb and in true alignment until completion of erection and installation of permanent bridging and bracing.
 - 8. Delay rigidly connecting bottom- chord extensions to columns or supports until dead loads have been applied.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Frame openings greater than 18 inches with supplementary framing.
- E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM

A325 or ASTM A490 Bolts" for high-strength structural bolt installation and tightening requirements.

- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- G. Do not permit erection of decking until joists are braced, bridged and secured.
- H. Do not field cut or alter structural members without the approval of the joist fabricator and the Engineer.
- I. After erection; prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.

3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds, bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Testing and analysis of components shall be performed under the provisions of Section 014500 - QUALITY CONTROL.
- C. Inspection and tests will not relieve the Contractor of responsibility for providing materials and fabrication and erection procedures in compliance with specified requirements. The Contractor is to verify that all materials meet the requirements specified in these specifications.
- D. Materials not in compliance with the specified requirements will be rejected.
- E. Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, as applicable:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709.
 - c. Ultrasonic Testing: ASTM E164.
 - d. Radiographic Testing: ASTM E94.
- F. Visually inspect bolted connections.
- G. High-strength, field bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts."
- H. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- I. Perform additional testing to determine compliance of corrected Work with specified requirements.
- J. Additional testing will be performed to determine compliance of corrected Work with the specified requirements.

3.04 TOLERANCES

- A. All joists shall be installed within SJI tolerances and the following:
 - 1. Maximum variation from plumb: 1/4 inch.

2. Maximum offset from true alignment: 1/4 inch.

3.05 ADJUSTING

- A. All misfits due to errors in location or fabrication or inaccuracies in the setting of anchor bolts or other items of attachment or support shall be immediately reported to the Architect and corrected in such a manner subject to the approval by the Architect.
- B. Submit method of correction to the Architect for approval under the provisions of Section 014500 - QUALITY CONTROL.
- C. Proceed with corrective work only after receiving written approval from the Architect.
- D. All corrections shall be made at no additional cost to the Owner.

3.06 PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime welds, rust spots, and abraded surfaces of joists, bearing plates, and accessories which are not shop primed, except surfaces to be in contact with concrete.
 1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
 2. Apply a compatible primer of same type as primer used on adjacent surfaces.
- C. Protect finished work under the provisions of Section 015000 - TEMPORARY FACILITIES AND CONTROLS.
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that joists and accessories are without damage or deterioration at time of final acceptance by the Owner.

END OF SECTION 052100

PAGE INTENTIONALLY BLANK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Roof deck and accessories.
 - 2. Non-composite form deck and accessories.
 - 3. Formed steel cant strips.
 - 4. Pourstop angles, cell closures and end forms to contain wet concrete.
 - 5. Bearing plates and angles
 - 6. Framing for openings up to and including 18 inches.
 - 7. Closure panels for cell voids.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated provide deck profile characteristics and dimension, structural properties and finish.
 - 1. Include a statement indicating costs for each product having recycled content.
- B. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Indicate temporary shoring of decking where required. Indicate welded connections using standard AWS A2.0 welding symbols and indicate net weld lengths.

1.04 INFORMATIONAL SUBMITTALS

- A. Submit under the provisions of Section 013300 - SUBMITTALS.
- B. Welding certificates.
- C. Product Certificates: For each type of steel deck by product manufacturer.
- D. Manufacturer's instructions: indicate special installation sequence and special instructions required for proper installation.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
- F. Research/Evaluation Reports: For steel deck.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Installer: Company specializing in performing the work of this section with a minimum of three (3) years of documented experience.

- C. Design deck layout, spans, fastening and joints under the supervision of a Professional Structural Engineer experienced in the design of this work and licensed in the State in which the project is located.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- E. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- F. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.
- G. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- H. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

1.06 PERFORMANCE REQUIREMENTS

- A. Metal decking design shall be in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Substitutions shall be designed to meet or exceed published section properties of the specified materials. Section properties shall be computed in accordance with American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Members.
- B. Lateral deflection of diaphragm shall not exceed $1/500$ of the story height. Maximum vertical deflection shall not exceed $1/240$ of the span length.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Cut plastic wrap to encourage ventilation.
- C. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
- D. Do not handle products in a manner which will distort or damage materials.
- E. Do not store decking directly on the ground.
- F. Store materials in a manner which will permit ease of access for inspection and identification.
- G. Schedule delivery of the materials to the site at intervals which will ensure uninterrupted progress of the work.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

1.08 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on the contract drawings and approved shop drawings as required by the manufacturer.
- B. The contractor is responsible for the proper locations and elevations of the work of this section.

1.09 COORDINATION

- A. Coordinate the work under provisions of Section 013100 - PROJECT MANAGEMENT AND COORDINATION.
- B. Coordinate the work of this section with utility installations and all other adjacent work.
- C. Coordinate the work such that the general progress of the work is not interrupted.

1.10 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Metal decking design shall be in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Substitutions shall be designed to meet or exceed published section properties of the specified materials. Section properties shall be computed in accordance with the American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Members
- C. Lateral deflection of diaphragm shall not exceed 1/500th of the story height. Maximum vertical deflection shall not exceed L/240th of the span length.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- E. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

PART 2 - PRODUCTS

2.01 METAL ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Nucor Corp.; Vulcraft Division.
 - 2. Canam.
 - 3. New Millennium Building Systems.
 - 4. Substitutions shall be permitted only after receiving approval from the Architect/Engineer.
- B. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Minimum 33 Ksi yield strength, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 - 2. Deck Profile: Type B or as indicated on the drawings.

3. Profile Depth: 1-1/2 inches (38 mm) or as indicated on the drawings.
4. Design Uncoated-Steel Thickness: 20 gauge unless otherwise indicated.
5. Span Condition: Simple span.
6. Side Laps: Overlapped.

2.02 NON-COMPOSITE FORM DECK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Nucor Corp.; Vulcraft Group.
 2. Canam.
 3. New Millennium Building Systems.
 4. Architect/Engineer approved equivalent.
- B. Non-composite Form Deck: Fabricate ribbed-steel sheet no composite form-deck panels to comply with "SDI Specifications and Commentary for Non-composite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
 1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 80 (550) minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 2. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80 (550), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 3. Profile Depth: 1-5/16 inch. or as indicated on the contract drawings..
 4. Design Uncoated-Steel Thickness: 24 gauge, 0.0239 inch (0.61 mm).
 5. Span Condition: Simple span.
 6. Side Laps: Overlapped.

2.03 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Welded Materials: AWS D1.1/D1.1M.
- C. Primer: Flexible, Rust inhibitive.
- D. Touch-up Primer: Red Oxide Type.
- E. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- F. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- G. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber. one inch thick profile to fit tight to decking in compression.
- H. Shear Connectors: 3/4 inch diameter. 4 1/2" inch long welded headed studs. locate as indicated on the contract drawings.
- I. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material, gauge and finish as deck; of profile indicated or required for application.

- J. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- K. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- L. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- M. Recessed Sump Pans: Single-piece steel sheet, 14 gauge or 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch (76-mm) wide flanges and sloped recessed side pans of 1-1/2 inch (38-mm) minimum depth below deck surface. For drains, cut holes in the field.
- N. Galvanizing Repair Paint: ASTM A780/A780M.
- O. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished.
- P. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.
- Q. Closure Panels: Neoprene Blend-FR as manufactured by Carrington Specialty Products, Inc., or approved equal.
 - 1. Fire-rated Neoprene-blend formed to match profile of deck at each location.
 - 2. Install compatible backer rod and sealant to seal all edge conditions airtight.
 - 3. Physical Characteristics:
 - a. Nominal Density: 5 to 7 pcf.
 - b. Tensile Strength: 50 psi.
 - c. Elongation: 150% to break.
 - d. Compression Set: 50% of original thickness.
 - e. Compression Strength: 2 to 5 psi (at 25% deflection).
 - f. Working Temperature: -40 to 160 degrees F.
 - g. Water Absorption by Weight: 5% maximum.
 - h. Flammability: HF-1 as per UL 94.

2.04 SOURCE QUALITY CONTROL

- A. Testing and analysis of components will be performed under provisions of Section 014500 - QUALITY CONTROL.
- B. Inspection and tests will not relieve the Contractor of responsibility for providing materials and fabrication and erection procedures in compliance with specified requirements. The Contractor is to verify that all materials meet or exceed the requirements specified in these specifications.
- C. Materials not in compliance with the specified requirements will be rejected

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Beginning of installation means that the installer accepts the existing conditions.

3.02 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Clean all bearing surfaces of debris and foreign matter.
- E. Verify bearing surface is smooth and flat.
- F. Bear decking on steel supports with 1 1/2 inch (38 mm) minimum bearing.
- G. Provide decking free of amounts of lubricants or oils which would impair the adhesion of spray on fireproofing or painting.
- H. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- I. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- J. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- K. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- L. Fasten deck to steel support members at ends and intermediate supports with fusion welds at 12 inches on center maximum, parallel with the deck flute and at each transverse flute. Weld washers are to be used only with decks 24 gauge or thinner.
- M. Mechanically fasten male/female side laps at 24 inches on center maximum for decking thinner than 20 gauge. Weld male/female side laps at 18 inches on center maximum for decks 20 gauge and heavier.
- N. Reinforce steel deck openings from 6 to 18 inches (150 to 460 mm) in size with 2 inch x 2 inch x 1/4 inch (50 mm x 50 mm x 6 mm) steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- O. Install 6 inch (150 mm) minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld 12 inches (300 mm) on center maximum.
- P. Install sheet steel closures and angle flashings to close openings between deck and walls, columns and openings.
- Q. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes.
- R. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- S. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
 - 1. Weld Diameter: 3/4 inch (19 mm), nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter based on roof-area definitions in FMG Loss Prevention Data Sheet - FM DS 1-28.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (457 mm), and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds where deck is thicker than 20 gauge.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches (51 mm) minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck flutes. Space welds not more than 6 inches apart with at least one weld at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld .
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- F. Place metal cant strips in position and fusion weld.
- G. Install sheet steel closures and angle flashings to close openings between deck and walls, columns and openings.

3.04 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: 3/4 inch (19 mm), nominal.
 - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
 - 3. Weld Spacing: Space and locate welds as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
 - 2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds where deck is thicker than 20 gauge.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated. Where steel angles are not utilized, install stops at floor edge upturned to the top surface of the slab to contain wet concrete. Provide stop of sufficient strength to remain in place and stationary without distortion.
- E. Floor deck closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and deck.
- F. Position floor drain pans with the flanges bearing on the top surface of deck. Fusion weld at each deck flute.
- G. Install piercing hanger tabs at 14 inches (355 mm) apart in both directions, within 9 inches (228 mm) of walls at ends, and not more than 12 inches (305 mm) from walls at sides unless otherwise indicated.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.06 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Pitched Roof Rafters.
 - 2. Exterior stud wall framing.
 - 3. Flat ceiling and attic floor joist framing.
 - 4. Joist framing.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 3. The design of the cold-formed steel framing shall be the responsibility of the contractor's fabricator. The sizes (depth) of the steel studs shall be as shown on the contract drawings. Unless specifically indicated on the construction documents, it shall be the responsibility of the design engineer to size the spacing and gauge of the element as well as the total depth of the member in the case of header and sill design.
 - 4. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 5. The contractor's fabricator shall provide a full set of engineering calculations as well as a complete set of shop drawings affixed with a New York State Professional Engineer's sign and seal. The design of the cold-formed steel elements shall be in conformance with the information shown on the contract documents and shall be in accordance with the 2020 Building Code of New York State.
- C. Fabrication Drawings:
- D. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.
 - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.

- C. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ClarkDietrich Building Systems, LLC.
 - 2. MarinoWARE
 - 3. Architect/ Engineer approved equivalent.

2.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: ST33H.
 - 2. Coating: G90 or equivalent.
- C. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: 50, Class 1 or 2.
 - 2. Coating: G90.
- D. All studs and/or joists and accessories shall be the type, size, gage, and spacing shown on the plans. Studs, runners (track) bracing, and bridging shall be manufactured per ASTM C955.
- E. All galvanized studs, joists, and accessories shall be formed from steel that conforms to the requirements of ASTM A653/A653M, as set forth in Section 1.02 of the AISI specification for design of cold-formed steel structural members.
- F. All galvanized studs joists and accessories shall have a minimum G60 coating.
- G. Minimum steel gauges shall be 18 gauge for all structural elements subject to gravity and/or lateral wind forces.
- H. Minimum steel gauge for interior elements subject to partition loadings shall be 20 gauge.
- I. All section properties shall be calculated in accordance with the AISI specification for the design of cold-formed steel structural members (latest edition).
- J. Facing materials may not be substituted for bridging. Horizontal bridging must be installed prior to loading the wall and/or floor/roof joists.
- K. The physical and structural properties published by approved supplier will be accepted; otherwise these properties must be substantiated by calculations for loading stresses and deflections of the designed framing sealed by a professional engineer licensed in the State of New York.
- L. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.

2.04 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, un-punched, with un-stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge.
 - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich Building Systems, LLC.
 - b. MarinoWARE
 - c. Steel Network, Inc. (The).
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; un-punched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inch, 16 gauge.
 - 2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2.05 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge or as indicated on the construction documents..
 - 2. Flange Width: 2 inches, minimum.

2.06 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Stud kickers and knee braces.
 - 7. Hole reinforcing plates.
 - 8. Backer plates.

2.07 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.
- G. Column Flange Grip Clips: Pre-manufactured Column/Beam connectors for rapid installation of board type materials to Steel Column and Beam Flanges. ASTM A1003/A1003M Structural Grade 33 (230) Type H, ST33H (ST230H): 33ksi (230MPa) minimum yield strength, 45ksi (310MPa) minimum tensile strength, 27mil minimum thickness (22 gauge, 0.0283" design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating. Manufacturer: The steel Network, Inc. Unit connection box measures 1 inch deep, 2 inches wide and 2 1/2 inches long with a spring clip depth of 2.375 inches and a curved clip spring clearance of .2 inches.
 - 1. Install as indicated on the drawings. Maximum spacing 24 inches on center.

2.08 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M.
- B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.09 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. Welds may be butt, fillet, spot or groove type. The appropriateness of which shall be determined by

and within the design calculations. All welds shall be touched-up using zinc -rich paint to galvanized members and paint similar to that used by the manufacturer for painted members.

- b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Install insulation, specified in Section 072100 - THERMAL INSULATION in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- J. Wire tying in structural applications is not permitted.

3.04 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches unless indicated otherwise.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to infill studs and anchor to building structure.
 - 4. Connect drift clips to cold formed metal framing and anchor to building structure
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and

- thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- a. Install solid blocking at centers indicated on Shop Drawings.
 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.05 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement and reinforcing.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work where test results indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.06 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

3.07 TOLERANCES

- A. Vertical alignment (plumbness) of studs shall be within 1/8 inch in 4 feet of the span.
- B. Horizontal alignment (levelness) of walls shall be within 1/8 inch in 4 feet of their respective lengths.
- C. Spacing of studs shall not be more than +1/8 inch from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

END OF SECTION 054000

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes but is not limited to the following:
 - 1. Loose bearing and leveling plates.
 - 2. Loose steel lintels.
 - 3. Anchor Bolts.
 - 4. Shelf angles.
 - 5. Steel pipe sleeves.
 - 6. Steel framing and supports for mechanical and electrical equipment.
 - 7. Miscellaneous framing including hoist beam and supports for elevator and elevator equipment.
 - 8. Steel shapes for supporting elevator door sills.
 - 9. Steel framing and supports for applications where framing is not specified in other Sections.
 - 10. Aluminum framing and supports for applications where framing and supports are not specified in other Sections.
 - 11. Slotted Channel Framing (Unistrut).
 - 12. Steel and galvanized steel pipe bollards.
 - 13. Galvanized overhead door jambs.
 - 14. Interior overhead door jamb extension plates.
 - 15. Miscellaneous plates located above overhead doors.
 - 16. Grate and frame for elevator sump pump pit.
 - 17. Recessed floor "D" rings and surface mounted wall "D" rings.
 - 18. Stainless steel sill protection plates.
 - 19. Rope Tie Offs.
 - 20. Loose steel angles and steel angles bolted to concrete or masonry.
 - 21. Tube steel posts in half height walls and/or parapet walls.
 - 22. Stainless Steel Ladder Standoff Bracket.
 - 23. Transition jamb plates and corner guards at openings between existing and new apparatus bays.

1.03 RELATED SECTIONS INCLUDE THE FOLLOWING:

- A. Section 033000 - Cast-In-Place Concrete
- B. Section 036000 - Grouting
- C. Section 040523 - Masonry Accessories
- D. Section 042200 - Concrete Unit Masonry
- E. Section 051200 - Structural Steel Framing

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.

- C. Fabricator Qualifications: A firm experienced in producing metal fabrications like those indicated for this Project and with a record of successful in-service performance, as well as enough production capacity to produce required units.
- D. Product Data:
 - 1. Shop paint primers.
 - 2. Galvanized Grating.
 - 3. Slotted Channel (Unistrut).
- E. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 1. Provide templates for anchors and bolts specified for installation under other Sections.
 - 2. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
 - 3. Indicate finishes.
- F. Welding Certificates: Copies of AWS certificates for welding procedures and personnel.
- G. Manufacturer's Mill Certificates: Certify that Products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code--Steel".
 - 2. AWS D1.3/D1.3M, "Structural Welding Code--Sheet Steel".
 - 3. AWS D1.2/D1.2M, "Structural Welding Code-Aluminum".
 - 4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.07 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
 - 1. For installed products indicted to comply with design loads, include structural analysis data signed and sealed by a Qualified Professional Engineer, licensed in the State in which the project is located, responsible for their preparation.
- B. Coordinate installation of steel weld plates (bearing plates) and angles for casting into concrete and/or bond beams that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, failure of connections, overstressing members and any other detrimental effect. Engineering calculations shall be based on surface temperatures of materials based on local maximum/minimum temperatures due to solar heat gain and nighttime heat loss.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.02 FERROUS METALS

- A. Steel, Shapes and Bars: ASTM A 36/A 36M.
- B. W-Shapes: ASTM A 992, Gr. 50.
- C. Steel Plates, Shapes, and Bars: ASTM A36/A 36M.
- D. Plates: ASTM A 283; gage to match existing where not indicated on Drawings.
- E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- F. Steel Tubing: ASTM A500, cold-formed steel tubing.
- G. Stainless-Steel Sheet, Strip and Plate: ASTM A 240/A 240M or ASTM A 366, Type 304.
- H. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- I. Bolts, Nuts, and Washers: ASTM A 325.
- J. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- K. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.03 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability
 - 1. Recycled Content: Give preference to aluminum with the highest recycled content feasible.

- B. Extruded Structural Pipe: ASTM B 429/B 429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
- C. Extruded Aluminum: ASTM B221, Alloy 6063-T6
- D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.
- E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.04 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

2.05 FASTENERS

- A. Select and provide fasteners for fastening steel components to base materials, of type and size required to support loads, anchor components to substrates indicated, and develop proper friction, keying, and bonding.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts; ASTM A563; and, where indicated, flat and/or lock washers.
 - 1. Provide countersunk heads where indicated on Contract Drawings.
- C. Stainless Steel fasteners; Type 304 or Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5 at exterior walls unless noted otherwise.
 - 1. Provide countersunk heads where indicated on Contract Drawings.
- D. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M). Use stainless-steel washers with stainless-steel fasteners.
- E. Expansion anchors with countersunk heads as shown on contract drawings.
- F. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated, with nuts, ASTM A 563; and where indicated, flat washers.
 - 1. Hot-dip galvanize where item being fastened is indicated to be galvanized.
- G. Cast-in-Place Anchors in Concrete or Grouted Masonry: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

2.06 FABRICATION, GENERAL

- A. Shop Assembly

1. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.
 2. Disassemble units only as necessary for shipping and handling limitations.
 3. Use connections that maintain structural value of joined pieces.
 4. Clearly mark units for reassembly and coordinated installation.
 5. Fabricate steel members in accordance with AISC Code of Standard Practice.
- B. Material
1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
 2. Use material free of defects which could affect the appearance or service ability of the finished product.
- C. Size:
1. Size and thickness of members as shown.
 2. When size and thickness is not specified or shown for an individual item, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.
- D. Cut, shear, drill and punch metals cleanly and accurately. Remove burrs and ease edges to radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- E. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Weld corners and seams continuously to comply with the following:
1. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
 2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 3. Obtain fusion without undercut or overlap.
 4. Remove welding flux immediately.
 5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Fabricate joints that will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
- J. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- K. Remove sharp or rough areas on exposed traffic surfaces.
- L. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

- M. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- N. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6" embedment and 2" hook, not less than 8" from ends and corners of units and 24" o.c., unless otherwise indicated.
- O. Galvanize and prime items as indicated herein and/or as shown on contract drawings. If not indicated all items shall be prime painted.

2.07 LOOSE STEEL LINTELS

- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.

2.08 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction.
 - 1. Drill plates scheduled to receive anchor bolts.
 - 2. Provide headed embedment studs where indicated.
 - 3. Plates scheduled to be galvanized shall be galvanized after fabrication.

2.09 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Galvanize miscellaneous framing and supports where indicated. All other miscellaneous framing and supports shall be prime painted.

2.10 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 40 galvanized steel pipe. Provide galvanized steel domed caps for field welding.

2.11 FINISHES, GENERAL

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

- C. Aluminum: Clear Anodic Finish; AAMA 611, Class 1, AA-M12C22A41

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

2.13 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 18 inches o.c., unless otherwise shown.
1. Provide mitered and welded units at inside and outside corners.
 2. Do not cross expansion and/or control joints. Create an open joint in shelf angle at each control/expansion joint 1-1/2 inches larger than expansion/control joint.
 3. Coordinate attachment of shelf angles thru continuous insulation.
 4. Shelf angles located in exterior wall assemblies shall be hot dip galvanized.
- B. Furnish wedge-type concrete inserts, complete with corrosion resistant fasteners, to attach shelf angles to cast-in-place concrete

2.14 "D" RINGS

- A. Wall mounted "D" ring tie-offs where shown on Contract Documents.
1. 10,000 lb load capacity, super heavy-duty "D" ring tie-off pre-welded to a 6" x 6" x 1/4" steel plate. On masonry surfaces, thru bolt (4) with stainless steel fasteners to two 6" x 1" x 1/4" washer plates. Secure with double nuts. On steel surfaces, weld "D" ring plate to steel plate.
 2. Gempler's item # 173155 or Architect approved equivalent.

2.15 SLOTTED CHANNEL FRAMING

- A. Slotted Framing Channels: Cold-formed metal channels with continuous slot complying with MFMA-4.
1. Acceptable Manufacturers:
 - a. Flex-Strut Inc.
 - b. Powerstrut.
 - c. Unistrut.
 2. Material: Steel complying with ASTM A1011 Grade 33; or ASTM A1008/A1008M, commercial steel, Type B structural steel, Grade 33.
 3. Size of channels: As required by structural analysis or as shown on Contract Drawings, but not less than 1-5/8" by 1-5/8", 12 gauge.

4. Finish: Hot Dip Galvanized unless indicated otherwise.
- B. Slotted Framing Accessories:
 1. Provide manufacturer's accessories and fittings as required for a complete installation, including channel nuts, insets, end caps, swivel and swing fittings, supports, joiners, brackets and other accessories as required.
 2. Accessories Finish: Match slotted framing channel finish.

2.16 TRANSITION JAMB PLATES AND CORNER GUARDS

- A. Manufacturer: Koffler Sales Company, 785 Oakwood Road, Lake Zurich, IL 60047, Phone: 888-726-1567.
- B. Jamb Plates: 1/8 inch thick aluminum diamond plate, chrome finish, 10" wide x full height of opening. Provide 1/2" diameter, countersunk holes at 12" o.c. (minimum four (4) holes) along both long sides of plate. Centerline of holes 1 1/2" from edge of plate.
- C. Provide 7/16" diameter stainless steel, counter sunk expansion anchors to secure Jamb transition plates and corner guard angles.
- D. Diamond plate aluminum corner guards: 3" x 3" x 17 gauge, chrome finish.

2.17 GALVANIZED STEEL GRATING

- A. Pressure-Locked Galvanized Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
 1. Acceptable Manufacturers:
 - a. Amico Grating.
 - b. Indiana Gratings.
 - c. Ohio Gratings, Inc.
 2. Bearing Bar Spacing: 11/16 inch o.c.
 3. Bearing Bar Depth: Minimum 1-1/2 inches and as required to comply with structural performance requirements.
 4. Bearing Bar Thickness: 3/16 inch.
 5. Crossbar Spacing: 4 inches o.c.
 6. Traffic Surface: Plain.
 7. Finish: Hot-dip galvanized, coating weight not less than 1.8 oz/sq.ft.
- B. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports. Elevator sump grating covers do not require anchoring.
- C. Fabricate cutouts in grating sections for penetrations. Arrange cut-outs to permit grating removal.
- D. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections and corners for perimeter angle frames. Cut, drill and tap units to receive hardware and similar items.
 1. Unless otherwise indicated, fabricate from same basic metal as gratings.
 2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 12 inches on center and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 6 inches long.

- E. Separate dissimilar metals.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Clean and strip primed steel items to bare metal where field welding is required.
 - 2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 3. Obtain fusion without undercut or overlap.
 - 4. Remove welding flux immediately.
 - 5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place masonry and/or concrete construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts screws, and other connectors. Provide countersunk heads on fasteners where exposed in finish work.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.02 SETTING BEARING AND LEVELING PLATES

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

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
- B. Support steel on solid grouted masonry or concrete. Secure steel with anchor bolts embedded in grouted masonry or concrete.
 - 1. Where grout space under bearing plates is indicated at steel supported on concrete or masonry, install as specified above for setting and grouting bearing and leveling plates.
- C. Overhead Door Jambs and Extension Plates
 - 1. Cover counter sunk stainless steel screw heads with epoxy metal filler. Finish smooth and level with door frame.

3.04 INSTALLING SLOTTED CHANNEL FRAMING

- A. Install framing to comply with requirements of items being supported, including manufacturer's written instructions and requirements indicated on Shop Drawings.
- B. Install shop or field fabricated, slotted channel framing and securely anchor to supporting structure, solid wood blocking or masonry construction with grouted cores.
 - 1. When attaching thru ceiling GWB to roof truss construction, slotted channel must connect to a minimum two roof trusses when truss spacing exceeds four (4) feet and to three (3) roof trusses when truss spacing is less than four feet. Coordinate with roof truss manufacturer for proper style and length of embedment of fastener.
 - 2. Install slotted channel framing and accessories plumb, square and true to line, and with connections securely fastened.

3.05 INSTALLING GALVANIZED PIPE BOLLARDS

- A. Anchor bollards in place as shown on drawings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.
- B. Fill bollards solidly with concrete.
- C. Field weld galvanized dome caps. Grind welds smooth. Fill any gaps with Bondo and finish smooth.
- D. Repair all damaged galvanizing.

3.06 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual apply to work of this Section.

1.02 SUMMARY

- A. This Section includes, but is not limited to, the following:
 - 1. Interior aluminum roof access ladders.
 - 2. Exterior aluminum roof access ladders.
 - 3. Ladder safety post.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 055000 - Metal Fabrications
 - 2. Section 061000 - Rough Carpentry
 - 3. Section 077233 - Roof Hatches
 - 4. Section 142400 - Machine Room-Less Hydraulic Passenger Elevator

1.03 STANDARDS

- A. All work of this section shall conform to CABO/ANSI, industry standards and manufacturer's recommendations.
- B. ASTM B 209 "Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate".
- C. ASTM B 221 "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes".
- D. American Welding Society (AWS) applicable welding methods and standards.
- E. OSHA 1910.27 - Fixed Ladders.
- F. FS TT-P-645A "Primer, Paint, Zinc Chromate, Alkyd Type".
- G. NAAMM Metal Finishes Manual.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: Manufacturer's data sheets on each product.
- D. Shop Drawings:
 - 1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrication and their connections.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. Provide reaction loads for each hanger and bracket.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.

1. Record of successful in-service performance.
 2. Sufficient production capacity to produce required units.
 3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.
- B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.
- C. Product Qualifications: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Deliver materials to job site in good condition and properly protected against damage to finished surfaces.
- D. Storage on site:
1. Store material in a location and in a manner to avoid damage. Stack to prevent bending.
 2. Store aluminum, bronze, and stainless-steel components and materials in clean, dry location, away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting and provide for circulation of air inside covering.
- E. Keep handling on site to a minimum. Exercise care to avoid damage to finished materials.

1.07 WARRANTY - ALUMINUM LADDERS

- A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years from date of Substantial Completion against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
1. Defects in materials and workmanship.
 2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third-party testing laboratory. Ordinary wear and tear, unusual abuse or neglect excepted.
 3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.
- B. Manufacturer shall be notified immediately of defective products and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor.

PART 2 PRODUCTS

2.01 ROOF ACCESS LADDER (INTERIOR)

- A. Manufacturer: Ladder shall be Model Number 500, as manufactured by O'Keeffe's Inc., 100 N. Hill Drive, Suite 12, Brisbane California 94005, (415) 824-4900 or Architect approved equivalent from established ladder manufacturer.
- B. Rungs shall be no less than 1 1/4" in section and 18 3/8" long, formed from tubular aluminum extrusions, alloy 6063-T5, and shall be squared and deeply serrated on all sides to provide

maximum grip and foot traction. Rungs shall be able to withstand a 1,000 lb. load without failure.

- C. Channel side rails, where specified, shall be no less than .125" wall thickness by 3" wide.
- D. Heavy duty tubular side rails, where specified, shall be assembled from two interlocking aluminum extrusions no less than .125" wall thickness by 3" wide. Construction shall be as follows: self-locking stainless-steel fasteners, full penetration inert-gas heliarc welds, clean, smooth and burr-free surfaces.
- E. Finishes: Mill finish aluminum.
- F. Provide manufacturer's standard retractable ladder safety post.

2.02 PARAPET ACCESS LADDER WITH ROOF OVER RAIL EXTENSIONS (EXTERIOR)

- A. Manufacturer: Ladder shall be Model Number 502, as manufactured by O'Keeffe's Inc., 100 N. Hill Drive, Suite 12, Brisbane California 94005, (415) 824-4900 or Architect approved equivalent from established ladder manufacturer.
- B. Rungs shall be no less than 1¼" in section and 24" long, formed from tubular aluminum extrusions, alloy 6063-T6, and shall be squared and deeply serrated on all sides to provide maximum grip and foot traction. Rungs shall be able to withstand a 1,000 lb. load without failure. Centerline of rungs shall be 12" from face of wall.
- C. Channel side rails, where specified, shall be no less than .125" wall thickness by 3" wide.
- D. Heavy duty tubular side rails, where specified, shall be assembled from two interlocking aluminum extrusions no less than .125" wall thickness by 3" wide. Construction shall be as follows: self-locking stainless-steel fasteners' full penetration inert-gas heliarc welds; clean, smooth and burr-free surfaces.
- E. Finishes: Mill finish aluminum.
- F. Alternate bottom support required.

2.03 MISCELLANEOUS MATERIALS

- A. Fasteners: Same basic metal as fastened metal. Do not use metals which are corrosive or incompatible with materials joined.
 - 1. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.
- B. Anchors and inserts: Anchors of type, size, and material required for loading and installation condition shown, and recommended by manufacturer. Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior locations and elsewhere as required for corrosion resistance. Use expansion bolt devices for drilled-in-place anchors.
- C. Primer paint for steel and iron: Manufacturer's standard rapid curing, rust-inhibiting primer; compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 099100 - Painting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fasteners resistance.
- B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.
- C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.03 PROTECTION

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

END OF SECTION 055133

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes, but not limited to, the following:
 - 1. Framing with dimension lumber.
 - 2. Wood grounds, nailers, sleepers, furring and blocking.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Exterior plywood sheathing/underlayment at roofing system, parapet walls, exterior stud walls and where shown on contract documents.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 061643 - Gypsum Sheathing.
 - 2. Section 075323 - Fully Adhered EPDM Roofing System for wood grounds, nailers, and blocking.
 - 3. Section 077213 - Manufactured Curbs for related nailers and blocking.
 - 4. Section 077233 - Roof Hatch for related nailers and blocking.
 - 5. Section 085213 - Aluminum Clad Wood Windows for related nailers, furring, and blocking.
 - 6. Section 092116 - Gypsum Board Assemblies for related nailers, furring, and blocking.
 - 7. Division 10 - Specialties for items requiring blocking.
 - 8. Division 12 - Furnishings for items requiring blocking.
 - 9. Division 23 - Heating, Ventilating, and Air Conditioning for rooftop equipment bases and support curbs.

1.03 REFERENCES

- A. Standards: Comply with the following unless otherwise specified or indicated on the Drawings:
 - 1. Lumber: American Softwood Lumber Standard PS 20 by the U.S. Department of Commerce. Comply with applicable provisions for each indicated use.
 - 2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.
 - 3. Plywood Installation: APA Design/Construction Guide, Residential & Commercial by the American Plywood Association (APA).
 - 4. Grading Rules:
 - a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).
 - b. Southern Pine: Southern Pine Inspection Bureau (SPIB).
 - c. Redwood: Redwood Inspection Service (RIS).
 - d. Spruce-Pine-Fir: National Lumber Grades Authority (NLGA).
 - 5. Preservative Treatment: American Wood Preservers' Association (AWPA) and American Wood Preservers Bureau (AWPB) Standards, quality control methods, and inspection requirements.
 - 6. Fire-Retardant Treatment: American Wood Preservers' Association (AWPA) Standards.
 - 7. Framing Installation: American Forest and Paper Association (AFPA).

1.04 SUBMITTALS

- A. Submit following pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.

- C. Submit the following in addition to other required submittals:
 - 1. Fire Retardant Plywood sample warranty.
 - 2. Wood species for specific lumber including grading.
 - 3. Plywood species group number, span rating, bond classification, and class.
 - 4. Product data for all fasteners and anchoring devices.
- D. Quality Control Submittals:
 - 1. Certificates: Certification for the following wood treatments:
 - a. Dip Treatment: Certification by treating plant stating chemical solutions used, submersion period, and conformance with applicable standards.
 - b. Pressure Treatment: Certification by treating plant stating chemicals and process used, net amount of chemical preservative retained, and conformance with specified standards.
 - c. Waterborne Preservatives: Certified written statement that moisture content of treated materials was reduced to a maximum of 19 percent prior to shipment to Project site.
 - d. Fire-Retardant Treatment: Certification by treating plant stating treated material complies with specified standards and treatment will not bleed through specified finishes.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this Section.
- B. Mill and Producers Mark: Each piece of lumber and plywood shall be grade-stamped indicating type, grade, mill, and grading agency certified by the Board of Review of the American Lumber Standards Committee. Mark shall appear on unfinished surface or ends of pieces with finished surfaces.
 - 1. Pressure Preservative Treated Material: Accredited agency quality mark on each piece of wood indicating treatment.
 - 2. Fire-Retardant Treated Material: Accredited testing agency mark on each piece of wood indicating compliance with the fire hazard classification. The mark must identify the name and location of the treating plant and show the material complies with AWWA standards and has been dried after treatment.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Stack lumber flat. Keep lumber and plywood dry by elevating above dampness, so that air can circulate, and warping will not occur, and by covering with waterproof film that permits circulation of air to all parts of each pile.
 - 1. Provide spacers between each bundle to promote air circulation.
- D. Do not stack any lumber in direct contact with the ground.

1.07 DEFINITIONS

- A. Abbreviations:
 - 1. PPT: Pressure preservative treated.
 - 2. E: Modulus of elasticity.
 - 3. Fb: Extreme fiber stress in bending.

4. RFS: Rough full sawn.
5. S4S: Surfaced four sides.

B. Association Abbreviations:

1. ALSC - American Lumber Standard Committee
2. APA - The Engineered Wood Association
3. AWPA - American Wood Protection Association
4. FSC - Forest Stewardship Council US
5. NFPA - National Fire Protection Association
6. NLGA - National Lumber Grades Authority

PART 2 PRODUCTS

2.01 WOOD PRODUCTS - GENERAL

- A. Lumber: American Softwood Lumber Standard PS 20 and applicable rules of grading agencies indicated. If no grading agency is specified, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC 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. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.

2.02 DIMENSION LUMBER AND BOARDS

- A. Qualities: Provide following species, product class, and grade for lumber up to 4 in. thick which is not in contact either with earth or concrete, is not above roof deck, and is not exposed to weather or moist environment. Grade stamp each piece except Appearance grade.
1. Framing, except studs:
 - a. Species: Southern Pine or Douglas Fir - Larch.
 - b. Product class: Structural Joists & Planks.
 - c. Stress grade: No. 2.
 - d. Moisture content: 19% maximum. Bring down to 19% after treatment.
 2. Studs and plates:
 - a. Species: Southern Pine or Douglas Fir - Larch.
 - b. Product class: Light Framing and Studs.
 - c. Grade: Stud or Construction.
 - d. Moisture content: 19% maximum.
 3. Blocking and lumber for supporting and fastening of other work, including such items as frames, nailers, curbs, and bases:
 - a. Species: Southern Pine or Western Woods.
 - b. Product class: Structural Joists & Planks or Light Framing.
 - c. Stress grade: No. 2 or Construction.
 - d. Moisture content: 19% maximum. Bring down to 19% after treatment.
 - e. Pressure preservative treatment: see Article 2.04 (Non-treated blocking & furring for cabinets).
 - f. Fire Treatment: All blocking in fire rated walls must be fire-treated wood blocking.
 4. Furring, grounds, bracing, and other board lumber:
 - a. Species: Southern Pine or Western Woods.
 - b. Product class: Boards.
 - c. Grade: No. 3 or Standard.
 - d. Moisture content: 19% maximum.

- e. Pressure preservative treatment: see Article 2.04.
- B. Referenced Standards:
 - 1. Lumber: PS 20.
- C. Inspection agencies whose ALSC-certified rules shall be used for lumber in this Work: NeLMA, NH&PMA, NLGA- SPIB, WCLIB, or WWPA.

2.03 PLYWOOD

- A. Qualities: Veneer-face composite or plywood panels, with 15% maximum moisture content, except 18% allowed after re-drying from pressure preservative treatment.
 - 1. Vertical Applications - Exposed:
 - a. Thickness: 5/8 in. unless otherwise shown.
 - b. Grade: APA AB, Group 1.
 - c. Exposure durability class: Exposure 1.
 - d. Fasteners: Hot-dip zinc coated galvanized steel, heavy duty (.265" thread diameter) screws or manufacturer's recommendation for application.
 - e. Fastener spacing: 6 in. o.c. at edges; 12 in. o.c. at intermediate supports.
 - 2. Vertical Applications (Not Exposed to View):
 - a. Thickness: 5/8 in. unless otherwise shown.
 - b. Grade: APA CDX, Group 1.
 - c. Exposure durability class: Exposure 1.
 - d. Fasteners: hot-dip galvanized steel, heavy duty (.265 thread diameter) screws or manufacturers recommendation for application.
 - e. Fastener spacing: 6 in. o.c. at edges; 12 in. o.c. at intermediate supports.
 - 3. Horizontal Interior Locations - Exposed
 - a. Thickness: 23/32"
 - b. Grade: APA BC Exterior Grade, Class 1.
 - c. Fasteners: hot-dip galvanized steel, heavy duty (.265 thread diameter) screws or manufacturers recommendation for application.
 - d. Fastener spacing: 6 in. o.c. at edges; 12 in. o.c. at each intermediate support.

2.04 PRESERVATIVE TREATMENT

- A. Treat lumber and plywood where indicated and as specified. Comply with applicable AWPA Standards and quality control and inspection requirements.
 - 1. Fasteners and anchoring devices to be used with wood treated with waterborne preservatives shall be hot-dip galvanized or stainless steel.
- B. Complete fabrication to the greatest extent possible prior to treatment of items to be treated. Where items must be cut after treatment, coat cut surfaces with heavy brush coat of the same chemical used for treatment or other solution recommended by AWPA Standards for the treatment.
- C. Inspect wood after treating and drying. Discard warped or twisted items.
- D. Pressure Treatment (Above Ground Use): Treat the following wood items with waterborne preservatives for above ground use, complying with AWPA Standard C2 for lumber and timbers and AWPA Standard C9 for plywood. A retention requirement of 4.0 kg/m³ (0.25 pcf). Redry wood to a maximum moisture content of 19 percent after treatment.
 - 1. Nailers, blocking, cants, shim stock, and similar members used in conjunction with roofing (including related flashings, trim and vapor barrier), coping, and waterproofing.
 - 2. Nailers, blocking, furring, stripping, and similar concealed members in contact with exterior masonry and concrete (including interior width of exterior walls), and all sills for framing.

3. Wood items indicated or shown on the Contract Drawings to be preservative treated.
- E. Pressure Treatment (Ground Contact Use): Treat the following wood items with waterborne preservatives for below ground use, complying with AWPAC Standard C2 for lumber and timbers and AWPAC Standard C9 for plywood. A retention requirement of 6.4 kg/m³ (0.40pcf):
 1. Wood members placed in the ground.
 2. Wood members immersed in fresh water.

2.05 FIRE RETARDANT TREATMENT

- A. Furnish "FR-S" lumber where indicated, complying with AWPAC Standards for pressure impregnation with fire-retardant chemicals to achieve a flame spread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E84 or NFPA Test 255.
 1. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.
 2. In exterior applications or applications of exterior sheathing and blocking other than roof sheathing use FRX fire retardant lumber.
 3. Provide UL label or identifying mark on each piece of fire-retardant lumber.
 4. Redry treated items to maximum moisture content of 19% for lumber and 15% for plywood.

2.06 FRAMING HARDWARE

- A. Fasteners and Anchoring Devices: Select and furnish items of type, size, style, grade, and class as required for secure installation of the Work. Items shall be hot-dip zinc coated galvanized steel (ASTM A153-Class C) or stainless-steel (Type 316) for exterior use. Unless shown or specified otherwise, comply with the following:
 1. Nails and Staples: FS FF-N-105.
 2. Wood Screws: FS FF-S-111.
 3. Bolts and Studs: FS FF-B-575.
 4. Nuts: FS FF-N-836.
 5. Washers: FS FF-W-92.
 6. Lag Bolts or Lag Screws: FS FF-B-561.
 7. Masonry Anchoring Devices: Expansion shields, masonry nails and drive screws: FS FF-S-325.
 8. Toggle Bolts: FS FF-B-588.
 9. Bar or Strap Anchors: ASTM A575 carbon steel bars.
 10. Wall Plugs: Corrugated type, galvanized steel, 24 USS gage min, not less than 2 inches wide x 2-1/2 inches deep.
 11. Cross Bridging: Nailable type, galvanized steel, 16 USS gage min, by 3/4 inch wide.
 12. Metal Hangers and Framing Anchors: Size and type for intended use, galvanized finish, manufacturer's recommended fasteners.
 13. Buck Anchors: Corrugated type, galvanized steel not lighter than 12 USS gage min, 4 inches wide (except where partitions are less than 4 inches thick) by 8 inches long, punched for two 5/16-inch carriage bolts at buck end.
 14. Sleeper Anchors: Approved type, galvanized steel not lighter than 20 USS gage min, not less than 1-1/4 inches wide, designed to anchor into concrete not less than 1-1/2 inches and permit height adjustment of sleeper.

PART 3 EXECUTION

3.01 FRAMING

- A. Frame the Work according to NFPA Manual for Wood Frame Construction.

- B. Cut pieces for full wood-to-wood fit at connections. Do not splice freestanding members.
- C. Examine each piece of lumber before setting in place. Set the soundest pieces in positions of greatest stress. Select clearest pieces for exposed use. Discard pieces which have defects that impair their structural function.
- D. Set members plumb, level, or to slope shown.
- E. Do not cope or notch horizontal members more than 1/6 their depth in center third of span, nor more than 1/4 joist depth at end thirds. Drill joists for passage of lines in end thirds only. Drilled holes shall be no more than 1/3 joist depth and shall leave a full 2 in. of wood top or bottom.

3.02 FASTENERS AND FASTENER SPACING

- A. For work above roof, all other exterior locations or in damp locations, use hot-dip zinc coated galvanized steel (ASTM A153-Class C) or stainless steel (Type 316) common nails, screws, bolts, nuts and washers.
- B. Drive nails or screws full depth, drilling hard or brittle woods first to prevent splitting. Leave no hammer marks in exposed work. In beams, headers and trimmers built up from 2x lumber, nail 16 in. o.c. minimum, staggered top and bottom.
- C. Nail according to NFPA Manual for Wood Frame Construction Table 11, except as more stringently specified herein or shown on Contract Drawings.

3.03 FURRING AND GROUNDS

- A. Provide PPT furring at exterior walls and in damp locations.
- B. Terminate vertical furring with horizontal firestop strip at floor, opening, and ceiling lines, positioned to provide fastening for edges of wall finish material and base and cove trim.
- C. Execute furring at openings to serve as grounds for finish work. Shim furring and grounds to make finish work plane and flush with opening frames. Bevel plaster grounds to form key.
- D. Space 1 x 3 or 1 x 2 furring at 16 in. o.c. for all finishes, except that 1 x 3 furring spaced 24 in. o.c. shall be provided for plywood paneling 3/8 in. or thicker.
- E. Do not use furring strips with knots or missing knots where nail or screw fastening of plywood finish will be employed.
- F. Provide furring at inside jamb of exterior windows to adjust G.W.B. return to meet finished edge of provided window or to meet provided window trim. Furring configuration at this location must be included with window submittals. See Section 085213 - Aluminum Clad Wood Windows.

3.04 BLOCKING AND OTHER SUPPORT MEMBERS

- A. Select sound lumber for blocking, nailers, sleepers, cants, deck edges, curbs, frames, bases, and ledgers. See Article 3.06 for locations where PPT blocking is to be used. Blocking in fire rated walls must be fire-treated wood blocking.
- B. Provide quality and size of fasteners that will support live and dead loads. Recess bolts and nuts as necessary to avoid conflict with roofing and other adjoining or covering work. Provide washers where bolt heads and nuts bear against wood.

- C. Furnish and install blocking and ledgers for support of all wall-hung construction including, but not limited to fixtures, cabinets, countertops, recessed equipment, shelving, railings, toilet partitions, shower rods, towel hooks, shower seats, lockers, door wall bumpers, coat racks, light fixtures, drinking fountains and mirror brackets.
- D. Furnish and install blocking in all drywall ceilings and soffits for support of all ceiling hung construction including, but not limited to, light fixtures, air drops, cord reels, speakers and projector screens.

3.05 EXTENT AND INSTALLATION OF PRESERVATIVE TREATED WOOD

- A. Provide PPT lumber at locations indicated on drawings:
- B. Install PPT lumber with galvanized steel or stainless-steel fasteners and connectors that do not react with the particular treatment salt that has been used.
- C. Apply a heavily brushed touchup coat to cuts, holes, and abraded or dented areas of each piece of treated lumber using specified chemical.

3.06 FIRE RETARDANT PLYWOOD, PARAPET CAPS AND/OR EXTERIOR PLYWOOD SHEATHING

- A. Store and install in accordance with manufacturer's recommendations.
- B. Provide 1/8" spacing between adjacent sheets of plywood.
- C. Installed plywood must be covered with either permanent or temporary coverings at the end of each day's work.

END OF SECTION 061000

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Gypsum sheathing in exterior cavity wall construction.
 - 2. Gypsum sheathing at roof side of parapets.
 - 3. Sheathing in areas of vertical membrane roofing.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 054000 - Cold Formed Metal Framing
 - 2. Section 061000 - Rough Carpentry

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM C 954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Panel products or Metal Plaster Bases to Steel Studs from 0.033 inch to 0.112 inch Thickness".
- C. ASTM C 1177 "Standard Specification for Glass Mat Gypsum - Substrate for use as Sheathing".
- D. ASTM C 1280 "Standard Specification for Application of Gypsum Sheathing".
- E. ASTM C 1396 "Standard Specification for Gypsum Board".
- F. GA-253 "Recommended Specifications for the Application of Gypsum Sheathing".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Product Data:
 - 1. Submit manufacturer's product data for each type of exterior gypsum sheathing indicating where each type will be used.
 - 2. Submit fastener data as recommended by exterior gypsum sheathing manufacturer and as specified herein.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- C. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:

1. Fire Resistance Ratings: As indicated by reference to GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
3. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements.
- C. Neatly stack gypsum panels flat to prevent sagging.

1.07 WARRANTY

- A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay).
- B. Manufacturer's Warranty:
 1. Five years against manufacturing defects.
 2. Ten years against manufacturing defects when used as a substrate in architecturally specified EIFS.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Gypsum Sheathing - Cavity Wall
 1. Glass-Mat Gypsum Board: Gypsum board designed as an exterior substrate for a weather barrier, consisting of a noncombustible water-resistant core, essentially gypsum, surfaced with glass mats on face and back, partially or completely embedded in core, and with unsurfaced square edges. Comply with ASTM C 1177 and requirements below.
 - a. Type: X
 - b. Thickness: 5/8 inch
 2. Products: Subject to compliance with requirements, gypsum sheathing boards that may be incorporated in the Work include, but are not limited to, the following:
 - a. Dens-Glass® Gold Exterior Sheathing; Georgia-Pacific Gypsum LLC
 - b. GlasRoc® Sheathing; CertainTeed
 - c. Fiberock® Aqua-Tough Sheathing; U.S. Gypsum Company
 3. Sheathing fasteners: ASTM C 954, steel drill screws, Type S-12 fluted tip, a minimum of 1 ¼ inches long with organic polymer coating or other corrosion-protective coating.
- B. Gypsum Sheathing to receive roofing material:
 1. On the roof side of framed parapets and other vertically framed areas where sheathing will be covered by roofing materials use fiberglass-mat faced gypsum roof board.
 - a. Thickness: 5/8 inch
 - b. Weight: 2.55 psf.
 - c. Surfacing: Fiberglass mat with non-asphaltic coating.
 - d. Flexural Strength, Parallel (ASTM C 473): 100 lbf, minimum

- e. Flute Span (ASTM E 661) 8 INCHES.
- f. Permeance (ASTM E 96): Not more than 32 perms
- g. R-Value (ASTM C 518): Not less than 0.67
- h. Water absorption (ASTM C 1177): Less than 10 percent of weight.
- i. Compressive Strength (Applicable Sections of ASTM C 472): 500 to 900 pounds per square inch.
- j. Surface Water Absorption (ASTM C 473): Not more than 2 grams.
- k. Acceptable products:
 - 1) DensDeck Prime, Georgia-Pacific Gypsum.
 - 2) Architect approved equivalent
- 2. Sheathing fasteners: ASTM C 954, steel drill screws, Type S-12 fluted tip, a minimum of 1 ¼ inches long with organic polymer coating or other corrosion-protective coating.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 SHEATHING INSTALLATION

- A. Comply with ASTM C 1280, GA-253 and manufacturer's written instructions. Erect gypsum sheathing pursuant to GA-216 and fasten at 6" o.c. along panel edge locations and 12" o.c. field locations with 1 ¼" S #6 screws.
 - 1. Fasten sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch gap where non-load bearing construction abuts structural elements.
 - 3. Install boards with a ¼ inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
- C. Horizontal Installation: Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 6 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 6 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Do not bridge building expansion joints; cut and space edges of gypsum sheathing to match spacing of structural support elements.

3.03 PROTECTION

- A. Protect gypsum sheathing and gypsum roof board until covered.
- B. Replace broken or damaged sheathing.
- C. Apply permanent or temporary covering within manufacturer's stated exposure limits.

END OF SECTION 061643

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes, but not limited to, the following:
 - 1. Casings, trims, and chair rails.
 - 2. Closet shelving and rods.
 - 3. Wood Base
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 061000 - Rough Carpentry for furring, blocking, and other carpentry work not exposed to view.
 - 2. Section 081429 - Pre-finished Wood Doors for wood doors.
 - 3. Section 092116 - Gypsum Board Assemblies for Related Nailers, Furring, and Blocking.
 - 4. Section 099100 - Painting for back priming and finishing of finish carpentry, interior and exterior wood items.

1.03 REFERENCES

- A. Standards: Comply with the following unless otherwise specified or indicated on the Drawings:
 - 1. Lumber: American Softwood Lumber Standard PS 20 by the U.S. Department of Commerce. Comply with applicable provisions for each indicated use.
 - 2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.
 - 3. Plywood Installation: APA Design/Construction Guide, Residential & Commercial by the American Plywood Association (APA).
 - 4. Grading Rules:
 - a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).
 - b. Southern Pine: Southern Pine Inspection Bureau (SPIB).
 - c. Redwood: Redwood Inspection Service (RIS).
 - d. Spruce-Pine-Fir: National Lumber Grades Authority (NLGA).

1.04 SUBMITTALS

- A. Submit following pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data:
 - 1. Provide where available product data and/or profile sheets of specified wood products.
- D. Samples:
 - 1. Provide three (3) samples for approval of each different style and finish wood product specified. Once approved, two samples shall be stained and finished with required polyurethane for color approval.
- E. Shop Drawings:
 - 1. Provide shop drawings to show termination and transition details for wood wainscot, wood base and/or wood chair rail including but not limited to the following conditions:
 - a. Outside corners.

- b. Expansion joints.
- c. Terminations at door frames and window openings.
- d. Terminations at miscellaneous wall interruptions including but not limited to: electrical devices, fire extinguisher cabinets, mail boxes, display cases and other wall mounted items.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Keep lumber, paneling and plywood dry by elevating above dampness, so that air can circulate, and warping will not occur, and by covering with waterproof film that permits circulation of air to all parts of each pile.
- D. Do not stack any finish carpentry materials outside.

1.07 DEFINITIONS

- A. Abbreviations:
 - 1. PPT: Pressure preservative treated.
 - 2. E: Modulus of elasticity.
 - 3. Fb: Extreme fiber stress in bending.
 - 4. RFS: Rough full sawn.
 - 5. S4S: Surfaced four sides.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install finish carpentry materials until building is enclosed, wet work is complete, dust creating activities are finished, all walls are prime painted, and HVAC System is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 PRODUCTS

2.01 WOOD BASE

- A. Wood Base and Shoe:
 - 1. Size 13/16" x 7-1/2" Hard Maple Base Baird Brothers Profile SPL 249 with 5/8" hard maple quarter round shoe or match existing.
 - 2. All wood base shall be stained to match wood doors and finished with three (3) coats of polyurethane.
 - 3. Quality: Clear - (3% Maximum moisture content)
 - 4. Provide continuous solid blocking in wall and attach base at 8" o.c. minimum.

2.02 CLOSETS

- A. Unless otherwise indicated, every closet shall have a fully secured 5/4" thick wood shelf and full-length closet rod.
 - 1. Shelf shall be primed and painted two coats.

2. Refer to Section 102813 - Toilet and Miscellaneous Accessories for closet rod.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 72 hours, unless longer conditioning is recommended by manufacturer.
- C. Prime lumber for applications to be painted and/or stained, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 09 Section - "Painting."

3.03 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 4. At window openings wood wainscot shall terminate flush with the GWB return and top rail mitered at termination to return to wall.
 5. No unfinished edges or end are allowed in Finish Carpentry or Finish Carpentry systems.
 6. All wood joints shall be mitered.
 7. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.04 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
 1. Match color and grain pattern across joints.
 2. Install trim after gypsum board joint finishing operations are completed and all surfaces have received paint primer at a minimum.

3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
4. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.05 ADJUSTING

- A. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.06 CLEANING

- A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 062000

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual apply to work of this Section.

1.02 SUMMARY

- A. This Section includes Cementitious Waterproofing applied to the following surfaces:
 - 1. Exterior and interior below-grade surfaces of concrete foundation walls and footings at elevator pit.

1.03 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures
- B. Submit pursuant to Section 016000 - Product Requirements
- C. Product Data: Include substrate preparation, technical data, and recommendations for method of application, primer, number of coats and coverage or thickness.
- D. Material Certificates: For each product, signed by manufacturers.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain primary waterproofing materials and primers through one source from a single manufacturer.

1.05 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit waterproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of waterproofing in enclosed spaces. Maintain ventilation until waterproofing has thoroughly cured.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Five Star Products, Inc.
 - 2. Sika Corporation
 - 3. W. R. Meadows, Inc.

2.02 CEMENTITIOUS WATERPROOFING

- A. Two component, self-curing cementitious waterproofing system, suitable for both negative and positive side waterproofing.
 - 1. Five Star® Waterproofing (Basis of Specification)
 - 2. SikaTop® Seal 107
 - 3. CEM-KOTE™ FLEX ST

- B. Compressive Strength (ASTM C109)
 - 1. 4 hours 3000 psi
 - 2. 28 days 7000 psi
- C. Bond Strength (ASTM C882)
 - 1. 7 days 2400 psi
- D. Permeability (CRD-C 48)
 - 1. 1/8" thickness: 7.16x10-13 cm/sec (negative side)
7.16x10-14 cm/sec (positive side)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
 - 1. Begin waterproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with waterproofing. Prevent waterproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by waterproofing manufacturer.

3.03 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of waterproofing.
 - 1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
 - 2. Allow each coat of waterproofing to cure 24 hours before applying subsequent coats.
- B. Apply waterproofing to footings and foundation walls of elevator pit as shown on Drawing.
 - 1. Trowel apply to 1/8" thickness.
 - 2. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches (150 mm) over outside face of footing.
 - 3. Extend 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.

3.04 CLEANING

- A. Remove waterproofing materials from surfaces not intended to receive waterproofing.

END OF SECTION 071116

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes but not limited to the following:
 - 1. Rigid perimeter foundation wall insulation.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 072116 - Blanket Insulation
 - 2. Section 072129 - Spray Foam Insulation
 - 3. Section 075323 - Fully Adhered EPDM Roofing System for board insulation under EPDM roofing.
 - 4. Section 079200 - Sealants for spray foam sealant.
 - 5. Division 22 - Plumbing for pipe insulation
 - 6. Division 23 - HVAC for duct, pipe and equipment insulation

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM C177 "Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus".
- C. ASTM C518 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".
- D. ASTM C578 "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation".
- E. ASTM C1289 "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board".
- F. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
- G. ASTM E119 "Standard Test Methods for Fire Tests of Building Construction and Materials".
- H. ASTM E136 "Standard Test Method for Behavior of Materials in A Vertical Tube Furnace At 750 degrees C."

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data:
 - 1. Provide manufacturer's cut sheets on each different type of board insulation required. Hi-lite proposed thicknesses and other pertinent information that is specific to this project.
 - 2. Provide cut sheets on proposed seam tape if required and other accessory items.

- D. Product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of insulation products with requirements including r-values (aged values for plastic foam insulation), fire performance characteristics, perm ratings, water absorption ratings, and other properties, based on comprehensive testing of current products.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this Section.
- B. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristic: ASTM E84.
 - 2. Fire resistance Ratings: ASTM E119.
- C. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- D. Allowable Thickness Variations: Manufacturer's standard units that vary slightly from the thickness indicated may be acceptable, SUBJECT TO THE APPROVAL OF THE ARCHITECT.
- E. Thermal Resistance: The thicknesses shown are for the thermal resistance (R-Value in accordance with ASTM C177 or ASTM C518) specified for each material. The R-Values specified are minimum acceptable. Provide adjusted thicknesses as directed for the use of material having a different thermal resistance.
- F. Certification: Affidavit by the polystyrene foam insulation board manufacturer, certifying that the insulation was manufactured hydrochlorofluorocarbon (HCFC) free with zero ozone-depletion potential.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.
- B. Protect insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Extruded Polystyrene Board Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following unless otherwise noted:
 - 1. DuPont™: Styrofoam™ Brand

2. Kingspan Insulation LLC
3. Owens Corning Foam Insulation, LLC: Foamular™ Brand

2.02 INSULATING MATERIALS

- A. Extruded Polystyrene Board (XPS):
 1. Provide extruded polystyrene rigid foam insulation that is manufactured with a blowing agent formulation that delivers a minimum 90% reduction to Global Warming Potential (100 year). including the complete elimination of HFC 134a.
 2. Extruded Polystyrene Board shall meet ASTM C578 Type IV and UL Classification Certificate U-197.
 3. Provide thickness to meet R-value shown on the Contract Drawings.
 4. Use extruded polystyrene (XPS) board where shown in contact with soil or in exterior wall construction. Insulation shall have a compressive strength of 25 PSI and R-Value of R-5 per inch of thickness.

2.03 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation or mechanical anchors securely to substrates indicated without damaging or corroding insulation, anchors, or substrates.
- B. Fastening Components
 1. Nails or Staples: Steel wire; galvanized, type and size to suit application.
 2. Tape: type and size to suit application.
 3. Spindle Fasteners: Galvanized wire spindle on flat metal base; self-adhering backing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adjacent materials are dry and ready to receive insulation.
- B. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install insulation in accordance with manufacturer's published instructions.
- B. Butt insulation tight. Leave no gaps or voids.
- C. No voids in the insulation will be permitted.
 1. Insulation shall be slit or neatly placed around conduits, pipes, boxes or any other pieces in walls, cavities or below slab grades.
 2. Insulation shall not be compressed when placed.
- D. Any holes, voids and/or spaces between heated and unheated spaces shall be sealed with foamed in place insulation/sealant.
 1. Voids are not acceptable.
- E. Joints between dissimilar exterior materials shall be filled with insulation.
 1. Compatible foamed in place insulation shall be used where insulation cannot be installed.
 2. Sealant and backer rod are required regardless of insulation or foamed in place insulation.
- F. Provide Rigid Extruded Polystyrene Board Insulation at all new exterior foundation walls and/or grade beams. Extend insulation vertically down face of foundation wall or grade beam. See

Contract Drawings for required depths and thickness of foundation insulation. Protect insulation from damage during concrete work and backfilling.

3.03 WASTE MANAGEMENT

- A. Plan and coordinate insulation work to minimize generation of off-cuts and waste. Sequence work to maximize use of insulation off-cuts and waste.
- B. Dispose of any excess insulation products and accessories in accordance with applicable federal, state, and local government regulations.

3.04 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072113

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes but not limited to the following:
 - 1. Building insulation in batt or blanket form.
 - 2. Sound attenuating fire batt insulation.
 - 3. Sill sealer
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 054000 - Cold Formed Metal Framing.
 - 2. Section 072113 - Board Insulation
 - 3. Section 075323 - Fully Adhered EPDM Roofing System for roof insulation specified as part of the roofing construction.
 - 4. Section 078400 - Firestopping for semi-refractory fiber insulation.
 - 5. Section 079200 - Sealants
 - 6. Section 092116 - Gypsum Board Assemblies.
 - 7. Division 22 - Plumbing for pipe insulation.
 - 8. Division 23 - HVAC for duct, pipe, and equipment insulation.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM C553 "Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications".
- C. ASTM C612 "Standard Specification for Mineral Fiber Block and Board Thermal Insulation".
- D. ASTM C665 "Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing".
- E. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
- F. ASTM E119 "Standard Test Methods for Fire Tests of Building Construction and Materials".
- G. ASTM E136 "Standard Test Method for Behavior of Materials In A Vertical Tube Furnace At 750 degrees C."

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Submit product data for each type of insulation and sill sealer.
- D. Product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of insulation products with requirements including R-values,

fire performance characteristics, perm ratings, water absorption ratings, and other properties, based on comprehensive testing of current products.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this Section.
- B. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristic: ASTM E84.
 - 2. Fire resistance Ratings: ASTM E119.
- C. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- D. Allowable Thickness Variations: Manufacturer's standard units that vary slightly from the thickness indicated may be acceptable, SUBJECT TO THE APPROVAL OF THE ARCHITECT.
- E. Thermal Resistance: The thicknesses shown are for the thermal resistance (R-Value in accordance with ASTM C177 or ASTM C518) specified for each material. The R-Values specified are minimum acceptable. Provide adjusted thicknesses as directed for the use of material having a different thermal resistance.
- F. Certification: Affidavit by the polystyrene thermal manufacturer, certifying that the blanket insulation was manufactured with CFC-free blowing agents.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

PART 2 PRODUCTS

2.01 INSULATING MATERIALS - GENERAL

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

2.02 SOUND ATTENUATION FIRE BATT INSULATION (MINERAL WOOL)

- A. Manufacturers:
 - 1. Johns Manville
 - a. Mineral Wool Sound Attenuation Fire Batts (SAFB)
 - 2. Owens Corning, Thermafiber
 - a. Thermafiber® SAFB™
 - 3. Rockwool
 - a. AFB evo™

- B. Type: Sound Attenuation Fire Blanket (SAFB)
 - 1. R-Value: 3.7 per inch
 - 2. Facing: Unfaced only
 - 3. Density: 4.0pcf (nominal) for 1" thick material
 - 4. Density: 2.5pcf (nominal) for thickness greater than 1".
 - 5. Surface Burning Characteristics: Unfaced-Flame spread 0 and Smoke Developed 0
 - 6. Minimum Recycle content: 70% (pre-consumer)
 - 7. Formaldehyde-Free product
- C. Interior Walls: 3" thickness in 3-5/8" cavities and 6" thickness in 6" or larger cavities (see drawings for wall thickness) Sound Attenuation Fire Batts (SAFB), 16" or 24" wide.
- D. Exterior Walls: 4" Thickness in Type 17 wall cavities.
- E. Used in both rated and non-rated interior walls and ceilings wherever sound attenuation is shown on the contract drawings. Also used in exterior stud wall cavities.

2.03 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: product with demonstrated capability to bond insulation or mechanical anchors securely to substrates indicated without damaging or corroding insulation, anchors, or substrates.
- B. Adhesively Attached Pin Anchors: Perforated plate, 2-inches square, welded to projecting pin, with self-locking washer, complying with the following requirements:
 - 1. Plate: Zinc-plated steel, 0.106-inch thick.
 - 2. Pin: Copper-coated low carbon steel, fully annealed, 0.106-inches in diameter, length to suit depth of insulation indicated and, with washer in place to hold insulation tightly to substrate behind insulation.
 - 3. Self-Locking washer: Mild steel, 0.016-inch thick, sizes as required to hold insulation securely.
 - a. Where spindles will be exposed to human contact after installation, project ends with capped self-locking washers.
- C. SILL SEALER
 - 1. Install high-density Polyethylene foam sill sealer at all exterior stud walls bottom tracks (in addition to top of foundation wall).
- D. FASTENING COMPONENTS
 - 1. Nails or Staples: Steel wire; galvanized, type and size to suit application.
 - 2. Tape: type and size to suit application.
 - 3. Spindle Fasteners: Galvanized wire spindle on flat metal base; self-adhering backing.
- E. WIRE-UP INSTALLATION
 - 1. Wire Mesh: galvanized steel, hexagonal wire mesh.
 - a. 16 Gauge Wire at 24" o.c. min.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adjacent materials are dry and ready to receive insulation.
- B. Verify mechanical and electrical services within walls have been installed and inspected.

- C. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removal of projections that might puncture vapor retarders.
- B. Verify that adjacent materials are dry and ready to receive the insulation.

3.03 INSTALLATION

- A. Install insulation in accordance with manufacturer's published instructions.
- B. Butt insulation tight.
- C. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation. Leave no gaps or voids.
- D. Fasten in place at maximum 6 in. on center, tape in place, or retain in place with spindle fasteners or retain in place with mesh secured to framing members as required by manufacturer's published instructions. Tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane with material compatible with membrane, on an insulation that bears a facing.
- E. All spaces around windows, doors and other penetrations shall be filled or foamed with insulation, with no voids.
- F. In exterior stud walls and insulated interior stud walls, all cavities within studs placed adjacent to each other shall be filled with insulation as stud assemblies are built. Likewise, all cavities in headers shall be filled with insulation.
- G. No voids in the insulation will be permitted.
 - 1. Insulation shall be slit or placed around conduits, pipes, boxes or any other pieces in walls or roof.
 - 2. Insulation shall not be compressed when placed, except where indicated to be stuffed.
- H. Any holes, voids or spaces between heated and unheated spaces shall be sealed with foamed in place insulation.
 - 1. Voids are not acceptable.
- I. Joints between dissimilar exterior materials shall be filled with batt insulation.
 - 1. Foamed in place insulation shall be used where batt insulation cannot be installed.
 - 2. Sealant and backer rod are required regardless of insulation or foamed in place insulation.
- J. Do not place insulation over or within 3-inches of recessed lighting fixtures, unless fixtures are rated for insulation contact.
- K. Apply sound attenuating fire batts; friction-fit in all partitions indicated by the wall type and/or keynote on the floor plans. Use metal clips or wire as required to ensure that the blankets remain in place in the wall assembly. Install the insulation consistently on one side of the partition filling the cavity to the full height of the wall. Leave no voids.

3.04 WASTE MANAGEMENT

- A. Plan and coordinate insulation work to minimize generation of off-cuts and waste. Sequence work to maximize use of insulation cut-offs and waste,

3.05 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation

END OF SECTION 072116

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. The work of this section includes, but is not limited to, the following:
 - 1. Closed cell spray foam insulation without a HFC blowing agent.
 - 2. Temporary UV protection for spray foam insulation.
 - 3. Ignition barrier applied to spray foam insulation where required by AHJ.
- B. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
 - 1. Section 042200 - Concrete Unit Masonry
 - 2. Section 054000 - Cold Formed Metal Framing
 - 3. Section 072713 - Air/Vapor Barriers
 - 4. Section 079200 - Sealants
 - 5. Section 092116 - Gypsum Board Assemblies

1.03 STANDARDS AND REFERENCES

- A. The following standards and publications (latest edition) are applicable to the extent referenced in the text.
 - 1. ASTM C 518 - "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".
 - 2. ASTM C 177 - "Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus".
 - 3. ASTM C1029 - "Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation".
 - 4. ASTM C 1338 - "Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings".
 - 5. ASTM E 84 - "Standard Test Method for Surface Burning Characteristics of Building Materials".
 - 6. ASTM E 96 - "Standard Test Methods for Water Vapor Transmission of Materials".
 - 7. ASTM E 283 - "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen".
 - 8. ASTM E 2178 - "Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials".
 - 9. ASTM D 1621 - "Standard Test Method for Compressive Properties of Rigid Cellular Plastics".
 - 10. ASTM D 1622 - "Standard Test Method for Apparent Density of Rigid Cellular Plastics".
 - 11. ASTM D 1623 - "Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics".
 - 12. ASTM D 2126 - "Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging".
 - 13. ASTM D 2842 - "Standard Test Method for Water Absorption of Rigid Cellular Plastics".
 - 14. "Guidance on Best Practices for the Installation of Spray Polyurethane Foam" by the Spray Foam Coalition of the American Chemistry Council Center for the Polyurethane Industry.

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements
- C. Product Data:
 - 1. Provide spray foam manufacturer's:
 - a. Product data for each type of insulation specified.
 - b. Storage and Handling requirements and recommendations.
 - c. Use Limitations and Recommendations.
 - 2. Provide product data for temporary UV blocking coverings to be utilized if spray foam exposure exceeds 90 days.
- D. Manufacturer's Certification:
 - 1. Provide manufacturer's certification attesting the spray foam proposed does not utilize any hydrofluorocarbon (HFC) blowing agents.
 - 2. Provide manufacturer's certification certifying proposed insulation meets or exceeds all specified requirements.
 - 3. Manufacturer's years of experience in manufacture of materials of this Section.
- E. Installer Certifications:
 - 1. Installer must be a licensed dealer (installer) of the spray foam manufacturer.
 - 2. Copy of Installer's current certificate issued by spray foam manufacturer attesting to proper training of installing their spray foam insulation.
 - 3. Installer's years of experience in the application of spray foam insulation.
- F. Test Reports: Provide test reports performed by a qualified third-party testing agency evidencing compliance of insulation products with specified requirements.
- G. Installation Instructions: Manufacturer's detailed, written installation instructions.
- H. Warranty:
 - 1. Provide sample Limited Lifetime Warranty with submittal package.
- I. Closeout Documents:
 - 1. Insulation installer shall provide a certification listing the type, manufacturer and R value of insulation installed in each element of the building thermal envelope. Certification shall indicate the initial installed thickness and installed density for each element of the building thermal envelope. The insulation installer shall provide two signed and dated copies of the certification. One copy shall be submitted to the Architect and the other copy shall be posted in a conspicuous location on the project site.
 - 2. Executed copy of Limited lifetime Warranty.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility: Single source products from one spray foam manufacturer.
- B. Installer: A firm which has at least 5 years experience in spray foam insulating and has been trained and approved by the spray foam manufacturer in the art of applying spray foam insulation.
- C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for the meeting shall include but is

not limited to review of special details, the cleaning requirements for masonry anchors, and overspray control.

- D. A copy of the manufacturer's published installation instructions must be available at all times on the project during installation.
- E. Spray foam must be applied to the sample masonry panel.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in manufacturer's original sealed containers clearly labeled with manufacturer's name, product identification, safety information, lot numbers if applicable, net weight of contents, and expiration date.
- B. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Store in accordance with local fire and safety codes. Protect from damage from sunlight, weather, excessive temperatures and construction operations.
- C. Empty containers must be removed from site on a daily basis.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Protect workers as recommended by the Spray Foam Coalition's Guidance on best practices for the installation of Spray Polyurethane Foam.
- C. Do not apply insulation when substrate temperatures are less than 50 degrees F prior to installation or as recommended by spray foam manufacturer.
- D. Surfaces must be dry prior to application of spray foam. Installer must measure substrate moisture content before applying spray foam. Record moisture readings and their respective locations and submit to Architect for record. Excess humidity may cause poor adhesion, and result in product failure.
- E. To avoid overspray, product should not be applied when conditions are windy.
- F. Protect adjacent surfaces: windows; flashings; masonry anchors; door frames; floors; soffits; fascia; equipment; etc. from damage of overspray. Immediately remove all overspray from adjacent surfaces.
- G. Spray foam on exterior walls and other areas subject to UV exposure shall not be left exposed more than 90 days. If permanent veneer/siding covering cannot be installed within 90 days, provide temporary UV blocking coverings. If it is known permanent covering will not occur within 90 day time limit, cover spray foam insulation within seven (7) days of application. Maintain temporary UV blocking coverings until installation of the permanent veneer/siding covering.

1.08 WARRANTY

- A. Provide manufacturer's Limited Lifetime Warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. BASF Corporation, 1703 Crosspoint Ave., Houston, TX 77054 Phone: 800-706-0712.
- B. Huntsman Building Solutions, 3315 East Division St., Arlington, TX 76011 Phone: (855) 942-7273.
- C. Icynene (Huntsman Building Solutions Company), 6747 Campobello Road, Mississauga, Ontario L5N 2L7 Canada Phone: 800-758-7325.
- D. Johns Manville, 717 17th Street, Denver, CO 80202 Phone: 309-978-2434.

2.02 MATERIALS

- A. Closed Cell Spray Foam Insulation
 - 1. Spray applied Rigid Polyurethane Foam Insulation System utilizing an EPA approved, zero ozone-depleting blowing agent.
 - 2. Products:
 - a. SPRAYTITE® Comfort Series manufactured by BASF Corporation.
 - b. Heatlok® HFO Pro manufactured by Huntsman Building Solutions.
 - c. Icynene ProSeal™ manufactured by Icynene (Huntsman Building Solutions Company).
 - d. JM Corbond® IV manufactured by Johns Manville.
 - 3. Physical Properties:

Property	Test Method	Typical Value
Density	ASTM D 1622	2.0 – 2.4 lbs/cubic foot
Thermal Resistance	ASTM C 518	1" =R 6.6 - 7.4. 3.5" = R 22 -23.
Air Permeance @75 Pa, 1"	ASTM E 283	less than 0.02 L/s m squared
Compressive Strength	ASTM D 1621	25 - 40 psi
Tensile Strength	ASTM D 1623	40 - 65 psi
Water Vapor Transmission, 1", Vapor Barrier (<1 perm) @ 1-1/4"	ASTM E 96	Less than 1.0 perms
Off Gassing Tests (VOC Emissions)	CGSB 51.23-92	Pass (No toxic vapors)
Surface Burning Characteristics 3" Flame Spread Index Smoke Development	ASTM E 84	Class 1 25 max. 450 max.
Closed Cell Content	ASTM D 2856	>92%

- B. Thermal Barrier & Intumescent Coating
 - 1. Provide thermal barriers and intumescent coatings listed in the ICC Evaluation Service ESR Report for the specific spray foam being installed.
- C. Primers
 - 1. Provide spray foam manufacturer's recommended primer for oily surfaces, galvanized steel and other substrates as determined by spray foam manufacturer.
- D. Signage
 - 1. The thickness of sprayed foam roof/ceiling insulation shall be written in inches on permanent markers that are installed at least one for every 300 sq. ft. throughout the attic

space. The markers shall be permanently affixed to the trusses, joists or structure and marked with the minimum initial installed thickness with numbers a minimum of 1 inch in height. Each marker shall face the attic access opening.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Ensure that penetrating work by other trades is in place and complete.
- C. Verify that all exterior and interior wall, partition, and floor/ceiling assembly construction has been completed to the point where the insulation may correctly be installed.
- D. Verify that substrate and cavities are dry by checking surface for moisture with Moisture Detection Paper strips or other moisture detection system acceptable to the Architect. Record location of all readings and results and submit to Architect for record.
- E. Verify substrate is free from any foreign material that will impede application and/or adhesion.
- F. Verify that mechanical and electrical services in ceilings, walls and floors have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
- G. Verify transition flashings and sealants are in place and are compatible with the spray foam insulation.
- H. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces by brushing, scrubbing, scraping, grinding or compressed air to remove loose mortar, dust, oil, grease, oxidation, mill scale, rust and other contaminants which will affect adhesion of the closed cell spray foam insulation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Install primer if recommended by spray foam manufacturer and/or substrate material dictates the use of a primer for proper spray foam adhesion.
- C. Mask and protect adjacent surfaces from overspray or dusting.
- D. Install required permanent signage in areas of attic/ceiling insulation installation.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Product must be installed according to local code and must be applied by a qualified applicator.
- B. Equipment used to apply the foam insulation shall have fixed ratio positive displacement pumps approved by the spray foam manufacturer.
- C. Apply insulation by spray method, to uniform monolithic density without voids. Apply in consecutive passes as recommended by manufacture to thickness as indicated on the drawings

or required to meet R values. Comply with manufacturer's recommended cooling times between passes. Apply additional insulation to any area not meeting design thickness.

- D. Apply insulation to seal voids at truss ends to prevent wind scouring of ceiling insulation.
- E. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage.
- F. Apply insulation to fill voids around doors, windows, and louvers. Apply insulation to fill voids around accessible service and equipment penetrations.
- G. Do not install spray foam insulation in areas where it will be in contact with equipment or materials with operating temperatures of 180 degrees F (82 degrees C) or greater.
- H. Where building is designed to meet the specific air tightness standards of the Energy Star Program, apply insulation as recommended by manufacturer to provide airtight construction.
- I. Clean all exposed masonry eyelets and/or anchor parts that extend thru the spray foam. Cleaning method shall not damage or bend masonry anchors.
- J. Apply sealant to joints between structural assemblies as specified in Division 07.
- K. Patch damaged areas just prior to permanent veneer covering.
- L. Trim, as required, any excess thickness that would interfere with the application of cladding/covering systems by other trades or restrict the open cavity required in veneer masonry construction.
- M. Apply ignition barrier coating where indicated in accordance with manufacturer's installation instructions.
- N. Full payment for spray foam work cannot be made until all masonry anchors and/or anchor parts have been cleaned and all areas of overspray have been rectified.

3.04 PROTECTION

- A. Protect installed spray foam until spray foam is covered by a finish product. Provide temporary coverings where spray foam insulation is subject to abuse.
- B. Provide temporary UV protection of installed foam if spray foam will be exposed more than 90 days.
- C. Touch-up, repair or replace damaged spray foam before covering with finish product.

END OF SECTION 072129

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. Provide EIFS with air and moisture barrier for vertical, above-grade exterior wall surfaces.
- B. Related Sections: Other specification sections which relate directly to the work of this section include the following:
 - 1. Section 061643 – Gypsum Sheathing
 - 2. Section 072713 – Air/Vapor Barriers
 - 3. Section 076200 – Sheet Metal Flashing and Trim
 - 4. Section 079200 – Sealants

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM Standards:
 - 1. B 117 - "Test Method for Salt Spray (Fog) Testing".
 - 2. C 578 - "Specification for Preformed, Cellular Polystyrene Thermal Insulation".
 - 3. C 1177 - "Specification for Glass Mat Gypsum for Use as Sheathing".
 - 4. C 1280 - "Specification for Installation of Sheathing".
 - 5. C 1382 - "Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints".
 - 6. D 522 - "Test Methods for Mandrel Bend Test of Attached Organic Coatings".
 - 7. D 882 - "Standard Test Methods for Tensile Properties of Thin Plastic Sheeting".
 - 8. D 968 - "Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive".
 - 9. D 1382 - "Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish System (EIFS) Joints".
 - 10. D 1784 - "Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds".
 - 11. D 2247 - "Practice for Testing Water Resistance of Coatings in 100% Relative Humidity".
 - 12. D 2370 - "Test Method for Tensile Properties of Organic Coatings".
 - 13. D 3273 - "Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber".
 - 14. E 84 - "Test Method for Surface Burning Characteristics of Building Materials".
 - 15. E 96 - "Test Methods for Water Vapor Transmission of Materials".
 - 16. E 108 - "Method for Fire Tests of Roof Coverings".
 - 17. E 119 - "Method for Fire Tests of Building Construction and Materials".
 - 18. E 283 - "Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen".
 - 19. E 330 - "Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference".
 - 20. E 331 - "Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference".

21. E 1233 - "Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference".
22. E 2098 - "Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution".
23. E 2134 - "Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)".
24. E 2273 - "Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies".
25. E 2430 - "Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)".
26. E 2485 - "Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings".
27. E 2486 - "Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)".
28. E 2570 - "Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage".
29. G 153 - "Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials".
30. G 154 - "Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials".

C. Building Code Standards

1. AC235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (Latest Edition).

D. National Fire Protection Association (NFPA) Standards

1. NFPA 268, "Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source".
2. NFPA 285, "Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus".

E. Other Referenced Documents

1. American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test.
2. GA-600 Fire Resistance Design Manual.
3. APA Engineered Wood Association E 30, Engineered Wood Construction Guide.
4. ICC-ES ESR-1748, Evaluation Report for StoTherm NExT EIFS.
5. ICC-ES ESR-1233, Evaluation Report for StoGuard.

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 – Submittal Procedures
- B. Submit pursuant to Section 016000 – Product Requirements.
- C. Manufacturer's specifications, details, installation instructions and product data.
- D. Manufacturer's code compliance report.
- E. Manufacturer's standard warranty.

- F. Applicator's certificate of instruction.
- G. Samples for approval as directed by Architect.
- H. EPS board manufacturer's certificate of compliance with ASTM E 2430
- I. Sealant manufacturer's certificate of compliance with ASTM C 1382.
- J. Prepare and submit project-specific details.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workmen familiar with the work and according to manufacturer's recommendations and/or industry standards.
- B. A single manufacturer is to provide all components of the EIFS and EFS to ensure compatibility.
- C. Manufacturer qualifications: A firm specializing in the manufacture of the specified EIFS and EFS.
- D. Installer Qualifications: A firm whose business is in the installation of EIFS and EFS equivalent to the type(s), scope, and complexity required for the Work.
 - 1. Installer shall have a minimum of five (5) years' experience.

1.06 PERFORMANCE REQUIREMENTS

Table 1—Air/Moisture Barrier Performance

TEST	METHOD	CRITERIA	RESULT
1. Water Penetration Resistance	AATCC 127 (Water Column)	Resist 21.6 in (55 cm) water for 5 hours before and after aging	Pass
2. Water Penetration Resistance after Cyclic Wind Loading	ASTM E 1233 / ASTM E 331	No water at exterior plane of sheathing after 10 cycles @ 80% design load and 75 minutes water spray at 6.24 psf (299 Pa) differential	No water penetration on Plywood, OSB, and Glass Mat Faced Gypsum sheathings
3. Water Resistance Testing	ASTM D 2247	Absence of deleterious effects after 14 day exposure	No deleterious effects
4. Water Vapor Transmission	ASTM E 96 Method B (Water Method)	Measure	Sto Gold Fill®*: 17.3 perms [994 ng/(Pa·s·m ²)]
5. Air Leakage	ASTM E 283	<0.06 cfm/ft ² (0.00030m ³ /s•m ²)	<0.0044 cfm/ft ² (0.000022 m ³ /s•m ²)
6. Structural Integrity	ASTM E 330	2-inches (51 mm) H ₂ O pressure (positive & negative) for 1 hour.	Pass
7. Dry Tensile Strength	ASTM D 882	20 lbs./in (3503 N/m), minimum before and after aging	Sto Gold Fill:* 159 lbs./in (27845 N/m)) before aging 213 lbs./in (37302 N/m) after aging

8. Pliability	ASTM D 522	No Cracking or Delamination using 1/8" (3 mm) mandrel at 14°F (-10°C) before and after aging	Pass
9. Surface Burning	ASTM E 84	Flame Spread 0 – 25 for NFPA Class A, UBC Class I	Flame Spread: 5 Smoke Density: 10
10. Tensile Adhesion	ASTM C 297	>15 psi (103 kPa)	>30 psi (207 kPa) to Plywood, OSB, Glass Mat Faced Gypsum sheathings

* Note: Sto Gold Fill testing with Sto Detail Mesh reinforcement

Table 2—EIFS Weather Resistance and Durability Performance

TEST	METHOD	CRITERIA	RESULTS
1. Accelerated Weathering	ASTM G 153 (Formerly ASTM G 23)	No deleterious effects* at 2000 hours when viewed under 5x magnification	Pass
2. Accelerated Weathering	ASTM G 154 (Formerly ASTM G 53)	No deleterious effects* at 2000 hours when viewed under 5x magnification	Pass @ 5000 hours
3. Freeze/Thaw Resistance	ASTM E 2485	No deleterious effects* at 10 cycles when viewed under 5x magnification	Pass @ 90 cycles
4. Water Penetration	ASTM E 331 (modified per ICC-ES AC 235)	No water penetration beyond the plane of the base coat/EPS board interface after 15 minutes at 6.24 psf (299 Pa) or 20% of design wind pressure, whichever is greater	Pass at 12.0 psf (575 Pa) after 30 minutes
5. Drainage Efficiency	ASTM E 2273	90% minimum	> 99%
6. Tensile Adhesion	ASTM E 2134	Minimum 15 psi (103kPa) tensile strength	Pass
7. Water Resistance	ASTM D 2247	No deleterious effects* at 14 day exposure	Pass @ 60 days
8. Salt Spray	ASTM B 117	No deleterious effects* at 300 hours	Pass @ 3000 hrs.
9. Abrasion Resistance	ASTM D 968	No cracking or loss of film integrity at 528 quarts (500 L) of sand	Pass
10. Mildew Resistance	ASTM D 3273	No growth supported during 28 day exposure period	No growth at 42 days

11. Impact Resistance	ASTM E 2486	Level 1: 25-49 in-lbs. (2.83-5.54J)	Pass with one layer Sto Mesh
		Level 2: 50-89 in-lbs. (5.65-10.1J)	Pass with two layers Sto Mesh
		Level 3: 90-150 in-lbs. (10.2-17J)	Pass with one layer Sto Intermediate Mesh
		Level 4: >150 in-lbs. (>17J)	Pass with one layer Sto Armor Mat and one layer Sto Mesh

*No deleterious effects: no cracking, checking, crazing, erosion, rusting, blistering, peeling or delamination

Table 3—EIFS and Air/Moisture Barrier Fire Performance

TEST	METHOD	CRITERIA	RESULT
1. Fire Endurance	ASTM E 119	Maintain fire resistance of existing rated assembly	Pass*
2. Intermediate Scale Multi-Story Fire Test	NFPA 285 (UBC Standard 26-9)	1. Resistance to vertical spread of flame within the core of the panel from one story to the next 2. Resistance to flame propagation over the exterior surface 3. Resistance to vertical spread of flame over the interior surface from one story to the next 4. Resistance to significant lateral spread of flame from the compartment of fire origin to adjacent spaces	Pass with 12 inches of EPS insulation *
3. Radiant Heat Ignition	NFPA 268	No ignition @ 20 minutes	Pass with 12 inches of EPS insulation
4. Surface Burning (individual components)	ASTM E 84	Individual components shall each have a flame spread of 25 or less, and smoke developed of 450 or less	Flame: 0 Smoke Developed: 5

Note: * indicates results based on extrapolation of data from series testing. ASTM E119 testing performed on assembly with 4 inch (305 mm) thick EPS.

Table 4—EIFS Component Performance

TEST	METHOD	CRITERIA	RESULT
1. Alkali Resistance of Reinforcing Mesh	ASTM E 2098	Greater than 120 ply (21 don/cm) retained tensile strength	Pass

2. Requirements for Rigid PVC Accessories	ASTM D 1784	Meets cell classification 13244C	Pass
---	-------------	----------------------------------	------

1.07 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Delivery: Pursuant to EIFS and EFS manufacturer's published instructions, with clearly legible manufacturer identification and labels or other identifying devices securely attached to packaging.
- D. Storage: In manufacturer's original unopened containers. Store and protect against exposure to direct sunlight, excessive moisture, construction dust, temperature or humidity conditions exceeding EIFS and EFS manufacturer's published limitations, or other conditions that may damage EIFS and EFS components.
- E. Handling: Do not bend, twist, scratch, or otherwise damage components.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Ambient air temperature: 40 degrees F minimum and rising during EIFS and EFS installation including drying period(s) required for coating system(s). Provide temporary heat as necessary to maintain required temperature.
 - 1. Protect substrate and finish from precipitation.

1.09 SPECIAL WARRANTY

- A. System warranty: Submit a written warranty, executed by the EIFS and EFS manufacturer agreeing to provide necessary materials to replace the EIFS and EFS, or any components thereof, which fail within special warranty period. Failures include but are not limited to: Failure of structural integrity; abnormal deterioration of finishes and other materials beyond normal weathering; water-tightness failure; sealant failure; failure of installed assemblies to meet performance requirements.
- B. Term: Five (5) years from Date of Substantial Completion.

PART 2 PRODUCT

2.01 MANUFACTURERS

- A. Provide Air/Moisture Barrier, EIF System and accessories from single source manufacturer or approved supplier.
- B. The following are acceptable manufacturers:
 - 1. Dryvit Systems.
 - 2. Synergy by Firestone
 - 3. STO Corp. (Basis of Design)
 - 4. USG
 - 5. PAREX

- C. The following are acceptable accessories manufacturer's:
 - 1. Plastic Components, Inc.

2.02 AIR/MOISTURE BARRIER

- A. StoGuard
 - 1. Joint Compound: Sto Gold Fill—ready mixed flexible joint compound for rough opening protection and joint treatment of wall sheathing (not required for concrete/masonry surfaces).
 - 2. Waterproof Coating: Sto Gold Coat®—ready mixed waterproof coating for wall substrates and sheathings.

2.03 ADHESIVE

- A. Cementitious Adhesives
 - 1. Sto Primer/Adhesive--acrylic based adhesive mixed with portland cement (for use over exterior glass mat faced gypsum sheathing (compliant with ASTM C 1177), exterior cementitious sheathing, concrete, masonry or cement plaster surfaces.

2.04 INSULATION BOARD

- A. Nominal 1.0 lb/ft³ (16 kg/m³) Expanded Polystyrene (EPS) insulation board in compliance with ASTM E 2430 and ASTM C 578 Type I requirements.

2.05 BASE COAT

- A. Waterproof Base Coat
 - 1. Sto Flexyl—two component fiber reinforced acrylic based waterproof base coat mixed with portland cement (*for use as a waterproof base coat for foundations, parapets, splash areas, trim and other projecting architectural features*).

2.06 REINFORCING MESHES

- A. Standard Mesh
 - 1. Sto Mesh--nominal 4.5 oz./yd² (153 g/m²), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials.
- B. High Impact Mesh
 - 1. Sto Intermediate Mesh--nominal 11.2 oz./yd² (380 g/m²), high impact, interwoven, open weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials (*achieves High Impact Classification*).
- C. Specialty Meshes
 - 1. Sto Detail Mesh--nominal 4.2 oz./yd² (143 g/m²), flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials.

2.07 PRIMER

- A. Sto Primer Sand—acrylic based tinted primer with sand for roller application.
- B. Sto Primer Smooth – acrylic based tinted primer for spray application.

2.08 FINISH COAT

- A. Sto Essence DPR Finish —acrylic based textured wall coating with graded marble aggregate.

2.09 JOB MIXED INGREDIENTS

- A. Water--Clean and potable.
- B. Portland cement--Type I, Type II, or Type I-II in conformance with ASTM C 150.

2.10 ACCESSORIES

- A. Starter Track— Rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., 9051 NW 97th Terrace, Miami, Florida 33178 (800 327-7077) or equivalent.

2.11 MIXING

- A. Sto Gold Fill--mix with a clean, rust-free high speed mixer to a uniform consistency.
- B. Sto Gold Coat-mix with a clean, rust-free high speed mixer to a uniform consistency.
- C. Sto Primer/Adhesive: mix ratio with portland cement is 1:1 by volume. Pour Sto Primer/Adhesive into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary by adding up to 8 fl. oz. (0.24L) of water per pail and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.
- D. Sto Primer/Adhesive-B: mix ratio with water: 5-6.5 quarts (4.7-6.2 L) of water per 50 pound (23 kg) bag of Sto Primer/Adhesive-B. Pour water into a clean mixing pail. Add Sto Primer/Adhesive-B, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary by adding up to 12 fl. oz. (0.35L) of water per bag and re-mix to a uniform trowel consistency. Avoid re-tempering. Keep mix ratio consistent. Do not exceed maximum amount of water in mix ratio.
- E. Sto RFP--mix with a clean, rust-free high speed mixer to a uniform consistency.
- F. Sto Flexyl--mix ratio with portland cement: 1:1 ratio by weight. Pour Sto Flexyl into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary with additional Sto Flexyl and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.
- G. Sto primer--mix with a clean, rust-free high speed mixer to a uniform consistency.
- H. Sto Essence DPR Finish --mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture
- I. Mix only as much material as can readily be used.
- J. Do not use anti-freeze compounds or other additives.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect surfaces for:
 - 1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
 - 2. Surface absorption and chalkiness.
 - 3. Cracks—measure crack width and record location of cracks.
 - 4. Damage and deterioration.
 - 5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough in accordance with manufacturer's specifications to receive the EIFS and record any areas of moisture damage.
 - 6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane).
- B. Inspect sheathing application for compliance with applicable requirement:
 - 1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177.
- C. Report deviations from the requirements of project and manufacturer's specifications or other conditions that might adversely affect the Air/Moisture Barrier and EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.02 SURFACE PREPARATION

- A. Remove surface contaminants on concrete and concrete masonry surfaces.
- B. Apply conditioner by sprayer or roller to chalking or excessively absorptive surfaces.
- C. Replace weather-damaged sheathing and repair damaged or cracked surfaces.
- D. Level surfaces to comply with manufacturer's required tolerances.
- E. Repair cracks, spalls or damage in concrete or concrete masonry surfaces.

3.03 INSTALLATION

A. Air/Moisture Barrier

For installation over exterior or Exposure I Plywood, and Glass Mat Faced Gypsum Sheathing in compliance with ASTM C 1177:

- 1. Protect rough openings, joints and parapets: apply Sto Gold Fill joint compound by trowel over rough openings, sheathing joints, inside and outside corners, and tops of parapets. Immediately embed reinforcing mesh in the wet joint compound and trowel smooth. Embed minimum 4 inch (101 mm) wide mesh at sheathing joints and minimum 9 inch (152 mm) wide mesh at rough openings, inside and outside corners and tops of parapets (refer to detail 10.23a for detailed information on proper protection of rough openings and sequencing of work at rough openings).
- 2. Spot fasteners with Sto Gold Fill joint compound.
- 3. Apply waterproof coating by roller over sheathing surface, including the dry joint compound, to a uniform wet mil thickness of 10 mils in one coat. Use ½ inch (13 mm) nap roller for plywood and gypsum sheathing. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.

4. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
 5. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
- B. Starter Track
1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
 2. Attach the starter track even with the line into the structure a maximum of 16 inches (406 mm) on center with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) penetration, and galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration. Attach between studs into blocking as needed to secure the track flat against the wall surface. For solid wood sheathing or concrete/masonry surfaces, attach directly at 12 inches (305 mm) on center maximum.
 3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS Board to be seated inside of track) and abut.
 4. Install Starter Track at other EIF System terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing.
- C. Splice Strips for Starter Track and Flashing
1. Starter Track, Window/Door Head Flashing and Side Wall Step Flashing: install 2 inch (51 mm) wide diagonal splice strips of detail mesh at ends of head flashings. Install minimum 4 inch (100 mm) wide splice strips of detail mesh between back flange of starter track, head flashings and roof/side wall step flashing. Center the mesh so it spans evenly between the back flange of the Starter Track or flashing and the sheathing. Embed the mesh in the wet joint compound and trowel smooth.
 2. Apply waterproof coating over the splice strip when the joint compound is dry (refer to Details 10.00 and 10.23b).
- D. Backwrapping
1. Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Adhere mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed (paragraph I.1). Alternatively, pre-wrap terminating edges of insulation board.
- E. Adhesive Application and Installation of Insulation Board (*for all adhesives except Sto BTS Silo*)
1. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. (*Note: rasping prevents an outward bow at the Starter Track*).
 2. Apply adhesive to the back of the insulation board with the proper size stainless steel notched trowel. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive uniformly so ribbons of adhesive do not converge.

3. Immediately place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply firm pressure over the entire surface of the boards to ensure uniform contact of adhesive. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.
 4. Butt all board joints tightly together to eliminate any thermal breaks in the EIFS. Care must be taken to prevent any adhesive from getting between the joints of the boards.
 5. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
 6. Remove individual boards periodically while the adhesive is still wet to check for satisfactory contact with the substrate and the back of the insulation board, and for spacing between ribbons of adhesive. An equal amount of adhesive must be on the substrate and the board when they are removed, as an indication of adequate adhesion. Do not use nails, screws, or any other type of non-thermal mechanical fastener.
- F. Adhesive Application and Installation of EPS Board with StoSilo Spray Equipment
1. Apply Sto BTS Silo material to the prepared sheathing to a rough thickness of 1/4" (6 mm). Form uniform vertical ribbons of adhesive by directing the proper size stainless steel notched trowel from the bottom of the wall upward. Immediately install insulation boards in accordance with steps E.3-E.6 above. If adhesive develops a "skin" before the insulation board is installed remove the adhesive and replace with fresh material.
- G. Slivering and Rasping of Insulation Board Surface
1. After insulation boards are firmly adhered to the substrate, fill any open joints in the insulation board layer with slivers of insulation or spray foam. Use spray foam that is identified by the spray foam manufacturer as suitable for this use.
 2. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.
- H. Trim, Reveals and Projecting Aesthetic Features
1. Attach features and trim where designated on drawings with adhesive to the insulation board or sheathing surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
 2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
 3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
 4. Do not locate reveals/aesthetic grooves at high stress areas such as corners of windows, doors, etc.
 5. A minimum 3/4 inch (19 mm) thickness of insulation board must remain at the bottom of the reveals/aesthetic grooves.
- I. Completion of Backwrapping
1. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.
- J. Base Coat and Reinforcing Mesh Application

1. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
 2. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
 3. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with StoSilo spray equipment or a stainless steel trowel to a uniform thickness of approximately $\frac{1}{8}$ inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2- $\frac{1}{2}$ inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 2- $\frac{1}{2}$ inch (64 mm) overlap in each direction. Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.
 4. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the weather exposed sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2- $\frac{1}{2}$ inches (65 mm).
 5. Allow base coat to thoroughly dry before applying primer or finish.
- K. Primer application
1. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.
- L. Finish Coat Application
1. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spraying or troweling with a stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
 - a. Avoid application in direct sunlight.
 - b. Apply finish in a continuous application, and work to an architectural break in the wall.
 - c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results; cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
 - d. Do not install separate batches of finish side-by-side.
 - e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
 - f. Do not apply finish over irregular or unprepared surfaces or surfaces not in compliance with the requirements of the project manufacturer's specifications.

3.04 PROTECTION

- A. Provide protection of installed materials from water infiltration into drainage plane or behind them.

- B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry.

3.05 CLEANING, REPAIR AND MAINTENANCE

- A. Clean and maintain the Exterior Insulation and Finish System (EIFS) for a fresh appearance and to prevent water entry into and drainage plane behind the system. Repair cracks, impact damage, spalls or delamination promptly.
- B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.
- C. Refer to reStore Repair and Maintenance Guide ([reStore Program](#)) for detailed information on EIFS restoration - cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

END OF SECTION

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This section includes, but is not limited to, the following:
 - 1. Infiltration Barrier (Weather Resistive Barrier).
 - 2. Window, Door, Louver & Transition Flashing
 - 3. Air Barriers.
 - 4. Vapor Retarders.
 - 5. Sill Sealer.
 - 6. Foam Closure Strip at Metal Roof Decking.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Section 031000 - Concrete Forming and Accessories for vapor barrier/insulation under interior slabs on grade.
 - 2. Section 053100 - Steel Decking
 - 3. Section 054000 - Cold Formed Metal Framing.
 - 4. Section 061643 - Gypsum Sheathing
 - 5. Section 075323 - Fully Adhered EPDM Roofing Systems for vapor retarder specified as part of the EPDM Roofing System.
 - 6. Section 076200 - Sheet Metal Flashing and Trim
 - 7. Section 079200 - Sealants

1.03 STANDARDS AND REFERENCES

- A. ASTM International
 - 1. ASTM D 882; "Standard Test Method for Tensile Properties of Thin Plastic Sheeting".
 - 2. ASTM D 1117; "Standard Guide for Evaluating Non-woven Fabrics".
 - 3. ASTM E 84; "Standard Test Method for Surface Burning Characteristics of Building Materials".
 - 4. ASTM E 96; "Standard Test Methods for Water Vapor Transmission of Materials".
 - 5. ASTM E 1643; "Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs".
 - 6. ASTM E 1677; "Standard Specification for Air Barrier (AB) Material or Assemblies for Low-Rise Framed Building Walls".
 - 7. ASTM E 2178; "Standard Test Method for Air Permeance of Building Materials".
 - 8. ASTM E 2357; "Standard Test Method of Determining Air Leakage Rate of Air Barrier Assemblies".
- B. AATCC - American Association of Textile Chemists & Colorists
 - 1. Test Method TM127; "Test Method for Water Resistance: Hydrostatic Pressure".
- C. TAPPI - Technical Association of the Pulp and Paper Industry
 - 1. Test Method T-460; "Air Resistance of Paper (Gurley Method)".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.

- C. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations.
- D. Manufacturer's field service reports for infiltration barrier: Provide pre-installation conference and site reports from authorized field service representative, indicating observation of infiltration barrier assembly installation.
- E. Infiltration Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion:
 - 1. Warranty Period: 10-year limited product and labor warranty.

1.05 PRE-INSTALLATION MEETING

- A. Review all related project requirements and submittals, status of substrate work and Preparation, areas of potential conflict and interference, availability of infiltration barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordination of methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials as recommended by manufacturer.

PART 2 PRODUCT

2.01 VAPOR RETARDER

- A. Wall and Roof
 - 1. Vapor Retarder shall be six (6) mil. polyethylene for exterior stud wall construction.
- B. Under slab on grade
 - 1. See Section 031000 - Concrete Forming and Accessories

2.02 INFILTRATION BARRIER

- A. Infiltration barrier DuPont™ Tyvek® DrainWrap™ or an Architect Approved Equivalent shall be installed over all exterior wall sheathing.
 - 1. Air Penetration: .004 cfm/ft² at 75 Pa maximum when tested in accordance with ASTM E2178. Type 1 when tested in accordance with ASTM E-1677.
 - 2. Water Vapor Transmission: 36 perms, when tested in accordance with ASTM E96, Method A
 - 3. Water Penetration Resistance: 210 cm when tested in accordance with AATCC Test Method 127.
 - 4. Basis Weight: 2.1-oz/yd² min., when tested in accordance with TAPPI Test Method T-410.
 - 5. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 5, Smoke Developed: 25.
 - 6. Infiltration Barrier to be made of spunbonded polyolefin, non-woven, non-perforated infiltration barrier (weather barrier).
 - a. Infiltration barrier to be covered within four (4) months of installation.
- B. Tape: 3" wide pressure sensitive tape of type recommended by manufacturer for sealing joints and penetrations in infiltration barrier.

- C. Fasteners: DuPont Tyvek Wrap Cap Screws, as distributed by DuPont: 1-5/8" rust resistant screw with 2" diameter plastic cap or manufacturer approved equivalent.

2.03 WINDOW, DOOR, LOUVER AND TRANSITION FLASHING (WDLT FLASHING)

- A. Self adhering membrane consisting of an SBS rubberized asphalt compound integrally laminated to an engineered film.
 - 1. Thickness: 35 mils minimum
 - 2. Primer: As recommended by manufacturer.
 - 3. Manufacturer: Henry Company Blueskin WB or Architect approved equivalent.
 - 4. Termination Bar: 1/8" x 1", 304 stainless steel, continuous, fastened at 16" o.c.

2.04 AUXILIARY SEALING MATERIALS

- A. SILL SEALER
 - 1. Install high-density Polyethylene foam sill sealer under bottom track at all exterior stud walls. Sealer to be full width of track.
- B. FOAM CLOSURE STRIPS
 - 1. Provide top and bottom void strip foam closures by Metal Deck.com or Architect approved equivalent.
 - 2. Foam Closure Strips to be manufactured to match the profile of the roof deck.
 - 3. Install in top and bottom flutes of all roof decking at perimeter envelope insulation as shown on Contract Drawings.

PART 3 EXECUTION

3.01 VAPOR TIGHTNESS

- A. No tears or gaps in the vapor retarder and infiltration barrier will be allowed. Repair any tears or punctures in barriers immediately BEFORE CONCEALMENT by other work. Cover tape or add another layer of vapor/infiltration barrier.
- B. Vapor retarders are to be installed over all exterior batt insulation, uninterrupted from slab to roof deck or as detailed on Contract Drawings.
 - 1. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.
 - 2. Overlap joints a minimum of 24".
 - 3. Overlapped joints shall be completely covered with adhesives or tape per vapor barrier/retarder manufacturer's printed directions. Locate all joints over framing members or other solid substrates.
- C. The joint between the exterior wall Gypsum Wall Board and the roof deck shall be sealed against air infiltration. The exterior wall Gypsum Wall Board shall overlay the bottom plate. Use foam closure strips specified above in both top and bottom flutes behind the exterior wall gypsum sheathing.

3.02 AIR TIGHTNESS

- A. Infiltration Barrier
 - 1. All joints in the infiltration barrier will be lapped a minimum of six (6) inches and sealed with an approved construction tape. Overlap infiltration barrier at exterior corners a minimum of 12 inches.
 - 2. The infiltration barrier shall be neatly folded into each building opening in a manner to eliminate any gaps in the continuous airtight surface.

3. Any terminating edges of the infiltration barrier, such as at the top or bottom of the wall shall be sealed with caulk.
 4. All penetrations shall be fully sealed per manufacturer's recommendations.
 5. Seal any tears or cuts as recommended by infiltration barrier manufacturer.
 6. Notify manufacturer's designated representative to obtain required periodic observations of infiltration barrier installation.
- B. It is intended that the building be as airtight as practical.
1. It is incumbent upon the contractor to notify the Architect of any conflict or problem, so the Architect may make revisions or modifications to the work.
 2. Notify Architect and allow 48 hours (minimum) for inspection of the insulation and vapor barrier prior to covering or sealing of the work.

3.03 WINDOW, DOOR, LOUVER AND TRANSITION FLASHING (WDLT FLASHING)

- A. Surface Preparation
1. All surfaces must be clean of oil, dust and excess mortar. Strike masonry joints flush.
 2. Prime all surfaces to receive flashing in accordance with manufacturer's recommendations.
- B. Installation
1. Lap flashing a minimum of 2" on both side and end laps. Orient laps shingle fashion to shed water. Seal joints in accordance with manufacturer's recommendations.
 2. Membrane applied to the underside of the substrate (i.e. ceilings) requires mechanical fastening with termination bars.
 3. Install termination bar where shown on the contract documents or required to insure permanent adhesion to substrate.
 4. Where spanning a change in substrates, beam, column, brace, etc., flashing shall extend onto each surface a minimum of 4" on each side of the discontinuity.
- C. Locations
1. Install at all window, door, louver, duct, pipe, conduit penetrations of the exterior gypsum/wood sheathing or exterior CMU back-up masonry.
 2. Install at all inside and outside corners of exterior gypsum/wood sheathing.
 3. Transition flashing shall span any discontinuity between exterior wall back-up materials. These can be vertical, horizontal and/or diagonal. Examples are:
 - a. Gypsum/wood sheathing terminates at start of exterior CMU back-up with both materials in the same plane.
 - b. Gypsum/wood sheathing overlaps exterior CMU back-up and terminates.
 - c. Exterior CMU back-up wall is not continuous due to a steel column, beam and/or brace.
 - d. Exterior gypsum/wood sheathing is not continuous due to a steel column, beam and/or brace.
 4. At all other locations shown on Contract Drawings.

3.04 PROTECTION

- A. General: Protect installed insulation, infiltration barriers, WDLT flashings and vapor barriers from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B. Protect WDLT flashings from sunlight as quickly as possible. Exposure to sunlight shall be limited to six weeks or as recommended by manufacturer in writing.

END OF SECTION 072713

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.
- B. Section 061000 - Rough Carpentry
- C. Section 076200 - Sheet Metal Flashing and Trim
- D. Section 077600 - Roof Pavers
- E. Division 22 - Plumbing for new roof drains, gas piping (exposed on roof) and vent pipes.
- F. Division 23 - HVAC for Roof Top HVAC units and roof top slit system units.

1.02 GENERAL NOTES

- A. Preceding job start up, contractor shall decide to his satisfaction that all specifications contained herein are workable.
- B. Contractor will perform all work by competent, trained, and properly equipped personnel in strict accordance with good roofing practices and applicable industry standards.
- C. Contractor will observe all published safety prevention policies and practices relating to application of roofing system and related work. All federal, state, and local codes shall be followed.
- D. Contractor will follow application, safety, etc. information as published in the most current edition of the manufacturer's Roofing System Technical Specifications.

1.03 SCOPE

- A. Work under this section covers the installation of a new FULLY ADHERED EPDM ROOFING SYSTEM including vapor barrier, insulation and cover board. Installation to provide for a warranty with a maximum wind speed of **90** mph. In addition, contractor shall include all related items of work as noted herein or indicated on the drawings or otherwise required to complete the specified elements of work and provide the necessary warranties for this work.
- B. Contractor to dispose of all materials properly.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Shop drawings: Furnish large scale (3" =1'-0") shop drawings to include the following:
 - 1. Roof Plan drawn to scale.
 - a. Roof drain locations. (If required)
 - b. All other roof penetrations.
 - c. Standard details and special details specific to this project.
 - 2. Roof insulation layout.
 - 3. Roof flashing, edges and pertinent details.

- D. Samples of membrane roofing, flashing, insulation and metal flashing, etc. if requested by the Architect.
- E. Copies of manufacturer's:
 - 1. Product Data for all products and accessories.
 - 2. Installation Instructions.
 - 3. Sample warranties specifically showing coverage for the enhanced wind warranty specified.
- F. Certification:
 - 1. Submit letter from Manufacturer certifying applicator's license.
 - 2. Certification that total system complies with specified requirements of regulatory agencies listed in this specification (UL and/or factory mutual) and Project Location State building code.
- G. Contract Closeout Submittals
 - 1. Maintenance Data: For membrane roofing system to include in maintenance manuals.
 - 2. Warranty: Warranties as specified.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to the site in the manufacturer's labeled, unbroken containers.
- B. Storage and Handling: Store materials in a dry, well-ventilated place protected from the weather.
 - 1. Volatile liquids shall be stored in a separate storage building or trailer or removed from the site at the end of each workday.
 - 2. Store volatile liquids at temperatures recommended by the manufacturer.
 - 3. Store adhesives at temperatures between 60 degrees F and 80 degrees F.
- C. Damaged materials shall be replaced at roofing contractor's expense.

1.06 JOB CONDITIONS

- A. Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not allow oil-based products (petroleum, grease, oil, solvents, mineral oil, animal fat etc.), or direct steam vents to come in contact with EPDM membrane.
 - 1. Abide by manufacturer's instructions for protection and cleaning.
- C. Coordinate roofing work with other trades.
- D. All surfaces to receive roofing shall be thoroughly dry and free of dew or frost.

1.07 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 and glossary of NRCA's "The Roofing and Waterproofing Manual" for definition of terms related to roofing work not otherwise defined in this section.
- B. American Society for Testing and Materials (ASTM), 1916 Race St., Philadelphia, PA 19103.

1.08 SYSTEM DESCRIPTION

- A. .060 Standard elastomeric sheet roofing that is adhered to acceptable substrate with system manufacture's bonding adhesive.

1.09 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Company specializing in manufacturing the roofing membrane specified in this Section with ten (10) years of manufacturing experience.
 - 2. System supplier must have ISO 9002 certification.
 - 3. Manufacturer must be able to provide the project with the membrane and Isocyanurate insulation that is produced in their facilities.
- B. Installer:
 - 1. A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
 - a. The installer shall be doing business under the same name for a minimum of five (5) years prior to January 1, 2021 and have applied similar roofing systems on ten (10) or more commercial projects which have been completed for more than two (2) years).
 - 1) Furnish names, addresses, facility contact person, and project Architect's contact for each project.
 - 2. Shall have a fully staffed office within 100 miles of the job site.
 - 3. Installer's Field Supervision: Maintain a full-time English speaking supervisor/foreman on-site during times that the roofing installation is in progress, who is experienced in installing the specified roofing system, similar in scope and size for this project. Field Supervisor shall be certified by the manufacturer as an approved applicator of the roofing system.

1.10 REGULATORY REQUIREMENTS

- A. Conform to applicable local building code requirements.
- B. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.
- C. Factory Mutual Corporation (FM): Roof Assembly Classification, FM Construction Bulletin 1-28, and 1-29 meeting minimum requirements of FM 1-60.

1.11 QUALITY INSPECTION/OBSERVATION

- A. Inspection by Manufacturer: Provide an interim and final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer.
 - 1. Technical representative shall not perform any sales functions.
 - 2. Technical representative shall issue a written report of each inspection.
 - 3. Contractor shall complete any necessary repairs required for issuance of warranty.

1.12 PRE-INSTALLATION CONFERENCE

- A. Before start of roofing work, attend a pre-installation conference on-site to discuss the proper installation of materials. Attendees shall include all parties directly affecting work of this Section.

1.13 WARRANTY

- A. Type/Term:

1. Provide 20-year Firestone Red Shield Roofing System Limited Warranty (Red Shield Warranty). Warranty shall include membrane, roof insulation and membrane accessories or membrane accessories, and metal edging and coping.
 2. Provide a separate Firestone ISO 95+ Insulation Warranty (Insulation Warranty term shall coincide with Red Shield Warranty.)
- B. Coverage:
1. Red Shield Warranty:
 - a. Limit of liability: No Dollar Limitation
 - b. Scope of coverage: Repair any leak in the Firestone EPDM Roofing System caused by the ordinary wear and tear of the elements, manufacturing defect in Firestone brand materials, workmanship used to install these materials and damage due to winds up to 90 mph.
- C. Special Project Warranty
1. Submit roof installer's warranty, signed by installer, covering Work of this Section, including all components of the membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway pads, for the following warranty period:
 - a. Warranty Period: Two years from date of Substantial Completion

1.14 RESTRICTED WORK PERIOD

- A. Do not perform the roofing and related Work between December 1st and April 1st unless approved otherwise, in writing, by the Architect. During this period, clear the roof of materials, equipment, and debris. Maintain the roof in a watertight condition.

PART 2 PRODUCTS

2.01 MANUFACTURERS - MEMBRANE MATERIALS

- A. Firestone: Firestone Building Products Co., Headquarters, 525 Congressional Blvd., Carmel, IN 46032-5607. (Basis of Specification)
- B. Carlisle Syntec Incorporated, PO Box 7000, Carlisle, PA 17013-0925
- C. Architect Approved Equivalent provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
1. Specializing in manufacturing the roofing system to be provided.
 2. Minimum ten (10) years experience manufacturing the roofing system to be provided.
 3. Able to provide a no dollar limit, single source roof system warranty that is backed by corporate assets in excess of one billion dollars.
 4. ISO 9002 certified.
 5. Able to provide isocyanurate insulation that is produced in its own facilities.

2.02 ELASTOMERIC SHEET ROOFING AND FLASHING MEMBRANE

- A. Description: Non-reinforced, cured, synthetic single-ply membrane composed of Ethylene Propylene Diene Terpolymer (EPDM) conforming to the following physical properties:
1. Membrane Type: .060 Standard
 2. Color: White

PROPERTY:	SPECIFICATION:
SPECIFIC GRAVITY	1.15 +/- 0.05
TENSILE STRENGTH, MINIMUM, PSI (MPA)	1425 (9.8)

ELONGATION, MINIMUM, %	475
TEAR RESISTANCE, LBF / IN (N / M)	210 (933)
OZONE RESISTANCE, 166 HOURS @ 100 PPHM @ 104°F WITH 50% EXTENSION	NO CRACKS
HEAT AGING, 28 DAYS @ 240°F TENSILE STRENGTH, MINIMUM PSI (MPA) ELONGATION, MINIMUM %	1415 (9.8) 310
BRITTLINESS POINT, MAX., °F, °C	-49 (-45)
WATER ABSORPTION, CHANGE IN WEIGHT AFTER IMMERSION IN WATER FOR 166 HOURS @ 158°F, %	< 2.0
TOLERANCE ON NOMINAL THICKNESS, %	+/- 10
WATER VAPOR PERMEABILITY, PERM-MILS	2.0

B. Reference Standards:

1. ASTM D4637-96: Standard Specification for EPDM Sheet used in single-ply roof membrane.
2. ASTM D297: Methods for Rubber Products, Chemical Analysis.
3. ASTM D412: Die C: Test Methods for Rubber Properties in Tension.
4. ASTM D471: Test Methods for Rubber Property, Effect of Liquids.
5. ASTM D573: Test Method for Rubber, Deterioration in an Air Oven.
6. ASTM D624, Die C: Test Method for rubber property-Tear Resistance.
7. ASTM D746: Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
8. ASTM D751: (Grab Method) Method of Testing Coated Fabrics.
9. ASTM D816: (Modified) Methods of Testing Rubber Cements.
10. ASTM D1149: Test Method for Rubber Deterioration, Surface Ozone Cracking in a Chamber.
11. ASTM D2240: Test Method for Rubber Property - Durometer Hardness.
12. ASTM E96: Test Methods for Water Vapor Transmission of Materials.

C. Product/Producer: RubberGard EPDM membrane by Firestone.

2.03 INSULATION PRODUCTS

A. POLYISOCYANURATE ROOF INSULATION

1. The specified insulation thickness is nominal, allowing for differences in insulating properties of various name brands. Minor variation in thickness is acceptable, provided the specified Long Term Thermal Resistance (LTTR) value and all other requirements of this Contract are met.
2. Description: Roof insulation consisting of closed cell polyisocyanurate foam core and a perforated black glass reinforced mat laminated to the face.
 - a. Thickness: 2 layers to meet the LTTR value as shown on the Contract Documents.
 - b. Nominal Size: 48 in x 96 in
3. Reference Standards:
 - a. FS HH-I-1972/Gen.
 - b. FS HH-I-1973/3.
 - c. ASTM C 209 - Water Absorption.
 - d. ASTM E 96 - Water Vapor Transmission of Materials.
 - e. ASTM D 1621 - Compressive Strength.
 - f. ASTM D 1622 - Density
 - g. ASTM D 2126 - Dimensional Stability.
 - h. ASTM E 84 - Flame Spread.
4. Product/Producer: ISO 95+™ GL Polyisocyanurate Insulation by Firestone.
5. Tapered Insulation System:

- a. Tapered Insulation: 1/4-inch pitch per foot factory tapered and mitered closed cell isocyanurate foam core skinned on both sides with factory applied facers as recommended by the membrane manufacturer. FS HH-1-1972, Class 2. UL Classified and Factory Mutual approved for direct application over steel decks.

B. INSULATION BOARD FASTENERS

1. Description: Heavy duty threaded fastener with 3-coat waterborne fluorocarbon polymer coating and drill point tip capable of penetrating 20-gauge steel. Fastener shall meet minimum thread size of .260" and a 13 threads per inch. Length shall be sufficient to penetrate deck a minimum of ¾" for steel and 1" for wood and concrete. Structural concrete decks must be pre-drilled with a 7/32" carbide drill bit to a depth ½" deeper than the fastener engagement.
2. Reference Standard: SAE 1022, Heat Treated
3. Product/Producer: Heavy Duty (HD) fasteners by Firestone.

2.04 ELASTOMERIC SHEET ROOFING SYSTEM COMPONENTS

A. Roof Flashing (Gravel Stops):

1. Description: Semi-cured 45 mil EPDM membrane laminated to 35 mil EPDM tape adhesive
2. Product/Producer: QuickSeam Flashing by Firestone.

B. Elastomeric Uncured Flashing:

1. Description: Non-reinforced, self-curing, synthetic, single-ply flashing composed of Ethylene Propylene Diene Terpolymer (EPDM) conforming to the following physical properties as indicated by ASTM D4811-90 standard specification for Non-vulcanized rubber sheet used as roof flashing.
 - a. Nominal Thickness: .060 inch

Property:	Specification:
Thickness	0.055
Green Strength Modulus 100% @ 75°F(psi)	25-250
Elongation, (Ultimate), %	400
modulus 100% @ 122°F(psi)	12
Elongation (Ultimate) %	200
Shelf Stability: Modulus 100% at 75°F(psi) Elongation, min, %	250 400
Vulcanizability: Tensile strength, min, (psi) Elongation, min, %	406 400
Tensile Set: min, %	80
Dimensional Stability, max, %	+/- 10
Weatherability, no cracks or crazing	pass
Water Vapor Permeability, Perm-Mils	2.0

b. Reference Standards:

- 1) ASTM D412: Test Methods for Rubber Properties in Tension
- 2) ASTM D471: Test Methods for Rubber Property-Effect of liquids
- 3) ASTM D573: Test Methods for Rubber-Deterioration in Air oven
- 4) ASTM D624: Test Methods for Rubber Property-Tear Resistance
- 5) ASTM D1149: Test Method for Rubber Deterioration-Surface Ozone Cracking in a chamber
- 6) ASTM D1204: Test Method for Linear Dimensional Changes on a Non-rigid Thermoplastic Sheet or Film at Elevated Temperatures
- 7) ASTM D2137: Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics
2. Product/Producer: EPDM FormFlash flashing membrane by Firestone

- C. Lap Splice Tape:
 - 1. Description: 35 mil EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer.
 - 2. Product/Producer: Eco White™ QuickSeam™ Splice Tape by Firestone.
- D. Adhesive Primer:
 - 1. Description: High-solids, butyl-based primer formulated for compatibility with EPDM membrane & tape adhesive.
 - 2. Product/Producer: QuickPrime by Firestone.
- E. Batten Covers:
 - 1. Description: Cured 60 mil EPDM membrane laminated to 35 mil EPDM tape adhesive.
 - 2. Product/Producer: QuickSeam Batten Cover by Firestone.
- F. Splice Adhesive:
 - 1. Description: Butyl-based, formulated for compatibility with EPDM membrane.
 - 2. Product/Producer: RubberGard Splice Adhesive by Firestone.
- G. Bonding Adhesive:
 - 1. Description: Neoprene-based, formulated for compatibility with EPDM membrane & a wide variety of substrate materials, including masonry, wood, and insulation facings.
 - 2. Product/Producer: RubberGard Bonding Adhesive by Firestone.
- H. Pourable Sealer:
 - 1. Description: 2-Part urethane, 2-color for reliable mixing.
- I. Seam Plates, Batten Strips and Insulation Plates:
 - 1. Description: Steel with a Galvalume coating.
 - 2. Reference Standard: Corrosion-resistant to meet FM-4470 criteria.
- J. Termination Bar:
 - 1. Description: 1.3" X 0.10" thick aluminum bar with integral caulk ledge.
 - 2. Product/Producer: Termination Bar by Firestone.
- K. Roof Walkway Pads:
 - 1. Description: EPDM Walkway Pads, 0.30" X 30" X 30" with EPDM tape adhesive strips laminated to the bottom.
 - 2. Product/Producer: EcoWhite™ QuickSeam Walkway Pads by Firestone.

2.05 VAPOR BARRIER

- A. Vapor Barrier Membrane: Comprised of SBS modified bitumen adhesive, factory-laminated to a tri-laminate woven, high-density polyethylene top surface. Release liner protecting adhesive.
 - 1. Intended for use as a direct to deck air/vapor barrier in roofing systems and may be used as a temporary roof membrane for up to ninety (90) days.
 - 2. Thickness: 0.0325" minimum, when tested in accordance with ASTM D 5147.
 - 3. Max Load at Break at 73°F (23 °C): 64 lbf/in, MD (11 kN/m) 88 lbf/in, XMD (15 kN/m) when tested in accordance with ASTM D 5147.
 - 4. Low Temperature Flexibility: -30°F (-34 °C) when tested in accordance with ASTM D 5147.
 - 5. Moisture Vapor Permeance, 0.02 Perms (0.92 Ng/Pa·s·m²) maximum, when tested in accordance with ASTM E 96.
 - 6. Air Permeability: 0.00114 ft³/min·ft² (0.007 Lsec·m²) maximum, when tested in accordance with ASTM E 2178.

7. Provide primer as recommended by vapor barrier manufacturer.
- B. Acceptable Product: V-Force Vapor Barrier Membrane by Firestone or Architect approved equivalent.

2.06 COVER BOARD

- A. DensDeck® Prime Roof Board with EONIC™ Technology as manufactured by Georgia Pacific Gypsum, LLC or Architect approved equivalent.
 1. Thickness and Type: 5/8" Type X.

2.07 ACCESSORIES

- A. Gas piping supports shall be set in place by the roofing contractor.
 1. Coordinate with gas piping contractor for number required for installation & spacing.
 2. Supports shall be supplied by gas piping contractor.

PART 3 INSTALLATION

3.01 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support roofers and their mechanical equipment, and that deflection will no strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Start work with sealants and adhesives at 60° - 80° F.
- E. Fumes from adhesive solvents may be drawn into the building during installation through rooftop intakes. Appropriate measures must be taken to assure that fumes from adhesive solvents are not drawn into the building through air intakes.
- F. The surface must be clean, dry, smooth, free of sharp edges, fins, loose or foreign materials, oil, grease and other materials that may damage the membrane. All roughened surfaces, which could cause damage, shall be properly repaired before proceeding.
- G. All surface voids of the immediate substrate greater than 1/4" wide must be properly filled with an acceptable insulation or suitable fill material.

3.02 PROTECTION OF OTHER WORK

- A. Protect metal, glass, plastic, and painted surfaces from adhesives and sealants.
- B. Protect neighboring work, property, cars, and persons from spills and overspray from adhesives, sealants and coatings and from damage related to roofing work.
- C. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trade.

3.03 MATERIAL STORAGE AND HANDLING

- A. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

- B. Consult container labels and material Safety Data Sheets (MSDS) for specific safety instructions.
- C. Deliver materials to job site in their original containers as labeled by the manufacturer.

3.04 WOOD NAILER LOCATION AND INSTALLATION

- A. Total wood nailer height shall match the total thickness of insulation being used and shall be installed with a 1/8" gap between each length and at each change of direction.
- B. Wood nailers shall be firmly fastened to the deck. Mechanically fasten wood nailers to resist a force of 200 lbs. per linear foot.

3.05 VAPOR BARRIER INSTALLATION

- A. All deck/deck cover substrates (except new metal decks) must be primed prior to installation. Use only primer supplied by membrane manufacturer.
- B. Expanded polystyrene, extruded polystyrene, common polyisocyanurate, fiberglass, wood fiber, Perlite and existing single-ply roofs are not acceptable substrates.
- C. Follow manufacturer's temperature guidelines for installation and storage of membrane.
- D. Install with a minimum 3" side laps and 6" end laps.
- E. Insure proper detailing of the vapor membrane at all roof penetrations, joints, roof/wall transitions and continuity with the wall air barrier.
 - 1. Apply vapor barrier manufacturer's approved sealant at all penetrations, lap joints not oriented to shed water, and T-joints.
- F. Roll in with minimum 75 lb roller to fully mate each roll to substrate, including all lap areas.

3.06 ROOF INSULATION APPLICATION: GENERAL

- A. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- B. Seal deck joints, where needed, to prevent bitumen drippage.
- C. Lay roof insulation in courses parallel to roof edges, stagger joints in one direction.
- D. Install insulation in full sheets, utilizing a single, cut piece only where required.
- E. Neatly fit insulation to all penetrations, projections, and nailers. Insulation shall be fit tightly, with gaps not greater than 1/4". All gaps greater than 1/4" shall be filled with acceptable insulation. Under no circumstances shall the roofing membrane be left unsupported over a space greater than 1/4". Tapered insulation shall be installed around roof drains and other areas as shown on drawings to provide proper slope for drainage. Miter roof insulation edges at ridge, valley and other similar non-planar conditions.
- F. When installing multiple layers of insulation, all joints between layers shall be staggered at least 6 in.
- G. Secure insulation to the deck with Manufacturer fasteners at the rate of twelve (12) for every 4'x 4' piece of insulation (twenty-four (24) for every 4'x 8' piece of insulation) or as recommended by Manufacturer to meet an FM I-90 wind uplift and the required 90 mph wind warranty.

- H. A minimum of 300 lb. pullout is required on all decks.

3.07 COVER BOARD INSTALLATION

- A. Apply bonding adhesive to top layer of insulation and install cover board into adhesive.
- B. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger cover board joints to not align with joints in top layer of insulation board. Loosely butt cover boards together. Continue cover boards up vertical faces of parapets, roof curbs, etc. where shown on Contract Drawings.

3.08 INSULATION ATTACHMENT

- A. Base Layer(s): Firestone ISO 95+™ GL
 - 1. Base Layer Attachment: Mechanically Attached
- B. Top Layer: Firestone ISO 95+™ GL
 - 1. Top Layer Attachment: Mechanically attached

3.09 MEMBRANE PLACEMENT AND ATTACHMENT

- A. Beginning at the low point of the roof, place the Firestone RubberGard membrane without stretching over the acceptable substrate (cover board) and allow to relax a minimum of 30 minutes before attachment or splicing.
- B. After making sure the sheet is placed in its final position, fold it back evenly onto itself to expose the underside.
- C. Sweep the mating surface of the membrane with a stiff broom to remove excess dusting agent (if any) or other contaminants from the mating surface.
- D. Apply Bonding Adhesive at about the same time to both the exposed underside of the sheet and the substrate to which it will be adhered to allow approximately the same drying time. Apply Bonding Adhesive so to provide an even and uniform film thickness. Do not apply bonding adhesive to areas that will be subsequently spliced.
- E. Allow Bonding Adhesive to flash off until tacky. Touch the Bonding Adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. As you are touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating.
- F. Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and evenly to minimize wrinkles.
- G. Compress the bonded half of the sheet to the substrate with a stiff push broom.
- H. Fold the unadhered half of the membrane sheet back onto itself and repeat the bonding procedure to complete the bonding of the sheet.

3.10 MEMBRANE LAP SPLICING

- A. General:
 - 1. Position the sheet at the splice area by overlapping membrane 5 inches. Once the membrane is in place, mark the bottom sheet 1/2" to 3/4" from the edge of the top sheet

- every 4 to 6 feet. Tack the sheet back with Firestone QuickPrime at 5' centers and at factory splices or as necessary to hold back the membrane at the splicing area.
2. Remove excess amounts of dusting agent on the sheet and at factory splices using a stiff push broom. Stir Firestone QuickPrime thoroughly before and during use. Dip the QuickScrubber into the bucket of QuickPrime, keeping the QuickScrubber flat. Apply the QuickPrime using long back and forth type strokes with pressure along the length of the splicing area until surfaces become a dark gray in color. Apply QuickPrime to both surfaces at the same time to allow the same flash off time. Change the scrub pad each 200 feet of 3-inch field splice, or when the pad will no longer hold the proper amount of QuickPrime. Additional scrubbing is required at areas that may have become contaminated or have excess amounts of dusting agent, and at all factory splices.
 3. Position the QuickSeam Splice Tape on the bottom sheet, aligning the edge of the release paper with the markings. Immediately roll the splice tape with a 3"-4" wide silicone or silicone sleeved steel hand roller or a short nap 3" paint roller.
 4. When the QuickSeam Splice Tape has been installed for the entire splice length allow the top sheet to rest on top of the tape's paper backing. Trim the top sheet as necessary to assure that 1/8"-1/2" of the QuickSeam Splice Tape will be exposed on the finished splice.
 5. To remove the paper backing from the tape, first roll back the RubberGard membrane sheet, then peel the paper backing off the QuickSeam Splice Tape by pulling against the weight of the bottom sheet at approximately a 45-degree angle to the tape and parallel with the roof surface. Allow the top sheet to fall freely onto the exposed QuickSeam Splice Tape. Broom the entire length of the splice as the release paper is being removed.
 6. Roll the splice using a 1-1/2"-2" wide silicone or silicone sleeved steel hand roller, first across the splice, and then along the entire length of the splice.

3.11 MEMBRANE SECUREMENT

- A. Secure membrane at all locations where the membrane terminates or goes through an angle change greater than 2" in 12" except for round pipe penetrations less than 18" in diameter and square penetrations less than 4" square.
- B. Mechanically fasten Reinforced Perimeter Fastening Strips per Firestone recommendations.

3.12 FLASHING - PENETRATIONS

- A. General:
 1. Flash all penetrations passing through the membrane.
 2. The flashing seal must be made directly to the penetration.
- B. Pipes, Round Supports, etc.
 1. Flash with Firestone Pre-Molded EPDM Pipe Flashings where practical.
 2. Flash using FormFlash when Pre-Molded EPDM Pipe Flashing is not practical.
- C. Structural Steel Tubing:
 1. Use a field fabricated pipe flashing detail provided that the minimum corner radius is greater than 1/4" and the longest side of the tube does not exceed 12". When the tube exceeds 12" use a standard curb detail.
- D. Roof Drains:
 1. Provide a clean even finish on the mating surfaces between the clamping ring and the drain bowl.
 2. Taper insulation around the drain to provide a smooth transition from the roof surface to the drain. Use pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope. Slope shall not exceed manufacturer's recommendations.
 3. Position the RubberGard membrane, then cut a hole for the roof drain to allow 1/2" -3/4" of membrane extending inside the clamping ring past the drain bolts.

4. Make round holes in the RubberGard membrane to align with clamping bolts. Do not cut the membrane back to the bolt holes.
 5. Place Water Block Seal on top of drain bowl where the clamping ring seats below the membrane
 6. Install the roof drain clamping ring and clamping bolts. Tighten the clamping bolts to achieve constant compression.
- E. Pipe Clusters and Unusual Shaped Penetrations:
1. Fabricate penetration pockets to allow a minimum clearance of 1" between the penetration and all sides.
 2. Secure penetration pockets per Firestone Details
 3. Fill penetration pockets with Pourable Sealer, to shed water. Pourable Sealer shall be a minimum of 2" deep.
- F. Hot Pipes:
1. Protect the rubber components from direct contact with steam or heat sources when the in-service temperature is in excess of 180° F. In all such cases flash to an intermediate insulated "cool" sleeve per Firestone details.
- G. Flexible Penetrations:
1. Provide a weathertight gooseneck set in Water Block Seal and secured to the deck.
 2. Flash in accordance with Firestone Details.
- H. Scuppers:
1. Set welded watertight scupper in Water Block Seal and secure to the structure.
 2. Flash in accordance with Firestone Details.
- I. Expansion Joints:
1. Install as shown on roof drawings in accordance with Manufacturer's details.

3.13 FLASHING - WALLS, PARAPETS, MECHANICAL EQUIPMENT CURBS, SKYLIGHTS, ETC.

- A. General:
1. Using the longest pieces practical, flash all walls, parapets, curbs, etc., a minimum of 8" high per manufacturer's Details.
- B. Evaluate Substrate:
1. Evaluate the substrate and overlay per manufacturer's specifications as necessary.
- C. Complete the splice between flashing and the main roof sheet with Splice Adhesive before adhering flashing to the vertical surface. Provide lap splices in accordance with manufacturer's Details.
- D. Apply Bonding Adhesive at about the same time to both the flashing and the surface to which it is being bonded to allow approximately the same flash off time. Apply Bonding Adhesive in a uniform coating.
- E. Allow Bonding Adhesive to flash off until tacky. Touch the Bonding Adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. While touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating. Flash off time will vary depending on ambient air conditions.
- F. Roll the flashing into the adhesive evenly and carefully to minimize wrinkles.

- G. Ensure proper contact of flashing by brooming in place.
- H. Provide termination directly to the vertical substrate as shown on roof drawings.
- I. Install T-Joint covers at field and flashing splice intersections as required by manufacturers.
- J. Install intermediate flashing attachment as required by Manufacturer's Specifications and Details.

3.14 FLASHING - GRAVEL STOPS OR ROOF EDGE METALS

- A. Apply QuickPrime to the metal edging and membrane as described in Manufacturer's Specifications.
- B. Place the roll of QuickSeam Flashing on the roof a few feet ahead of the application starting point, positioned so that it unrolls from the top of the roll. Remove approximately 2'-3' of release paper and apply to the metal flange and RubberGard membrane. Lap adjacent rolls of QuickSeam Flashing a minimum of one inch.
- C. With a 2"-3" wide silicone or silicone sleeved steel hand roller, roll the QuickSeam Flashing ensure proper adhesion. Additional attention must be given to factory splice intersections and to any change in plane.
- D. Apply 6" length of QuickSeam Flashing, a QuickSeam Joint Cover, or 6"x6" FormFlash to the inside edge of the QuickSeam Flashing at all overlaps.
- E. Apply 6" length of QuickSeam Flashing, a QuickSeam Joint Cover, or 6"x6" FormFlash at all intersections between the QuickSeam Flashing and field fabricated splices.
- F. Where QuickSeam Flashing will not completely cover the metal flange, an additional piece of QuickSeam Flashing must be applied to the metal edge laps. Apply Seam Edge Treatment at the intersections of the flashing sections.
- G. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, an additional piece of QuickSeam Flashing shall be applied over the metal lap to the top of the gravel stop, after the initial application of QuickSeam Flashing. SeamEdge Treatment shall be applied at the intersections of the two flashing sections.
- H. When the roof slope is greater than 1 in 12, apply Seam Edge Treatment along the back edge of the QuickSeam Flashing.

3.15 TEMPORARY CLOSURE

- A. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

3.16 ROOF WALKWAYS

- A. Install walkways at all access points to the roof and around all rooftop equipment that may require maintenance and as shown on roof drawings.
- B. Layout Firestone RubberGard Walkway Pads so that the flat surface is over the completed RubberGard membrane, spacing each pad a minimum of 1" and a maximum of 3" from each other to allow for drainage.

- C. If the installation of Firestone RubberGard Walkway Pads over field fabricated splices or within 6" of a splice edge cannot be avoided, flash in the splice using QuickSeam Flashing prior to installing the walkway pad. The QuickSeam Flashing shall extend beyond the walkway pad a minimum of 6" on either side.
- D. Remove the release paper. Turn the walk pad over and place it in the QuickPrime.
- E. Walk on the pad to press in place assuring proper adhesion.
- F. If loose laid pavers are used for walkways. Adhere a layer of RubberGard membrane beneath them to isolate them from the roofing membrane. Protection layers must extend a minimum of 2" beyond the paving stone.

3.17 DRIP EDGE / FASCIA

- A. Refer to Section 076200 -Sheet Metal Flashing and Trim for definition of drip edge and fascia.
- B. Metal flange of drip edge / fascia shall be secured to wood blocking at perimeter making sure that metal flange is completely supported by wood. Clean metal using Manufacturer Splice Primer.
- C. Special considerations must be given to copper edging. Copper may be weathered, or lacquer coated and require special cleaning with acetone or lacquer thinner.
- D. Drip Edge Flashing:
 - 1. Install the drip edge over the roofing membrane.
 - 2. Strip in the horizontal portion of the drip edge with cover tape.
 - a. Apply the manufacturer's primer over the metal flange of the gravel stop and the roofing membrane before applying the cover tape.
 - b. Apply uncured EPDM cover tape or 6-inch x 6-inch uncured EPDM over "T" joints, at end laps, and at metal joints.
 - c. Apply lap sealant at metal joints and at cover tape or uncured EPDM patches.

3.18 FIELD QUALITY CONTROL

- A. Manufacturer's requirements and recommendations shall be followed in all respects for installation of membrane materials. In addition to membrane manufacturer's requirements, the following standards and remedial actions are specified for installation of membrane materials as part of the work:
 - 1. Miscellaneous Mechanical Fasteners: Mechanical fasteners for securing insulation to roof decking shall in all cases be driven tight. Loose, overdriven, or backed out fasteners will not be acceptable. If a straightedge is placed over a fastener and that fastener is greater than 1/8 inch above the surface of the surrounding membrane, that fastener shall be considered to be backed out. Loose, overdriven, or backed out fasteners will be repaired in accordance with specification TS 18 in the ARMA/NRCA/SPRI Repair Manual for Low-Slope Roof Systems. Each such repair shall be considered a patch.
 - 2. Field Lap Seams: Field lap seams and seam cover tape shall be installed along straight lines. A four-foot straightedge shall be placed along any given section of lap seam or seam cover tape; a variance of more than 1/4 inch in either direction, or a total of 1/4 inch in both directions, shall constitute failure to meet the standards of good workmanship. Sections of membrane with seams not complying with this standard shall be removed and replaced.
 - 3. Wrinkles in Membrane: Field membrane shall be adhered with minimum of wrinkling. Wrinkles greater than 24 inches in length, or groups of wrinkles which contain a total of 30 inches, shall constitute failure to meet the standards of good

workmanship. Wrinkles not complying with this standard shall be repaired in accordance with specification TS 7 in the ARMA/NRCA/SPRI Repair Manual for Low-Slope Roof Systems. Each such repair shall be considered a patch.

4. Cuts and Holes: All cuts and holes in the membrane shall be repaired in accordance with specification TS 3 or 5, as applicable, in the ARMA/NRCA/SPRI Repair Manual for Low-Slope Roof Systems. Each such repair shall be considered a patch.
 5. Replace of Deficient Field Membrane: Areas of roof membrane containing more than 3 patches in any area of 100 square feet shall be considered defective and shall be removed and replaced at the direction of the Architect.
- B. Inspection by Manufacturer: Provide final inspection and written report of the roofing system by a Technical Representative (i.e. not a salesperson) employed by roofing system manufacturer specifically to inspect installation for warranty purposes.
1. Notify Architect, Owner, General Contractor 72 hours in advance of date and time of inspection.
 2. Written report shall be distributed to the Owner, Architect and General Contractor.
- C. Perform all corrections identified in Technical Representatives Inspection Report necessary for issuance of warranty.

3.19 WASTE MANAGEMENT

- A. Plan and coordinate insulation work to minimize generation of off-cuts and waste.

3.20 CLEAN-UP

- A. Clean all contaminants from building and surrounding areas.
- B. Remove trash, debris, equipment from roof and surrounding areas.
- C. Clean all dirt and mud from finished roof surface.
- D. Repair or replace damaged building components or surrounding areas to the satisfaction of the Architect.

END OF SECTION 075323

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. Furnish labor and materials necessary to install a complete system.
- B. This Section includes the following items, refer to the Drawings for their specific use and location:
 - 1. Metal counter flashing and base flashing (if any).
 - 2. Metal wall flashing and expansion joints.
 - 3. Exposed metal trim, fascia, and soffits.
 - 4. Miscellaneous sheet metal accessories.
 - 5. Flexible sheet membrane flashing.
 - 6. Scuppers.
 - 7. Step flashing.
- C. Integral masonry flashings are part of the masonry work as specified in Section 040523 - Masonry Accessories.
- D. Roofing Accessories installed integral with roofing membrane are part of the roofing work as specified in the roofing system sections.
- E. Related Sections: The following sections contain requirements that relate to this section;
 - 1. Section 040523 – Masonry Accessories
 - 2. Section 042200 – Concrete Unit Masonry
 - 3. Section 075323 – Fully Adhered EPDM Roofing System
 - 4. Section 079200 – Sealants

1.03 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal metal flashings and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.04 STANDARDS

- A. All work of this section shall confirm to industry standards and/or manufacturer's recommendations including:
 - 1. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association Inc. - "Architectural Sheet Metal Manual" (latest edition).
- B. Referenced Standards: The following standards (latest edition or edition in force by AHJ) form part of this specification only to the extent they are referenced as specification requirements.
 - 1. ASTM B32 - "Standard Specification for Solder Metal".
 - 2. ASTM B209 - "Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate".
 - 3. ASTM B370 - "Standard Specification for Copper Sheet and Strip Building Construction".
 - 4. ASTM D2244 - "Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates".

5. ASTM D4214 - "Standard Test Methods for Evaluating the Degree of chalking of Exterior Paint Films".

1.05 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Qualifications Data: for Fabrication shop.
- D. Manufacturer's technical product data, material descriptions, finishes, installation instructions and general recommendations for each specified material and fabricated product.
- E. Shop drawings for sheet metal flashing and trim showing layout, profiles, methods of joining, and anchorages details, including flashing, counterflashings, expansion joint systems, termination points and any other system of flashing required. Include details of any special conditions. Distinguish between factory and field assembly work.
- F. Provide layouts at 1/4-inch scale and details at 3-inch scale. Layouts shall not be copies of Architectural Drawings.
- G. Samples:
 1. Initial Samples for color selection: Submit two small samples of manufacturer's full range of colors for flashings, fascias, soffits and other materials that may have a color choice required.
 2. Submit two (2) samples 6" square of each exposed finish material in the color chosen by the Architect.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 1. For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mock-ups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
- C. Perform work in accordance with SMACNA details and standards and approved shop drawings and Contract Documents.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- C. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.08 PROJECT CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

1.09 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Metal Copings, scuppers, roof edges, counterflashing, and other components incorporated or in contact with the Roofing System shall be pre-approved by and made integral to the 20-year Total Roofing System warranty specified in Division 07. Shop drawings and components shall be reviewed and approved by the Roofing manufacturer prior to submittal to the Architect for approval. Submit a letter signed by a current representative of the manufacturer on Roofing manufacturer letterhead, attesting to this approval and warranty acceptability. Submit this certification letter as part of the shop drawing submittals for this section.

PART 2 PRODUCTS

2.01 FABRICATED UNITS

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of Elastomeric sealant, in compliance with SMACNA standards.
- E. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

- F. Aluminum Extrusion Units: Fabricate extruded aluminum running units with formed or extruded aluminum joint covers for installation behind main members where possible. Fabricate mitered and welded corner units.

2.02 METAL FASCIA, DRIP EDGE, TRIM MATERIALS, FLASHING AND SCUPPERS

- A. Material: Profile as shown on contract drawings.
 - 1. 0.050 aluminum except as otherwise indicated.
- B. Finish: Clear Satin Anodized

2.03 STEP FLASHING

- A. Material: .040 Aluminum except as otherwise noted.
 - 1. Profiles: As shown or required.
 - 2. Color: Clear Satin Anodized.

2.04 ALUMINUM BASE FLASHING AND COVER SHEET

- A. Material: Profile as shown on contract drawings.
 - 1. 0.040 Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
 - a. Color to be selected by Architect.
- B. Termination Bar
 - 1. 1/8" x 1", 304 Stainless Steel

2.05 MISCELLANEOUS MATERIALS AND ACCESSORIES:

- A. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.
- B. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by manufacturer. Match finish of exposed heads with material being fastened.
- C. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant.
- E. Elastomeric Sealant: Type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants.
- F. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.
- G. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.
- H. Paper Slip Sheet: 5-lb. rosin-sized building paper.
- I. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

- J. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.

2.06 WALL FLASHING (BASE FLASHING, THRU-WALL FLASHING)

- A. Refer to Section 040523 - Masonry Accessories.

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip-sheet of red rosin paper and a course of polyethylene underlayment.
- C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
- D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 03 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 04 sections.
- E. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.
- F. Install elastic flashing in accordance with manufacturer's recommendations. Where required, provide for movement at joints by forming loops or bellows in width of flashing. Locate cover or filler strips at joints to facilitate complete drainage of water from flashing. Seam adjacent flashing sheets with adhesive, seal and anchor edges in accordance with manufacturer's recommendations.
- G. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6 inches o.c. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.
- H. Base Flashing and coversheet
 1. Lap joints 4" minimum.
 2. Provide sealant at all overlaps.
 3. Lap higher cover sheet over lower cover sheet.
 4. Termination Bar: Provide where shown on contract documents, continuous, fastened at 12" o.c. or as recommended by roofing manufacturer.

3.02 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

- B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 076200

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to Work of this Section.

1.02 SUMMARY

- A. This section includes pre-manufactured equipment rails for vehicle exhaust system fans.

1.03 RELATED SECTIONS INCLUDE THE FOLLOWING:

- A. Section 075323 – Fully Adhered EPDM Roofing

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 – Submittal Procedures.
- B. Submit pursuant to Section 016000 – Product Requirements.
- C. Shop Drawings: Show relationship with adjoining Work and anchorage methods. Include plans, sections, and details.
- D. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions.

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate installation of roof curbs (rails) with all roofing and flashing work.

PART 2 PRODUCTS

2.01 EQUIPMENT RAILS

- A. Prefabricated Equipment Rails shall be Model ER-4A manufactured by Roof Products and System Corp, Bensenville, IL.
 - 1. "R" dimension shall equal roof insulation thickness.
 - 2. Overall Height shall equal roof insulation thickness plus 12" unless noted
 - 3. otherwise.
 - 4. Top width shall equal 6" unless noted otherwise.
 - 5. Two 5'-0" rails required for each Vehicle Exhaust system fan unit..

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with the manufacturer's instructions, unless shown otherwise on the Drawings. Securely anchor units.
- B. Where mounting flanges are set directly in the roofing, embed the flanges in roofing cement or other waterproof mastic or adhesive as recommended by the manufacturer of the roofing

END OF SECTION 077213

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work on this Section.

1.02 SUMMARY

- A. This Section includes a thermally broken roof hatch, insulated curb, and roof hatch guard rail systems to replace existing roof hatch.
- B. Related Sections include the following:
 - 1. Section 055133 - Metal Ladders
 - 2. Section 061000 - Rough Carpentry
 - 3. Section 075323 - Fully Adhered EPDM Roofing

1.03 STANDARDS

- A. All work of this section shall confirm to industry standards and/or manufacturer's recommendations.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Product Data: Manufacturer's technical data for each type of hatch assembly, including setting drawings, templates, finish requirements, anchorage details, latching and locking provisions, insulation values and other pertinent data.
- D. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- E. Warranty: Submit sample warranty with submittals.
- F. Contract Closeout Submittals:
 - 1. Executed copy of manufacturer's standard warranty

1.05 QUALITY ASSURANCE

- A. Experienced workmen familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Manufacturer: A minimum of 5 years' experience manufacturing similar products.
- C. Installer: A minimum of 2 years' experience installing similar products.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

1.07 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The BILCO Company, P.O. Box 1203, New Haven, CT 06505, Phone 800-366-6530. (Basis of Specification)
- B. Babcock-Davis, 9300 73rd Ave N., Brooklyn Park, MN 55428, Phone 888-412-3726
- C. Architect approved equivalent roof hatch with Thermal Break.

2.02 ROOF HATCH

- A. Furnish and install where indicated on plans, aluminum roof hatch. The roof hatch shall be single leaf and of a size to fit existing deck opening. The roof hatch shall be pre-assembled from the manufacturer.
 - 1. BILCO Type S-50TB.
 - 2. Babcock Davis BRHTA.
- B. Performance characteristics:
 - 1. Cover and curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.
 - 2. Cover shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/15th of the span or 20 psf wind uplift.
 - 3. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - 4. Operation of the cover shall not be affected by temperature.
- C. Cover: Shall be 11-gauge (2.3 mm) aluminum with a 5" beaded flange with formed reinforcing members. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- D. Cover insulation: Shall be 3" thick polyisocyanurate with an R-value = 20.3 ($U=0.279 \text{ W/m}^2\text{K}$), fully covered and protected by an 18-gauge (1 mm) aluminum liner.
- E. Curb: Shall be 12" in height and of 11-gauge (2.3 mm) aluminum, interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 5 1/2" flange with 1/16" holes provided for securing to the roof deck. The curb shall be equipped with an integral metal cap flashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" on center, to be bent inward to hold single ply roofing membrane securely in place.
- F. Curb insulation: Shall be 3" thick polyisocyanurate with an R-value = 20.3 ($U=0.279 \text{ W/m}^2\text{K}$).
- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of

moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

H. Hardware

1. Heavy stainless steel pintle hinges shall be provided.
2. Cover shall be equipped with a spring latch with interior and exterior turn handles.
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" diameter red vinyl grip handle to permit easy release for closing.
6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
7. Finishes: Factory finish shall be mill finish aluminum.

2.03 HATCH RAIL SYSTEM

- A. Furnish and install on all roof hatches, hatch rail system designed to fit each roof hatch. The hatch rail system shall be field assembled and installed per the manufacturer's instructions.
- B. Performance characteristics:
1. High visibility safety yellow powder coat paint finish.
 2. Hatch rail system shall attach to the cap flashing of the roof hatch and shall not penetrate any roofing material.
 3. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
 4. Corrosion resistant construction with a five-year warranty.
 5. Hinged gate shall ensure continuous barrier around the roof hatch.
 6. Self-closing gate hinge and positive latching system provided with hatch rail system.
- C. Posts and Rails: 1 1/4" 6061 T6 schedule 40 aluminum pipe.
- D. Hardware: Mounting brackets shall be 3/8" thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
1. Test units for proper function and adjust until proper operation is achieved.
 2. Repair finishes damaged during installation.
 3. Restore finishes so no evidence remains of corrective work.

3.03 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 077233

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes through-penetration Firestop systems for penetrations through fire-resistance-rated horizontal and vertical constructions, including both empty openings and openings containing penetrating items. Fire-rated joint construction in or between fire-resistance rated construction and at exterior curtain wall/floor intersections.
- B. This Section includes fireblocking within the exterior cavity wall by use of vertical safing insulation (mineral wool insulation strips) compressed within the cavity at a specific spacing.
- C. Related Sections include the following:
 - 1. Section 099100 - Painting for stencil paint requirements.
 - 2. Division 22 Sections specifying piping penetrations.
 - 3. Division 23 Sections specifying pipe and duct penetrations.
 - 4. Divisions 26, 27 and 28 Sections specifying cable and conduit penetrations.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM E814 "Standard Test Method of Fire Tests of Penetration Firestop Systems".
- C. UL 1479 "Standard for Fire Tests of Penetration Firestops".
- D. UL "Building Materials Directory".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: For each type of product necessary to complete all types of firestopping required on the project.
- D. Product Schedule: For each interior penetration firestopping system. Include location and design designation of qualified testing and inspection agency.
 - 1. Engineering Judgements: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system or joint firestopping system condition, submit illustration, with modifications marked, approved by firestopping system manufacturer's fire-protection engineer as an engineering judgement or equivalent equivalent fire-resistance rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.
- E. Qualification Data: For qualified installer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration fire stopping similar in material, design, and extent to that Indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
 - 1. Installer shall have a documented and archived record-keeping system for all installations.
 - 2. A different installer may install cavity wall fireblocking.
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) FM Global in its "Building Materials Approval Guide".
 - 2) UL in its "Fire Resistance Directory".

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver through-penetration Firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspection agency's classification marking applicable to Project, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials for through-penetration Firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. Comply with recommended procedures, precautions or remedies described in Material Safety Data Sheets (MSDS) as applicable.
- D. Do not use damaged or expired materials.

1.07 REGULATORY REQUIREMENTS

- A. Provide fire and smoke resistivity pursuant to IBC NYS and NFPA.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install interior through-penetration Firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration Firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration Firestop systems per manufacturer's written instructions by natural means or where this is inadequate, forced-air circulation.

1.09 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration Firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, and/or cut openings to accommodate penetration firestopping.
- C. Do not cover up through-penetration Firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector and/or authorities having jurisdiction, if required.
- D. Coordinate installation of vertical safing insulation (mineral wool strips) in exterior wall cavity with completion of spray foam insulation and the start of veneer construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Emerson Industrial Automation; Nelson Firestop Products.
 - 2. Grace Construction Products; W.R. Grace & Co. - Conn.
 - 3. Hilti, Inc.
 - 4. Tremco, Inc., Tremco Fire Protection Systems Group.
 - 5. USG Corporation.
 - 6. 3M Fire Protection Products.
 - 7. Owens Corning (Cavity Wall Fire Blocking).

2.02 FIRESTOPPING OF THROUGH PENETRATIONS AND VOIDS

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Fire-resistance-rated walls include fire walls, fire-barrier walls and fire partitions.
 - 2. F-Rating: Not less than the fire resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Horizontal assemblies include ceiling membranes of roof/ceiling assemblies.
 - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 - 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Designs: Firestopping designs tested pursuant to ASTM E814 or UL 1479, and UL "Classified" for the application intended.

1. Through penetration firestops: UL category XHCR for devices; category XHEZ for systems.
2. Fill void, and cavity firestopping: UL category XHHW for firestopping materials; category XHKU for forming materials; pursuant to UL Classified systems for openings other than through penetrations.

UL ASSEMBLIES FOR THROUGH WALL PENETRATIONS						
PENETRANTS						
WALL TYPE	METAL CONDUIT	CABLES	NON-INSUL. METAL PIPE	INSUL. PIPE	FR POLY PROPYLENE PIPE	INSULATED METAL DUCT
GWB Stud Wall or Shaft Wall up to 2-HR Rating	W-L-1001	W-L-3001	W-L-1001	W-L-5011	W-L-2002	W-L-7009 up to 24"x12" W-L-7025 up to 42"x28"
CMU Wall up to 2-HR Rating	C-AJ-1044 C-AJ-1008	C-AJ-3029 C-AJ-3030	C-AJ-1044	C-AJ-5001	C-AJ-2001	C-AJ-7003 C-AJ-7016
Note: Up to 1-hour rating, submit engineered judgment firestopping system for this combination of penetrant, wall/floor assembly and fire rating.						

- E. Performance: F and T rating of not less than 1 hr.; with F rating to match fire resistance rating of assembly or barrier being penetrated.
- F. Design selection: Based on performance and, when compared to other designs that may be suitable, based upon ability to provide environmental/water seal and accommodate:
 1. Movement transmitted by the penetration item.
 2. Thermal expansion of construction materials.
 3. Future modifications to utilities, services, and penetrations.
- G. Fire-rated Caulk manufacturers:
 1. Approved intumescent sealant or putty.
- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.03 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
 - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor or roof in or between which it is installed.
- C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- D. Accessories: provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

2.04 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- D. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- F. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- H. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicted below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of non-sag grade for both opening conditions.

2.05 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, missing containers, missing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.06 CAVITY WALL FIREBLOCKING

- A. Provide continuous, vertical safining insulation (unfaced mineral wool strips) within the exterior wall cavity at a spacing as shown on the Contract Drawings or at a maximum spacing necessary to create a maximum concealed area between vertical safining insulation strips of 100 SF of face area.
 - 1. Provide Owens Corning Thermafiber® TopStop® Mineral Wool Insulation or Architect approved equivalent.
 - a. Mineral Wool Density: 6.0 pcf.
 - b. Prefabricated Size: Top Width: 4-1/2"; Bottom Width: 5-1/2"; Thickness: 2".
 - c. Field Cut Size: Width: 5"; Thickness: 2"

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.03 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Cavity wall fireblocking.
1. Temporarily secure installed vertical safing insulation strips (mineral wool strips) in cavity wall thru spray foam insulation with staples or other approved fastening systems.
 2. Vertical safing insulation shall run continuous from top of foundation wall to top of wall at required spacing.
 3. Safing insulation thickness should allow for a slight compression of the insulation as the veneer masonry and/or cladding is installed.
 4. Through wall flashings should penetrate the vertical safing insulation strips.

3.04 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using contrasting color lettering not less than 3 inches high and with minimum 0.375-inch strokes. See specification section 099100 for additional information.
- B. Install labeling required by code. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage".
 2. Contractor's name, address and phone number.
 3. Designation of applicable testing and inspecting agency, UL system, F-rating, T-rating, and the hourly rate of the wall.
 4. Date of installation.
 5. Manufacturer's name, and product number.
 6. Installer's name.

3.05 CLEANING AND PROTECTION

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

3.06 JOINT FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.
- B. Where Intertek Group listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building products" under product category Firestop Systems.

- C. Head-of-Wall, Fire-Resistive Joint Firestopping Systems:
 - 1. UL Classified Systems: HW-S-0000-0999.
 - 2. Assembly Rating: As indicated on Contract Drawings.
 - 3. Nominal Joint Width: As indicated on Contract Drawings.
 - 4. Movement Capabilities: Class 1.
- D. Perimeter Joint Firestopping Systems:
 - 1. UL Classified Perimeter Fire Containment Systems: CW-D-2000-2999.
 - 2. Integrity Rating: 1 hour.
 - 3. Insulation Rating: 1 hour.
 - 4. Linear Opening Width: As indicated, maximum.
 - 5. Movement Capabilities: Class II.
 - 6. F-Rating: 1 hour.

3.07 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestopping with No Penetrating Items:
 - 1. UL-Classified Systems: W-L-0001-0999.
 - 2. F-Rating: 1 or 2 hours.
 - 3. T-Rating: 1 hour
 - 4. Type of Fill Materials: As required to achieve rating.
- C. Firestopping for Metallic Pipes, Conduit, or Tubing:
 - 1. UL-Classified Systems: W-L-1001-1999.
 - 2. F-Rating: 1 or 2 hours.
 - 3. T-Rating: 1 hour.
 - 4. Type of Fill Materials: As required to achieve rating.
- D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:
 - 1. UL-Classified Systems: W-L-2001-2999.
 - 2. F-Rating: 1 hour to 2 hours.
 - 3. T-Rating: 1 hour.
 - 4. Type of Fill Materials: As required to achieve rating.
- E. Firestopping for Electrical Cable:
 - 1. UL-Classified Systems: W-L-3001-3999.
 - 2. F-Rating: 1 hour or 2 hours.
 - 3. T-Rating: 1 hour.
 - 4. Type of Fill Materials: As required to achieve rating.
- F. Firestopping for Miscellaneous Mechanical Penetrants:
 - 1. UL-Classified Systems: W-L-7001-7999.
 - 2. F-Rating: 1 hour or 2 hours.
 - 3. T-Rating: 1 hour.
 - 4. Type of Fill Materials: As required to achieve rating.
- G. Firestopping for Groupings of Penetrants:
 - 1. UL-Classified Systems: W-L-8001-8999.
 - 2. F-Rating: 1 hour or 2 hours.
 - 3. T-Rating: 1 hour.
 - 4. Type of Fill Materials: As required to achieve rating.

END OF SECTION 078400

PAGE INTENTIONALLY BLANK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide through penetration firestopping. The work of this section shall include, but not be limited to, the following:
 - 1. Provide firestopping at all openings in floors and fire rated walls and partitions to prevent the passage of fire, smoke or toxic gases and to maintain required fire ratings.
 - 2. Provide firestopping at all electrical, plumbing and electrical duct and pipe penetrations in floors, and fire-rated walls and partitions, to prevent the passage of fire, smoke or toxic gases.

1.02 QUALITY ASSURANCE

- A. Qualifications: The work of this section shall be performed by a qualified and experienced installer, acceptable to the Architect/Engineer. The term "installer", as used herein shall mean a firm of established reputation; which has been trained by the manufacturer in the proper installation of fire safing material and which is regularly engaged in, and maintains a regular force of workers skilled in the installation of fire safing material of the type specified.

1.03 REFERENCES

- A. Codes and Regulations: Comply with applicable regulations of governmental authorities having jurisdiction.
- B. ASTM E119, Method for Fire Tests of Building Construction and Materials.
- C. ASTM E814, Fire Tests of Through Penetration.
- D. U.L. 1479, Standards for Fire Tests of Through Penetration Firestops.
- E. Factory Mutual Systems.

1.04 SUBMITTALS

- A. Shop Drawings: Shop drawings shall indicate the locations and types of the various fire safing material to be used throughout the building, and material and methods of installation of damming for the various floor, wall and ceiling construction. Details of damming shall be large scale and shall indicate material and methods of installation.
- B. Product Data: Submit manufacturer's technical data and installation instructions.
- C. Test Reports: Submit copies of test reports, by an independent testing laboratory, indicating that the fire safing material complies with the specified requirements.

1.05 FIELD QUALITY CONTROL

- A. Section 014500 - Quality Control: field inspection and testing.
- B. Tests for thickness and density of applied material will be performed by an independent testing agency. Where test results are unsatisfactory in sample areas, additional tests in other areas may be made. Such further testing, if required, shall be by the same testing agency but shall be paid for by the installer.
- C. Independent Testing Agency will:

1. Inspect the installed firestopping after application and curing for integrity, prior to its concealment.
2. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings.
3. Re-inspect the installed firestopping for integrity of fire protection, after installation of subsequent work.
4. Provide written certification to the Architect, indicating installation meets or exceeds requirements of contract documents.

1.06 WARRANTY

- A. Provide standard manufacturer's warranty on material composition and resistance to breakdown.

PART 2 - PRODUCTS

2.01 FIRE RESISTANT SILICONE FOAM

- A. Acceptable materials are DOW CORNING Silicone RTV Foam, Chase-Foam CTCPR-855 by CHASE TECHNOLOGY CORP., Pensil RTV 851 by GENERAL ELECTRIC, or approved equal.
- B. Foam sealant shall conform to the required fire rating in accordance with the requirements of ASTM E119, with a flamespread rating of 15 in accordance with ASTM E84. Foam sealant shall also conform to UL Standard 1479: "Standards for Fire Tests of Through Penetration Firestops".
- C. The foam sealant shall provide a fire resistance equal to the construction into which it is installed; in accordance with "Through Penetration Firestop Systems (XHEZ)" in the Underwriters Laboratories "Building Materials Directory".
- D. Dams: Provide dams as recommended by the manufacturer, as required for proper installation and for required fire rating.

2.02 MINERAL FIBER FIRE SAFING INSULATION

- A. Provide insulation as manufactured by USG INTERIORS, INC. Product "Thermafiber Safing", CAFCO INDUSTRIES LTD., FIBREX INC. or approved equal. Density shall be 4 pcf with thickness to suit condition.
- B. Provide 20 gauge minimum metal plate where required for fire safing support to comply with fire ratings.
- C. Do not use fibrous safing insulation unless it is in conjunction with a compatible smoke seal as specified herein.

2.03 MINERAL WOOL

- A. Loose mineral wool, rated noncombustible when tested according to ASTM E136, free of asbestos and glass fiber, and suitable for stuffing into metal deck flutes to an in place density of 6 to 12 pcf.

2.04 FIRESTOPPING SEALANT

- A. Provide a silicone firestop sealant classified for both flame and temperature ratings under ASTM E814.

- B. Acceptable materials are USG INTERIORS "Smoke Seal Compound", DOW CORNING "Firestop Sealant", BIO FIRESHIELD "Biotherm", 3M "Fire-Barrier Caulk", GENERAL ELECTRIC "RTV 7403" or approved equal.

2.05 FIRESTOPPING MORTAR

- A. Provide Portland cement/fly ash mortar with an air dried density of 50 to 55 pounds per cu.ft. Mortar shall be classified for both flame and temperature ratings under ASTM E814.
- B. Acceptable materials are BIO FIRESHIELD "Novasit K-10" or approved equal.

2.06 PREFORMED PIPE SEALS

- A. Provide preformed intumescent collars classified for both flame and temperature under ASTM E814.
- B. Acceptable materials are BIO FIRESHIELD "Firestop Collars", 3M "Wrap/Strip FS 195" or approved equal.

2.07 ACCESSORIES

- A. Provide anchorage assemblies complying with U.L. designs and other components and accessories as needed.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

- A. Deliver material and products in unopened packages and containers, clearly indicating name of manufacturer and U.L. labeling. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage. Protect material from freezing or overheating in accordance with manufacturer's instructions.

3.02 INSPECTION

- A. Examine all surfaces to which the firestopping materials are to be applied, and notify the Architect/Engineer in writing of any conditions detrimental to the proper and expeditious installation of the work. Starting of work within an area shall be construed as acceptance of the conditions of that area.
- B. Thoroughly clean all surfaces to receive firestopping material to eliminate mill scale, dirt, grime, oil, grease, dust, loose rust or paint, and all other foreign material.
- C. Cleaning shall be accomplished just prior to application of firestopping material.

3.03 INSTALLATION (GENERAL)

- A. Material and equipment shall be as approved by the manufacturer. Application procedures shall be in strict accordance with the manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the material manufacturer shall be allowed to place the material.
- B. Provide firestopping material at thicknesses as required to provide indicated ratings. Where not otherwise indicated, comply with U.L. standard designs. In multiple layer work, offset joints by at least 6 inches.

- C. Anchor firestopping using manufacturer's recommended system and in compliance with U.L. standard designs.
- D. Install firestopping without gaps and voids of any kind. Do not use damaged materials. Remove and replace nonfitting or disturbed work.

3.04 MINERAL SAFING INSULATION

- A. Use mineral safing insulation at top of fire-rated partitions at underside of metal deck to provide complete fire-rated seal.
- B. Mineral safing insulation must be used in conjunction with a sealant or foam firestop to ensure a continuous smoke seal.

3.05 FIRESTOPPING SEALANT

- A. Use firestopping sealant at narrow joints at fire-rated floor and wall penetrations, and at penetrations subject to vibration or movement. Typical penetrations requiring sealant are plumbing and HVAC piping, electric conduit and ductwork.
- B. Where openings are large enough, use mineral safing insulation in thicknesses required to dam the joint, and apply 1/2 inch minimum depth of sealant, or as required to achieve the rated assembly.

3.06 FOAM-IN-PLACE FIRESTOPPING

- A. Apply foam-in-place firestopping material in depths required to meet the fire ratings indicated or required by U.L. standards. Provide clips or other approved means to contain the foam-in-place material which will enable the foam to solidly fill the areas intended. Mixing and application shall be in strict accordance with the manufacturer's written instructions.
- B. Foam firestopping may be used in lieu of sealant or mortar material at the Contractor's option, provided details conform to manufacturer's recommendations for maintaining the integrity of the assembly in question.

3.07 FIRESTOPPING MORTAR

- A. Mortar may be used to firestop all large, nonmoving openings in fire-rated assemblies, including multiple openings in floor slabs.
- B. Mix mortar with clean water in accordance with the manufacturer's printed instructions. Wet all surfaces with water prior to application of mortar. Apply by hand or pump and vibrate in penetrations to prevent voids from forming.
- C. Do not apply mortar if ambient or substrate temperature is below 35°F during the 24 hour period before application.

3.08 PREFORMED PIPE SEALS

- A. Use preformed pipe seals for firestopping nonmetallic pipes or conduit penetrating rated assemblies. Preformed collars may be surface mounted or embedded in firestop mortar as space permits to seal PVC or ABS pipe penetrations. Size selection and installation shall be in strict accordance with manufacturer's written instructions.

3.09 FIELD QUALITY CONTROL

- A. Coordinate installation of firestopping work with other work to minimize cutting and removal of installed firestopping. As work of other trades is completed, review firestopping work and repair or replace work which has been damaged or removed. Inspections will be performed to verify compliance with requirements.

3.10 CLEANING AND PROTECTION

- A. Upon completion of the work, remove all unused materials from the site. Clean floors, walls and other adjacent surfaces that are stained, marred or otherwise damaged by this work. Leave all work and the adjacent areas in a clean condition.
- B. Protect all completed work from damage, by methods recommended by the manufacturer of installed material.

3.11 SYSTEMS AND APPLICATION SCHEDULE

A.	CONSTRUCTION CONDITION	UL DESIGNATION
B.	Metal Pipe or Conduit	220, 221, 223
1.	Through Round Opening	316, 400, 425
C.	Insulated Metal Pipe	301, 310, 402, 403
1.	Through Round Opening	
D.	Metal Pipes or Conduits	399
1.	Through Large Openings	
E.	Cables Through Opening	222, 224, 307, 425
F.	Nonmetallic (Plastic) Pipe	300
1.	or Conduit through Opening	
G.	Metal Pipe or Conduit	425
1.	Through Gypsum Board Wall	
H.	Nonmetallic (Plastic) Pipe	226, 227, 228, 312
1.	or Conduit Through Gypsum	
2.	Board Wall	
I.	Cables Through Gypsum	425
1.	Board Wall	
J.	Mixed Penetrating Items	218, 219
K.	1. Ductwork Insulated	301
	1. Through Gypsum Board Wall in	227, 313
	2. Sleeve Opening	
L.	1. Ductwork	218, 219
	1. 2 Hr Gypsum Wall	312

- 3.12 PROVIDE ADDITIONAL UL DESIGNATION AS REQUIRED TO ACHIEVE FIRESTOPPING RATINGS EQUAL TO OR GREATER THAN ASSEMBLY PENETRATION.

END OF SECTION 078413

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes:
 - 1. Smoke barrier systems for walls designated on the Contract Drawings to be smoke tight.
 - 2. Bottom and top of vertical chase openings that run between floors or levels of the building to be smoke tight in all instances.
- B. Related Sections include the following:
 - 1. Division 22 Sections specifying piping penetrations.
 - 2. Division 23 Sections specifying duct and/or pipe penetrations.
 - 3. Divisions 26, 27 and 28 Sections specifying cable and conduit penetrations.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
- C. UL "Building Materials Directory".

1.04 DEFINITIONS

- A. Penetrations are any holes, openings or faults created in a fire barrier or smoke partition that compromise the integrity of the smoke or fire rating of the penetrated structure. Penetrations also include vertical chase openings between floors or levels of the building. This would include the top and bottom of the chase opening.
- B. Smoke Barrier is a continuous membrane designed and constructed to restrict the passage of smoke. Smoke Barriers are design to form smoke compartments and are constructed to be continuous from outside wall to outside wall, floor to floor or ceiling, from one fire or smoke barrier to another, or a combination thereof, including continuity through concealed spaces.

1.05 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Submit product data on all components being utilized to create a smoke barrier. Provide details for tops of walls, horizontal penetrations and vertical penetrations requiring barriers to smoke passage. Address any special conditions i.e. hot pipes/flues, ducts, cable trays passing thru a smoke barrier.

1.06 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

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

1.08 REGULATORY REQUIREMENTS

- A. Provide smoke resistivity pursuant to IBC NYS and NFPA 101 Life Safety Code.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install Smoke Barrier systems when ambient or substrate temperatures are outside limits permitted by Smoke Barrier system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate Smoke Barrier systems per manufacturer's written instructions by natural means or where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that Smoke Barrier systems are installed according to specified requirements.
- B. Do not cover up Smoke Barrier system installations that will become concealed behind other construction until each installation has been examined by building inspector and/or authorities having jurisdiction, if required.

PART 2 PRODUCTS

2.01 SMOKE BARRIER SYSTEMS

- A. The smoke sealing spray shall be a water based, high quality latex coating and shall dry to a water resistant and flexible smoke seal when dry. The coating shall be tested for smoke sealing, noise abatement (acoustical) properties and shall meet class A finish requirements when tested in accordance with ASTM E84 (UL723). The approved coating shall be SpecSeal® Smoke'N' Sound Spray or Architect approved equivalent.
- B. Fibrous Insulation:
 - 1. Mineral wool batt insulation.

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. Pursuant to manufacturers' published instructions.
- B. Seal tops and bottoms of all walls designated to be smoke tight.

- C. Seal openings and penetrations in smoke tight rated construction, including wall/partition assemblies, including but not limited to electrical boxes, data boxes, plumbing penetrations, HVAC penetrations conduit and cable penetrations.
- D. Seal tops and bottoms of vertical chases running between floors or levels of the building. Verify prior to sealing that all Prime Contractors and all trades have completed all work within the chase. Smoke tight sealing is required of all chases. If chase carries a fire rating, firestop chase openings in accordance with Section 078400 - Firestopping.
- E. Comply with applicable provisions of referenced codes and authorities having jurisdiction to achieve ratings matching the assembly in which it is installed.
- F. Notify code authorities to make required inspections. Document completion and inspection approvals.

END OF SECTION 078600

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes joint sealants for the following locations:
 - 1. Exterior joints in vertical surfaces and non-traffic horizontal surfaces as follows, unless indicated otherwise:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between different materials.
 - d. Perimeter joints (both interior and exterior) between materials listed above, frames of doors, windows, and louvers.
 - e. Joints at plumbing, sprinkler, mechanical and electrical penetrations thru the exterior building envelope.
 - f. At any fixed joint or space that allows air penetration into the building.
 - g. Other joints as indicated.
 - 2. Exterior joints in horizontal traffic surfaces as follows below, unless indicated otherwise:
 - a. Control, expansion, and isolation joints in cast-in-place slabs, sidewalks, aprons and pavement.
 - 1) Hybrid Joint Sealant where shown on contract drawings in joints 1" wide and larger.
 - b. Joints between different materials listed above.
 - c. Other joints as indicated.
 - 3. Interior joints in vertical surfaces and horizontal non-traffic surfaces as follows, unless indicated otherwise:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - d. Control joints in GWB walls and ceilings.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - f. Perimeter joints of toilet fixtures, urinals, wall hung sinks, mop sinks, drinking fountains, etc.
 - g. Any joints or voids between dissimilar materials.
 - h. Joints and/or locations as noted on the Contract Drawings requiring acoustical sealant.
 - i. Any joints or voids between existing and new construction.
 - j. Other joints as indicated.
 - 4. Interior joints in horizontal traffic surfaces as follows, unless indicated otherwise:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
- B. This section includes spray foam sealant to be used throughout the project to seal the building envelope penetrations and any break in the building envelope including but not limited to studs, sills, headers, other framing/sheathing gaps, exterior door frames, window frames, louvers, vents, electrical boxes, mail box slots, wall hydrants and at any other exterior penetration creating a gap or break in the envelope insulation.

- C. This section includes sealant for setting beds for exterior window and louver sills and exterior door thresholds.
- D. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 033000 - Cast-In-Place Concrete
 - 2. Section 042113 - Brick Masonry
 - 3. Section 042200 - Concrete Unit Masonry
 - 4. Section 047200 - Cast Stone
 - 5. Section 076200 - Sheet Metal Flashing and Trim for sealing joints related to flashing and sheet metal for roofing.
 - 6. Section 078400 - Firestopping for through-penetration firestopping systems and fire-rated joint construction.
 - 7. Section 078600 - Smoke Barrier Systems for through penetrations smoke barrier systems.
 - 8. Section 085213 - Aluminum Clad Wood Windows.
 - 9. Section 088000 - Glazing for sealants used in glazing.
 - 10. Section 092116 - Gypsum Board Assemblies for sealing concealed perimeter joints of gypsum board partitions to reduce sound transmission.
 - 11. Section 093013 - Ceramic Tiling for sealing tile corner joints.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM C834 "Standard Specification for Latex Sealants".
- C. ASTM C919 "Standard Practice for Use of Sealants in Acoustical Applications".
- D. ASTM C920 "Standard Specification for Elastomeric Joint Sealants".
- E. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- F. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Provide the following certifications:
 - 1. Certification by joint sealant manufacturer that sealants, plus the primers and cleaners required for sealant installation, comply with local regulations controlling use of volatile organic compounds.
 - 2. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- D. Provide the following test reports:
 - 1. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's

- interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
2. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.
 3. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.
- E. Product Data for the following:
1. Each different type of sealant to be used.
 - a. Indicate specific location/situation the product will be used.
 2. Backer Rod
 3. Spray Foam Sealant
 4. Bond Breaker Tape
 5. Primers for Sealants
- F. Samples for verification purposes of each type and color of joint sealant required and selected by the Architect. Install joint sealant samples in ½-inch wide joints formed between two six (6) inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- G. Provide cured sample of each Architect approved color sealant a minimum of thirty (30) days prior to installation.
1. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view. THE SAME COLOR SEALANT WILL NOT BE USED THROUGHOUT THIS PROJECT.
 - a. Architect may request various sealant color test strips be installed in project joints to aid in the selection of a final color. Test strips shall be removed prior to final joint sealant installation.
 2. Sample of Bond Breaker Tape: 12-inch long section.
- H. Closeout Documentation
1. Submit "Sealant Installation Log" as detailed in Part 3 of this specification.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who had completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance. Installer must be able to comply with warranty requirements and completion of the required "Sealant Installation Log" required at closeout.
- B. Provide certification from sealant manufacturer signed by a corporate officer attesting that sealant products comply with Contract Documents.
- C. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
 - 2. When joint substrates are wet due to rain, frost, condensation or other causes.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.08 WARRANTY

- A. Special Installer's Warranty: Installer's written warranty in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two (2) years from the date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's written warranty in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period:
 - a. Polyurethane Exterior Building Sealants: Five (5) years from the date of Substantial Completion.
 - b. Silicone Exterior Building Sealants: Twenty (20) years from the date of Substantial Completion.
 - c. Interior Building Sealants: Two (2) years from the date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.02 SPRAY FOAM SEALANT

- A. One component, minimal expanding, low pressure build, flexible polyurethane foam sealant.
 1. GREAT STUFF PRO™ Window & Door Foam Sealant by Dow Building Solutions.
 2. Energy Complete Sealant by Owens Corning.
 3. Architect approved equivalent.

2.03 ENTRANCES, STOREFRONTS, WINDOWS, AND FLASHING

- A. Sealant: BASF polyurethane, one-component (MasterSeal® NP1™) or two component (MasterSeal® NP2™) or Architect approved equivalent.
- B. Standard: ASTM C920
 1. NP1™: Type S, Grade NS, Class 35.
 2. NP2™: Type M, Grade NS, Class 25
- C. Colors:
 1. To be selected by Architect from manufacturer's full range of colors.

2.04 MASONRY AND OTHER EXTERIOR LOCATIONS (AS SHOWN ON DRAWINGS AND ALL REQUIRED INCIDENTAL APPLICATIONS.)

- A. Sealant: BASF polyurethane, two component (MasterSeal® NP2™) or Architect approved equivalent.
- B. Standard: ASTM C920
 1. Type M.
 2. Grade NS
 3. Class 25
- C. Colors:
 1. To be selected by Architect from manufacturer's full range of colors.

2.05 INTERIOR CONTROL AND EXPANSION JOINTS

- A. Sealant: BASF polyurethane, one-component (MasterSeal® NP1™) or Architect approved equivalent.
- B. Standard: ASTM C920.
 1. Type: S.
 2. Grade: NS.
 3. Class: 35.
- C. Colors:
 1. To be selected by Architect from manufacturer's standard colors.

2.06 CONCRETE CONTROL AND EXPANSION JOINTS (INTERIOR AND EXTERIOR)

- A. BASF Multi-Component Self-Leveling Elastomeric Polyurethane Sealant: (MasterSeal® SL2™) or Architect approved equivalent.
 1. Standard: ASTM C920, Type M, Class 25, Grade P.
 2. Color: Match concrete color.
 3. Use slope grade where conditions warrant.

- B. Hybrid Joint Sealant - Joints in excess of one inch in width
 - 1. Manufacturers:
 - a. EMSEAL Joint Systems, Ltd., 25 Bridle Lane, Westborough, MA 01581, Phone: 800-526-8365.
 - 1) DSM System watertight preformed and pre-compressed joint filler system.
 - b. Watson Bowman Acme, 95 Pineview Drive, Amherst, NY 14228. Phone 716-691-7566.
 - 1) BASF Wabo® HSeal, a pre-compressed elastomeric coated expansion joint system.
 - 2. Size: As shown on Contract Drawings.
 - 3. Color: Gray.
 - 4. Adhesive as recommended by manufacturer.

2.07 INTERIOR MATERIAL AND NON-MOVING JOINTS

- A. Sealant: siliconized acrylic latex, non-sag one component.
- B. Standard: ASTM C834, Type OP, Grade NF.
- C. Colors:
 - 1. Clear, Limestone and White, paintable.

2.08 INTERIOR MILDEW RESISTANT JOINTS

- A. Joint Locations:
 - 1. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 2. Tile corner joints.
 - 3. Tile control and expansion joints where indicated.
- B. Sealant: silicone, one component, fungicidal.
- C. Standard: ASTM C920
 - 1. Type: S.
 - 2. Grade: NS.
 - 3. Class: 25.
- D. Colors:
 - 1. To be selected by Architect from manufacturer's full range of colors.

2.09 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product to effectively reduce airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. Tremco Incorporated; Tremflex 834, Acoustical/Curtainwall Sealant.
 - c. USG Corporation; SHEETROCK® Brand Acoustical Sealant.

2.10 SETTING BEDS FOR EXTERIOR WINDOW AND LOUVER SILLS AND EXTERIOR DOOR THRESHOLDS

- A. Sealant: Butyl Rubber and/or Polyisobutylene Mastic Sealant (Tremco® Butyl Sealant or Architect Approved Equivalent).
- B. Standard: ASTM C1311.
- C. Color: Black unless any is exposed to view.

2.11 ACCESSORY COMPONENTS

- A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26deg F (-32 deg C). 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.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.12 MISCELLANEOUS MATERIALS

- A. Primer: Provide sealant manufacturer's primer formulated for each sealant over each substrate surface. Omit only where specifically approved by sealant manufacturer for a specific sealant application over a specific substrate surface.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

- B. Clean substrate surfaces around joint free of moisture, oil, dust, release agents, and materials harmful to sealant adhesion and cure.
 - 1. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 2. Remove laitance and form release agents from concrete.
 - 3. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm surfaces, or leave residues capable of interfering with adhesion of joint sealants.
- C. Execute joint preparation pursuant to sealant manufacturer's published instructions.
 - 1. Joint Priming: Prime joint substrates where indicated and where recommended by joint sealant manufacturer based on Preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
 - 2. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.02 JOINT SUB-ASSEMBLY

- A. Backer rod:
 - 1. Select size to result in a tight fit without excessive deformation to rod.
 - 2. Place continuously in joint by means of a roller or other tool approved by sealant manufacturer. Do not stretch rod.
 - 3. Replace rod that is damaged, ruptured, or torn.
 - 4. Place at a uniform depth pursuant to sealant manufacturer's published instructions.
- B. Bond breaker tape:
 - 1. Place continuously and to full dimension between sealant bond surfaces.
 - 2. Locate and install pursuant to sealant manufacturer's published instructions.

3.03 PRIMER APPLICATION

- A. Sealant may be considered a non-priming sealant but special circumstances or substrates may require a primer. It is the applicator's responsibility to check the adhesion of the cured sealant on typical test joints at the project site before and during application.
- B. Apply in a continuous, even application pursuant to sealant manufacturer's published instructions.
- C. Sealant must be installed within primer manufacturer's recommended time frame or re-priming will be required.

3.04 SEALANT APPLICATION

- A. Apply in an even, continuous application.
- B. Avoid 3-sided joints. Use backer rod or bond breaker tape to create 2-sided joints pursuant to sealant manufacturer's published instructions.

- C. Avoid vee shaped joints. Use backer rod to bring width of joint back closer to width of joint front.
- D. Apply to achieve a solid bond to both joint bond surfaces. Tool sealant surface concave.
- E. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations. Install acoustical sealant behind edge molding of suspended acoustical ceilings. Install acoustical sealant at bulkheads of operable wall systems where shown on Contract Drawings.
- F. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.05 HYBRID JOINT SEALANT INSTALLATION

- A. Install EMSEAL DSM System or Architect approved equivalent pre-molded joint filler at locations shown on Contract Drawings. Install DSM System in accordance with manufacturer's instructions.

3.06 SEALANT INSTALLATION LOG

- A. A tabular log of all sealant installations on the project shall be kept and submitted with Closeout Documents.
- B. Tabular Log shall have columns for:
 - 1. Sealant Type
 - 2. Sealant Installation Location
 - 3. Temperature during installation
 - 4. Date of Installation
 - 5. Manufacturer including specific type
 - 6. Sealant Color installed
 - 7. Comments (provide comments if applicable)

3.07 PROTECTION

- A. Protect joint sealants 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 damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that repaired areas are indistinguishable from original work.

END OF SECTION 079200

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following products manufactured in accordance with Steel Door Institute (SDI) Recommended Standards:
 - 1. Doors: Flush, hollow or composite construction standard steel doors for interior and exterior locations.
 - 2. Frames: Pressed steel frames for doors, transoms, sidelights, mullions, interior glazed panels, and other interior and exterior openings of the following type:
 - a. Welded unit type.
 - b. Thermally broken, welded type at all exterior locations.
 - c. Kerfed Frames at interior locations where indicated on Contract Drawings.
 - 3. Assemblies: Provide standard steel door and frame assemblies as required for the following:
 - a. Labeled and fire-rated.
 - b. Thermal rated (insulated).
 - 4. Provide factory primed doors and frames to be field painted.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 081429 - Pre-finished Wood Doors.
 - 2. Section 087100 - Door Hardware.
 - 3. Section 088000 - Glazing.
 - 4. Section 099100 - Painting.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ANSI/SDI A250.6 "Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames".
- C. ANSI/SDI A250.8 "Specifications for Standard Steel Doors and Frames".
- D. ANSI/SDI A250.10 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames".
- E. ANSI/SDI A250.11 "Recommended Erection Instructions for Steel Frames".
- F. ASTM A569 "Standard Specification for Steel, Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled, Commercial Quality".
- G. ASTM E152 "Standard Methods of Fire Tests of Door Assemblies".
- H. NFPA 80 "Standard for Fire Doors and Opening Protectives".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.

- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Certification: Manufacturer is a current member of the Steel Door Institute (SDI).
- D. Product Data: Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes for each type of product required.
- E. Shop drawings showing dimensions, materials, adjacent wall construction, accessories and all other information needed for a complete system.
 - 1. Provide schedule of doors and frames using same reference numbers for details and openings as those on the Contract Drawings.
 - 2. Indicate coordination of glazing frames and stops with glass and glazing requirements.
- F. Label Construction Certification: For door assemblies required to be fire-rated and exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.
- G. Sample warranties: Submit sample warranties of those to be furnished upon project completion. Warranties must meet or exceed all requirements of the Warranty paragraph below.

1.05 QUALITY ASSURANCE

- A. Provide doors and frames complying with Steel Door Institute "Specifications Standard Steel Doors and Frames" ANSI/SDI A250.8 (SDI-100) latest edition and as herein specified.
- B. Membership in good standing in the Steel Door Institute is required. Architect reserves the right to require proof of membership prior to accepting any items described by or related to this Section.
- C. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies whose fire resistance characteristics have been determined per ASTM E 152 and which are labeled and listed by UL, Factory Mutual, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.
- D. Hot-Rolled Steel Sheets and Strips: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569 (ASTM A 569M), free of scale, pitting, or surface defects.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Deliver, handle, and store doors, and frames at job site in such a manner as to prevent damage.
- C. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- D. Protect against moisture exposure and damage. Store doors and frames at building site under cover.
- E. Store doors, and frames in a vertical position on blocking, clear of floor and with blocking between doors to permit air circulation between doors.

- F. Carefully protect frames from twisting or racking and preserve the integrity of spreader bars.
- G. Immediately remove from job site all damaged or otherwise unsuitable door, and frame.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Establish Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating hollow metal frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors. Deliver such items to Project site in time for installation.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering standard steel doors and frames which may be incorporated in the Work, but are not limited to, the following:
 - 1. Amweld Building Products, LLC
 - 2. Ceco Door Products; an ASSA ABLOY Group Company
 - 3. Curries Company; an ASSA ABLOY Group Company
 - 4. de La Fontaine Industries, Inc.
 - 5. Fleming Door Products Ltd; an ASSA ABLOY Group Company
 - 6. Republic Doors & Frames, an Allegion PLC Company
 - 7. Steelcraft; an Allegion PLC Company

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 metallic coating, mill phosphatized.

- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011 M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- G. Grout: Comply with requirements for grout in Division 03 Section "Grout".
- H. Glazing: Furnished and installed by Division 08 Section "Glazing".

2.03 FINISH

- A. All Steel Doors and Frames shall be factory prepped.
 - 1. Galvanize pursuant to ASTM A653, Grade A60 or G60; to ASTM A591, Class A.
 - 2. Clean, phosphate treat, and paint with a rust inhibitive primer pursuant to ANSI A224.1, applied after fabrication.
 - 3. Reinforcements for galvanized frames are to be galvanized.

2.04 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI-100 requirements.
- B. Fabricate sidelite and transom frames with closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

2.05 HARDWARE

- A. Factory prepare all doors, and frames for hardware pursuant to ANSI A115; ANSI A151; SDI 107; and SDI 111-E. See Door Schedule and Section 087100 - Door Hardware.
- B. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series Specification for door and frame preparation for hardware.
- C. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames," published by Door and Hardware Institute.
- D. Coordinate locations of conduits and wiring boxes for electrical connections with Electrical Contractor and Owner's Access Control Contractor.

2.06 INSULATED DOORS:

- A. Grade I, Standard Duty, 1-3/4 in. thick.

- B. Full flush-composite.
- C. Exterior Door Core: Polyurethane with a U-Factor = 0.09, R-Factor = 11.1.
- D. Interior Insulated Door Core: Polystyrene.
- E. Door Edge Construction: Seamless Edge, continuously welded, internally reinforced.
- F. Metal thickness: 16 gauge
 - 1. Construction and galvanized finish: Pursuant to SDI - 100.
- G. Lites/Glazing stops
 - 1. Fabricate and install pursuant to SDI - 100.
 - 2. Material: 20-gauge steel.
 - 3. Corner construction: Mitered.
 - 4. Fastening to door: Non-removable steel stops on the outside of exterior door, screws interior of door.
- H. Doors between "living side" and apparatus bay(s) shall be provided with high frequency hinge reinforcement on all hinges.
 - 1. 10 gage auxiliary hinge reinforcement spot welded to the top and bottom of each hinge reinforcement in two locations.
- I. Top and Bottom Edges: Closed with inverted 14-gauge flush and sealed steel channels, projection welded, fill and finish smooth.
- J. Bottom channels of all insulated doors to be provided with concealed double sealing sweeps equivalent to Steelcraft FAS-SEAL™.
- K. Reinforce doors scheduled to have closers with optional 12-gauge closer reinforcements.
- L. Provide cylinder lock reinforcement, rim exit reinforcement, deadbolt lock reinforcement or mortise lock reinforcement per specified lock type.

2.07 INTERIOR DOORS:

- A. Grade: I, Standard Duty, 1-3/4 in. thick.
 - 1. Class/rating per drawings - UL approved
- B. Full flush-hollow steel.
- C. Core:
 - 1. Fire Rated: Mineral Fiber
 - 2. All others: Honeycomb
- D. Door Edge Construction: Seamless Edge, No visible edge seam.
- E. Metal thickness: 18 gauge
 - 1. Construction, and galvanized finish: Pursuant to SDI - 100.
- F. Lites/Glazing stops
 - 1. Fabricate and install pursuant to SDI - 100.
 - 2. Material: 20-gauge steel.
 - 3. Corner construction: Mitered.
 - 4. Provide 20 ga. channel louver cutout reinforcing at each corner

- 5. Fastening to door: Screws.
- G. Top and Bottom Edges: Closed with inverted 14-gauge welded channels.
 - 1. Bottom channels of all rated and smoke tight doors to be provided with concealed double sealing sweeps equivalent to Steelcraft FAS-SEAL™.
- H. Louvers
 - 1. 1" Thick
 - 2. Inverted "Y" blade type
 - 3. Free air space to be 50% of louver area.
 - 4. Provide fusible link, fire rated louvers in rated doors with louvers.
- I. Doors for fire rated openings:
 - 1. Provide labeled doors with fire rating per door schedule.
- J. Reinforce doors scheduled to have closers with optional 12-gauge closer reinforcements.
- K. Provide cylinder lock reinforcement, rim exit reinforcement, flush bolt lock reinforcement or mortise lock reinforcement per specified lock type.

2.08 FRAMES

- A. Provide frames in following types:
 - 1. Height: 84" frame with 2" head for all stud openings.
 - 2. Height: 84" frame with 4" head for all masonry openings unless noted otherwise.
 - 3. Saw Miter Welded construction at all locations with faces ground to a smooth finish.
 - 4. All exterior door frames shall be thermally broken.
 - 5. Interior door frames where indicated on Door Schedule to have integral 1/8" kerf for additional weatherstripping.
 - 6. Frames for doors with electric strikes shall have 4 7/8" strike reinforcement with mud box containing an electrical knock out.
 - 7. Frames scheduled to have Electric Power Transfers shall have templated cutouts with 12 gauge reinforcing tabs.
 - 8. Frames for doors scheduled to have door closers, provide full closer sleeve reinforcement.
 - 9. All hinge reinforcements shall have a mudcap.
 - 10. High Frequency Hinge Reinforcement: Door frames between "Living Side" and apparatus bay(s) shall be provided with high frequency hinge reinforcements at all hinge locations.
 - 11. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 - 12. Provide other frame "preps" and reinforcements as required to accommodate the hardware and accessories specified in the Hardware Schedule.
 - 13. Provide either factory or distributor installed frame back coating (waterborne asphaltic emulsion coating) or additional field applied primer as indicated in paragraphs 3.02 C of this section.
- B. Frames for fire rated openings:
 - 1. Provide frames with same hourly rating as door opening.
- C. Exterior opening metal thickness:
 - 1. Grade I: 16 gauge.
- D. Interior opening metal thickness:
 - 1. Grade I: 16 gauge.

2.09 FIRE RATED OPENING ASSEMBLIES

- A. Provide labels on rated doors and frames.
 - 1. Approved testing agencies for source of labels: Underwriters Laboratories and Factory Mutual.

2.10 SOUND RATED OPENING ASSEMBLIES

- A. Provide steel door and frame assemblies:
 - 1. STC rating of 52 or better.
 - 2. 3/4 hr fire rating.

2.11 ACCESSORIES

- A. Grout Guards
 - 1. Formed from same material as frames, not less than 0.016 inch thick.
 - 2. Weld guards to frame at back of hardware mortises in frames to be grouted.
- B. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

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 performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install standard steel doors, frames, and accessories in accordance with final approved shop drawings, manufacturer's installation instructions, and as herein specified.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface mounted hardware.
- C. Frame Back Painting:
 - 1. If factory or distributor back coating is furnished touch-up areas of the frame with back coating to cover any bare or primer metal on the inside of the frame. If not factory or distributor back coated, comply with paragraphs 2 and 3.
 - 2. All metal door frames to be installed in masonry and exterior walls shall have all hidden surfaces field painted with an additional coat of primer prior to installation. See Section 099100 - Painting.

3. All metal door frames to be installed in interior non-masonry walls shall have all hidden surfaces field painted with an additional coat of primer from floor level to 48-inches above finish floor prior to installation. See Section 099100 - Painting.
- D. Placing Frames: Comply with provisions of SDI-119 and SDI-105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.
 1. Erect frames plumb, level, and square; free of racking, warping, or bowing; for effort-free door operation and without gravity-imposed movement upon door anywhere within door swing.
 2. Except for frames located at existing concrete, masonry or drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged. If screws and/or expansion anchors are required, frames shall be dimpled, and countersunk fasteners utilized.
 3. In masonry construction, locate three (3) wall anchors per jamb adjacent to hinge locations on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry Tee anchors.
 4. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 5. Install door silencers in frames before grouting.
 6. In metal stud partitions, install at least three (3) wall anchors per jamb at hinge and strike levels. In closed steel stud partitions, attach wall anchors to studs with screws.
 7. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal stud partitions.
 8. Install fire-rated frames in accordance with NFPA Standard No. 80.
 9. Metal Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 10. After wall construction is complete, remove temporary braces, leaving surfaces smooth, flush and undamaged.
- E. Door Installation: Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI-100.
 1. Install fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.03 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer, providing for a continuous unbroken primer coating.
- B. Cover countersunk exposed screw heads with epoxy metal filler. Finish smooth and level with frame.
- C. Finish Paint per Section 099100 - Painting.
- D. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.
- E. Final Adjustments: Check and readjust operating hardware items, leaving steel doors and frames undamaged and in complete proper operating condition. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door. Shims shall not be visible.

END OF SECTION 081113

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. Extent and location of each type of flush wood door is indicated on Construction Documents and in schedules.
- B. Types of doors required include the following:
 - 1. Solid core flush wood doors with wood veneer faces.
 - 2. Fire-rated flush wood doors.
- C. Factory-finishing of flush wood doors is included in this Section.
- D. Factory pre-fitting to frames and factory pre-machining for hardware for wood doors is included in this Section.
- E. Louvers for flush wood doors, including furnishing and installation, are specified under this Section.
- F. Metal door frames for flush wood doors are specified in another Division 08 Section.
- G. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 081113 - Hollow Metal Doors and Frames
 - 2. Section 087100 - Door Hardware
 - 3. Section 088000 - Glazing
 - 4. Section 099100 - Painting

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. NWWDA Quality Standard: I.S.1 "Industry Standard for Wood Flush Doors", of National Wood Window and Door Association (NWWDA).
- C. AWI Quality Standard: "Architectural Woodwork Quality Standards"; including Section 1300 "Architectural Flush Doors", of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.
- D. NFPA 80 "Standard for Fire Doors and Windows".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data
 - 1. For each type of door, include grade of door information, core and edge construction, louver information and trim for openings.
 - 2. Fire rated doors showing conformance with NFPA 80.

- D. Shop Drawings
 - 1. Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, undercuts, requirements for factory finishing, requirements for veneer matching and other pertinent data.
 - a. Include details of electrical raceway and preparation for electrified hardware, access control systems, and security systems if applicable.
 - 2. For factory pre-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.
- E. Samples
 - 1. Factory finishes applied to actual door veneer materials, approximately 8" x 10". Provide two (2) samples of each available stain.
 - 2. Glazing stops: 6" long sample for each available glazing stop.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain-of-custody by an FSC-accredited certification body and is a certified participant in AWI's Quality Certification Program..
- B. Provide wood flush doors complying with:
 - 1. ANSI/WDMA: Industry Standard I.S.1-A-13 Series.
 - 2. Match between Veneer Leaves: Book Match.
 - 3. Double doors and sliding doors shall be pair matched.
 - 4. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
 - 5. Fire-Rated Doors: In addition to complying with I.S.1 Series standards, provide flush wood doors identical in materials and construction to units tested in frame and door assemblies pursuant ASTM E 152 and which are labeled and listed for ratings indicated by Underwriters Laboratories, Factory Mutual, or other testing and inspection agency acceptable to authorities having jurisdiction.
- C. Obtain doors from a single manufacturer, unless otherwise indicated.
 - 1. Mark each door with stamp indicating conformance with WDMA Wood Flush Door Certification Hallmark.
 - 2. Mark each door manufactured with Type I (exterior) adhesives with permanent Type I glue bond mark.
- D. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Package, deliver, store, and handle doors pursuant to WDMA standards and appendix plus manufacturer's recommendations.
- D. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete and dry, and HVAC System is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.08 WARRANTY

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement in door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.
 - 1. Warranty shall include reinstallation that may be repaired due to repair or replacement of defective doors where defect was not apparent prior to hanging.
 - 2. Warranty shall be in effect during following period of time after date of Substantial Completion.
 - 3. Solid Core Interior Doors:
 - a. Life of installation
- C. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering doors which may be incorporated in the Work include, but are not limited to, the following:
 - 1. Solid Core Doors with Wood Veneer Faces and Fire Rated Flush Wood Doors.
 - a. Haley Brothers, Inc.
 - b. Masonite International Corporation
 - c. VT Industries, Inc.

2.02 FLUSH WOOD DOORS, GENERAL

- A. Fabricate doors pursuant to WDMA Industry Standard I.S.1 Series.
- B. WDMA I.S.1A-13 Performance Grade: Heavy Duty

2.03 INTERIOR DOORS - SOLID CORE - 1 3/4" THICK UNO

- A. Face:
 - 1. Species: birch, rotary cut, natural, select white veneer, Custom Grade .
 - 2. Factory finished: transparent manufacturer's standard stain color selection by Architect.
 - a. Minimum of eight standard stain colors are required.
- B. Structural Composite Lumber Core (SCLC)
 - 1. Structural Composite Lumber: Engineered hardwood composite wood products tested in accordance with WDMA I.S.1A, Testing Cellulosic Composite Materials for use in Fenestration Products containing no added urea formaldehyde.

- C. Hardware Preparation:
 - 1. Factory machine doors for hardware that is not surface applied. Comply with final, approved hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
 - 2. Electrical Raceways: Provide wood doors receiving electrified hardware with concealed pathway for wiring harness with plug connectors on both ends. Coordinate with hardware supplier if wiring harness is to be factory installed in wood door.
- D. Edge Bands:
 - 1. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA Section P-1, Performance Standards for Architectural Wood Flush Doors.
 - 2. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA Section P-1, Performance Standards for Architectural Wood Flush Doors.
- E. Doors for fire rated openings:
 - 1. Provide construction and fire resistive composite core containing no asbestos as needed to provide fire ratings indicated.
 - 2. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60 and 90 minute rated doors. Comply with specified requirements for exposed edges.
 - 3. Category B Edge Construction: Provide 20 minute fire rated doors at Category B, with smoke and fire seals applied to frame for 20 minute openings.
 - 4. Pairs: Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - a. Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals.
 - b. Where required for concealed hardware, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel in color as selected by the Architect.
- F. Glued on Applique
 - 1. Provide glued on wood molding to simulate a six-panel (2x3 or 3x2) door, as detailed.
- G. Finishes
 - 1. Doors shall receive factory finishing.
 - 2. Factory Finishing: WDMA System TR-6, catalyzed polyurethane, premium grade.
 - a. Stain Coat
 - b. Sealer: 3 coats
 - c. Sanding: Sand
 - d. Topcoat: 2 coats

2.04 CLOSET DOORS AND SLIDERS

- A. Same grade and finish as interior doors. Hardware and edge bands same as interior doors.
- B. Every door shall have a hollow metal door frame unless otherwise noted.

2.05 LOUVERS AND LIGHT FRAMES

- A. Metal Louvers: Size, type and profile shown on the Contract Drawings and fabricated from the following:
 - 1. Steel: 20-gage, galvanized and factory primed for paint finish.
 - a. Color: To be selected by Architect from the manufacturer's full range of colors.

2. Provide fusible link, self-closing louvers in fire rated doors.
- B. Metal Frames for Lite Openings in Fire Rated Doors: Manufacturer's standard frame formed of 18-gage cold-rolled steel, factory-primed, and approved for use in door of fire-rating indicated.
- C. Wood Frames for Lite Openings in Non-Rated Doors: Manufacturer's standard wood frame in same species as door faces, factory stained to match face of doors.

PART 3 EXECUTION

3.01 EXAMINATION AND INSTALLATION

- A. Inspect openings to verify that frames are plumb and level and comply with tolerance requirements of WDMA Industry Standard I.S.1 Series and Appendix.
 1. Bring frames into compliance with WDMA Industry Standard I.S.1 Series and Appendix prior to installation of doors.
- B. Hardware: For installation, refer to Division 8 Section "Door Hardware."
- C. Install doors pursuant to door manufacturer's published instructions and WDMA Industry Standard I.S.1 Series and Appendix.
 1. Install fire-rated doors pursuant to requirements of NFPA 80 and WDMA Standards and Instructions.
 2. Seal cut in prefinished doors pursuant to door manufacturer's published instructions.
 3. Putty all nail/staple holes in wood glass trim. Putty shall match wood door color.
- D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 1. Clearances: Provide 1/8-inch at heads, jambs, and between pairs of doors. Provide 1/8-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch from bottom of door to top of threshold.
 - a. Comply with NFPA 80 for fire-rated doors.
 2. Bevel non-fire-rated doors 1/8-inch in 2-inches at lock and hinge edges.
 3. Bevel fire-rated doors 1/8-inch in 2-inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project Site.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

3.03 CLEANING

- A. Clean doors pursuant to door manufacturer's published instructions.

3.04 PROTECTION

- A. Protect doors, as recommended by door manufacturer, to ensure that wood doors will be without damage and/or deterioration at time of Substantial Completion.

END OF SECTION 081429

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Specifications, apply to work of this Section.
- B. Section 033000 - Cast-In-Place Concrete
- C. Section 042200 - Concrete Unit Masonry
- D. Section 092116 - Gypsum Board Assemblies
- E. Section 099100 - Painting.

1.02 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: For each type of access door.
 - 1. Include construction details, fire ratings, insulation information, material descriptions, dimensions of individual components and profiles, attachment methods, and finishes.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Fire Rated Access Doors For Walls: Complete assemblies complying with Underwriter's Laboratories, Inc (UL) requirements for 1-1/2 hour "B Label" rating. Identify each assembly with UL label.
 - 2. Fire Rated Access Doors For Ceilings: Complete assemblies complying with Warnock Hersey (WHI) requirements for one-hour rating in wood-framed assemblies and three-hour rating in non-combustible assemblies. Identify each assembly with WHI label and NFPA requirement indicating "For Horizontal Installation".

PART 2 PRODUCTS

2.01 ALL ACCESS DOORS

- A. Doors in insulated assemblies must be insulated and weatherstripped.
- B. Doors in wet locations are to be Stainless Steel, U.N.O.

2.02 NON-FIRE RATED ACCESS DOORS FOR WALLS AND CEILINGS

- A. Frames: Minimum 16 gage steel.
 - 1. Flange: Integral exposed flange not less than 3/4-inch wide around the perimeter.
 - a. Plaster Applications: Expanded metal lath and exposed casing bead welded to perimeter of frame, in place of integral exposed flange.
 - b. Acoustical Tile Applications: Frames without exposed flange.
 - 2. Finish: Match door panel.
 - 3. Anchorage, Except for New Concrete or Masonry Construction: Predrilled holes in frame for anchoring with fasteners.
 - 4. Anchorage for New Concrete or Masonry Construction: Adjustable metal masonry anchors.

- B. Door Panel: Flush type, minimum 14 gage steel.
 - 1. Hinges: Concealed type set to open a minimum of 135 degrees; continuous type, or sufficient number to support the door size.
 - 2. Finish: Factory-applied rust inhibitive baked enamel or primer over phosphate treated steel.
- C. Door Panel: Recessed type, minimum 18 gage steel with face of panel formed to provide a 1 inch recessed surface for application of finish material, and reinforced as required to prevent buckling.
 - 1. Hinge: Continuous type hinge.
 - 2. Finish: Factory-applied rust-inhibitive baked enamel or primer over phosphate treated steel.
 - 3. Plaster Applications: Self-furring 3.4 lb. per sq. yd. galvanized expanded metal mesh welded to panel face and casing bead welded to perimeter of panel.
- D. Cam Locks: Flush, screwdriver operated; sufficient number to hold door panel in flush, smooth plane when closed.

2.03 FIRE RATED ACCESS DOORS FOR WALLS AND CEILINGS

- A. Frames: Minimum 16 gage steel, with integral exposed flange not less than one inch wide around the perimeter.
 - 1. Anchorage, Except for New Concrete or Masonry Construction: Predrilled holes in frame for anchoring with fasteners.
 - 2. Anchorage for New Concrete or Masonry Construction: Adjustable metal masonry anchors.
- B. Door Panel: Flush type, minimum 20 gage steel double wall construction with insulation, equipped with automatic closer and inside release mechanism.
 - 1. Hinge: Concealed pin hinge or continuous hinge set to open to approximately 100 degrees.
- C. Finish: Factory-applied baked enamel or primer over phosphate treated steel.
- D. Automatic Latches: Direct action knurled knob or turn ring operated; sufficient number to hold door panel in flush, smooth plane when closed. Equip each latch with inside release device.

2.04 FABRICATION

- A. Assemble access doors as integral units complete with all parts and ready for installation. Fabricate units of continuous welded steel construction unless otherwise indicated or specified. Grind welds smooth and flush with adjacent surfaces. Anchorage devices shall be of size and type required to secure access doors to types of supports indicated on the Drawings.
 - 1. Allowable Size Variations: Manufacturer's standard size units that vary slightly from the sizes indicated may be acceptable, subject to the approval of the Director.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the access doors in accordance with the manufacturer's printed installation instructions, except as shown or specified otherwise.
- B. Coordinate access door installation with installation of supporting construction.

- C. Set units accurately in position and securely attach to supports with face panel plumb or level in relation to adjoining finish surface.
- D. Install access doors in location as shown on the drawings or location determine by the Architect.

3.02 ADJUSTING

- A. Adjust hardware and doors for proper operation.

3.03 SCHEDULE

- A. Provide non-fire rated access doors in non-fire rated construction and fire rated access doors in fire rated construction.

END OF SECTION 083113

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.
- B. Division 26 - Electric.

1.02 SUMMARY

- A. Furnish and install new commercial, sectional overhead doors, operators, controls and wiring from individual door operators to door motors as shown on the Contract Drawings.
- B. Wiring and conduits from each overhead door to Radio Room or other remote location are the responsibility of the Electrical Contractor.
- C. Connection to other systems is the responsibility of the Electrical Contractor.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM A924 "Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process".
- C. ASTM A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process".
- D. ANSI/DASMA 102 - "American National Standard Specifications for Sectional Overhead Type Doors".
- E. ANSI/DASMA 105 - "Test Method for Thermal Transmittance and Air Filtration of Garage Doors".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Product Data: Submit product literature specific to the model being submitted, installation, operating and maintenance instructions.
- D. Shop Drawings: Submit shop drawings which show compliance with specified qualities and the way sectional overhead doors fit in with and are fastened to rest of the Work including interface with power systems. Provide shop drawings indicating track details, head and jamb conditions, spring shafts, anchorage, accessories, finish colors, operator mounts, remote operator specifications and other related information. Show door and track clearances with overhead steel floor beams.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Warranty: Submit sample warranty for door section and hardware, insulation delamination, operator, and paint finish.

- G. Door Installer: Submit qualifications of door installer indicating the installer meets the following requirements:
 - 1. Authorized Distributor/Installer.
 - 2. Years of experience.
 - 3. Emergency Service.
 - 4. Travel time to project.
- H. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner in the form of a standard five-year maintenance agreement, starting on the date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options. Owner is under no obligation to accept maintenance proposal and may negotiate any aspect of the agreement.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Door Installer must be an authorized distributor of the manufacturer of the doors and openers with a minimum of five (5) years documented experience, to be assured of accessibility to parts, updated product changes, recalls and warranty claims. Door installer must offer 24/7 emergency service and be located within 60 miles of the project.
- C. Operator manufacturer must be the same manufacturer as door manufacturer to eliminate any questions or problems with warranty claims.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.

1.07 WARRANTY

- A. Warranty: 1-year limited warranty. Component parts to be free from defects in material and workmanship for a period of one year from date of substantial completion. Door shall be free from delamination of the insulation to the skins for ten (10) years from installation date.

PART 2 PRODUCTS

2.01 OVERHEAD DOORS

- A. Doors shall be steel sectional insulated overhead, with lites as shown on the Contract Drawings. **Doors must work within the clearances and head room provided.** Overhead doors shall be as manufactured by:
 - 1. Thermaseal® Series, Model TM300 as manufactured by Raynor Garage Doors, 1101 East River Road, Dixon, IL 61021, Phone 800-472-9667. (Basis of Specification)
 - 2. Thermacore AP, Model 850 as manufactured by Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067, Phone 800-275-3290. (Must meet or exceed all specification requirements)
 - 3. Architect Approved Equivalent 3" thick door.
- B. Door Sections:
 - 1. Doors consisting of sections to be 3" thick roll formed from commercial quality hot dipped galvanized (G40 exterior) steel complying with ASTM A-653. Door sections constructed of

- 26 gauge (exclusive of finish) interior and exterior skins. Lites as shown on the Contract Drawings.
2. Interior and exterior skins to be mechanically interlocked and pressure bonded to an expanded polyurethane foam core with a minimum R-value of 24.54.
 3. Interior and exterior skins to be separated by a continuous dual durometer vinyl extrusion to form an effective thermal break and a complete weather-tight seal along section joint.
 4. Thermal break extrusion to be held in place by means of mechanical interlock.
 5. End stiles to be minimum 16 gauge separated from exterior skin with a thermal break.
 6. Hinge reinforcement strips shall be 20-gauge galvanized steel.
- C. Finish:
1. Exterior door skin pre-coated prior to roll forming with an epoxy primer. Provide two coats baked on polyester finish or Kynar finish as selected by Architect.
 2. Surface Texture: Stucco embossed and pencil groove exterior and interior.
- D. Color:
1. Color to be selected by the Architect from manufacturer's full range of colors.
- E. Weatherstripping:
1. Door to be fully weather-stripped (extreme weather condition type) to reduce air infiltration. Top of door with EPDM rubber sealing strips.
 2. Bottom of door to have flexible U shaped black ribbed EPDM seal encased in extruded aluminum retainer to conform to irregularities in floor. Bottom seal must be encased in aluminum retainer, not screwed into bottom section. Jamb seal to be EPDM rubber blade type attached to track angle mounting with rigid vinyl snap on extrusion.
 3. Weather-stripping to be replaceable without removal of track, angle mounting, or door hardware. . No air leakage shall be detected between section joints when tested in accordance with ASTM E-283.
 4. Provide IECC (International Energy Conservation Code) compliant Overhead Doors.
 - a. Air Infiltration at 25mph: 0.19 cfm/sq.ft.
- F. Tracks:
1. Hot dipped galvanized 12-gauge track per ASTM A-653, 3". Tracks to have graduated seal for weathertight closing.
 2. See Contract Drawings for track profile and heights.
 3. Tracks to be continuous angle mounted and fully adjustable for sealing door to jamb. Continuous angle mount to be not less than 11-gauge steel angle, 2-5/16" x 5" for 3-inch track. Horizontal track to be adequately reinforced with continuous angle.
 4. Hanger Angle: 11-gauge
- G. Track Stops:
1. Provide manufacturers standard stop at the end of the overhead door track.
- H. Hardware:
1. Provide full, heavy duty (11gauge) hinges and brackets made from galvanized steel.
 2. Provide 3" diameter, heavy duty track rollers with ten (10) hardened steel ball bearings.
- I. Spring Counterbalance:
1. Heavy Duty oil tempered wire torsion springs on continuous solid, ball bearing cross header shaft. Galvanized aircraft type lifting cables w/minimum safety factor of 5 to 1. 50,000 Cycle springs for extended spring life.
- J. Windload:
1. Windload to withstand 20 lb. per sq. ft. Deflection of door in horizontal position to be a maximum 1/120th of door width.

K. Glazing:

1. Side Overhead Door: Full View Lites of maximum allowable width consisting of extruded PVC lite frames, color matched to door exterior with thermal break.
2. Front Overhead Door: Match lite size with existing front overhead doors.
3. Glazing: 5/8" insulated, low-E glass.
4. Configuration of Lites as shown on Drawings.

L. Thermal Conductivity:

1. When calculated in accordance with ASTM C-518 the door must test for the following energy values. Minimum R-Value = 24.54 (U Value = 0.040). Insulation must not be manufactured with nor contain chlorofluorocarbons (CFC) which are known to have harmful effects on the earth's ozone layer and the environment.

M. Electric Operators:

1. Operator shall be Raynor Control Hoist Optima, 1/2 HP (continuous), single-phase garage door operators, industrial duty, belt-drive, jackshaft or jackshaft with trolley operator (as required based on available headroom) with manual chain hoist, type-SR-2 wiring, pneumatic safety edge, reversing equipment.
2. Motor; provide continuous duty motor. Motor shall be separate from reduction mechanism for ease of maintenance.
3. Reduction: Furnish V-belt drive from motor to full ball bearing power train with additional reduction by chain and sprockets. All power train shafts shall be a minimum 3/4" diameter.
4. Roller Chain Drive - door shall be driven by roller chain at 6" to 12" per second.
5. Adjustable Friction Clutch shall be provided to protect door and operator if door movement is obstructed.
6. Starter - Reversing Contactor type (Type RGJH). Furnish heavy duty across the line reversing type with mechanical interlock.
7. Limit switches - provide positive chain drive screw type limit switch, enclosed in electrical control box, easily accessible for precision setting. Limit switches will remain in time when emergency chain hoist is used and door is operated manually.
8. Provide auxiliary output module with the capability to integrate with other devices including:
 - a. Dry relay contacts at door limit positions.
 - b. Lamp output contacts.
 - c. Selectable ADA outputs to sound a horn or run a flashing light.
 - d. Multiple relay contact points.
9. Provide Model #300320 RC Operator Pushbuttons - Flush Mounted.

N. Control Wiring:

1. Provide long distance module. Control wiring shall be 24 volts for safety.
2. Three button (open-close-stop) to be installed at each door. Provide SR2 Three button momentary contact on open-close-stop. Open override feature. Open button, photo eye and pneumatic safety edge will reverse door to open position when door is closing. Doors to be equipped with pneumatic safety edge for protection against damage to door on contact of object.
3. Provide additional individual three button (open-close-stop) to be installed in the Radio Room to operate each individual overhead door. provide Model #022150 Operator Pushbuttons - Surface Mounted in the Radio Room.
4. Provide heavy duty through-beam car wash (NEMA 4X rated) photoelectric reversing system for each door to reverse door's downward path if visible beam is broken. Photo-eye to utilize interference reduction technology.
5. Provide and install master control panel to operate all (doors with open-close-stop) from Radio Room. Provide individual switches with pilot lights for each door. Pilot lights to show door closed and door open. Long Wiring Kit to ensure proper voltage for multiple push

- button stations. Provide a brushed stainless-steel bezel with finished edges for installation of the switches in a laminate console.
6. Overload Protection - Provide manual reset for over load protection. All electrical components shall be in NEMA 1 enclosure. Horsepower of Motor to be of manufacturers standards based on the size and weight of the door.
 7. Emergency operation - Supply a chain hoist that may be engaged from the floor for mechanical operation. An electric interlock disconnects power when the chain hoist is engaged.
 8. Magnetic Brake - furnish magnetic solenoid brake for positive stop.
- O. Receivers and Transmitters:
1. Provide individual receivers to operate each overhead door.
 2. Provide four channel, four button transmitters to operate new overhead doors shown on the Drawings. Total quantity of transmitters shall be equal to number of overhead doors plus two (2).

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine existing conditions in Work before installing doors. In the Record Documents, list unsatisfactory conditions and steps taken to correct them.
- B. Correct unsatisfactory conditions before installing doors. Beginning installation shall mean acceptance of related work and corrected existing conditions by installer and Contractor.

3.02 INSTALLATION

- A. General: Install door, track and operating equipment complete with all necessary accessories and hardware according to shop drawings and manufacturer's instructions.
- B. Coordinate with Electrical Contractor to connect door controls and operating devices to other building systems such as power systems.
- C. Select, identify, and locate controls so that safety of users and protection of property and vehicles is ensured.
- D. Provide inserts, anchors, hangers, brackets, moldings, seal strips, and welding as needed to make door assembly secure against air pressure, operating loads and intrusion, and so that air infiltration is held to minimum. Conceal bolt heads so that access cannot be made from outside.
- E. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- F. Completely remove from all components bar codes, visible markings and shipping labels. Clean away all residues from tags and stickers. Clean installed products in accordance with manufacturer's instructions prior to substantial completion.
- G. Lubricate bearings, rollers and sliding parts in accordance with manufacturer's recommendations.
- H. When door assembly is complete and hooked up to other systems test and adjust doors until they operate easily and quietly, maintaining airtightness and water tightness, under all conditions of normal and emergency use. Doors must be in full contact with weather stripping.

- I. Re-adjust doors just prior to substantial completion and after installation of any finished flooring materials.

3.03 DEMONSTRATION AND TRAINING

- A. Upon completion of installation, demonstrate proper operation and maintenance to the Owner.
- B. Verify with Owner the following:
 - 1. All safety devices on every door are functioning as designed.
 - 2. All pushbutton operators and remote operators function as designed.

END OF SECTION 083613

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. Extent and location of each type of Aluminum-Clad Wood Window is indicated on Construction Documents and in schedules. Aluminum-Clad Wood Windows are used in both new construction and existing window replacements
- B. Factory-assembled aluminum-clad wood windows, sub-frame shell system, alternate T sub-sill, glass and glazing, mullions, operable hardware, weather-stripping, insect screen, and standard or specified anchors, trim, attachments and accessories.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 061000 - Rough Carpentry
 - 2. Section 072113 - Board Insulation
 - 3. Section 079200 - Sealants
 - 4. Section 099100 - Painting

1.03 STANDARDS

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36, "Standard Specification for Carbon Structural Steel".
 - 2. ASTM C1036, "Standard Specification for Flat Glass".
 - 3. ASTM C1048, "Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass".
 - 4. ASTM D4216, "Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly (Vinyl Chloride) (CPVC) Building Products Compounds".
 - 5. ASTM E90, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements".
 - 6. ASTM E283, "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen".
 - 7. ASTM E330, "Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference".
 - 8. ASTM E413, "Classification for Rating Sound Insulation".
 - 9. ASTM E547, "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Cyclic Static Air Pressure Difference".
 - 10. ASTM E2190, "Standard Specification for Insulating Glass Unit Performance and Evaluation".
 - 11. ASTM F588, "Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact".
- C. Consumer Product Safety Commission (CPSC):
 - 1. CPSC 16CFR-1201, "Safety Standard for Architectural Glazing Materials".
- D. National Fenestration Rating Council Incorporated (NFRC):
 - 1. ANSI/NFRC 100-2014, "Procedure for Determining Fenestration Products U-factors".

2. ANSI/NFRC 200-2014, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence".
- E. Window and Door Manufacturers Association (WDMA), (formerly National Wood Window & Door Association (NWWDA)):
 1. WDMA I.S. 2, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
 2. WDMA Industry Standard I.S. 4, Industry Standard for Water-Repellent Preservative Non-Pressure Treated for Millwork.
- F. American Architectural Manufacturers Association (AAMA)
 1. AAMA 450 - Voluntary Performance Rating Method for Muller Fenestration Assemblies.
 2. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
 3. AAMA 2605 - Voluntary Specification, Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 4. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
- G. Federal Specifications (FS)
 1. Aluminum mesh, 18 x 16, 0.011-inch wire diameter, black or charcoal color finish; FS RR-W-365, Type VII.
- H. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

1.04 PERFORMANCE REQUIREMENTS - DOUBLE HUNG UNITS AND COMBINED ASSEMBLIES

- A. Window units shall meet Performance Class LC and Grade, Impact-Resistant: PG 50 in accordance with WDMA I.S.-2.
- B. Window unit air leakage, when tested in accordance with ASTM E283 at 1.57 psf. (25mph), must be 0.15 cfm/ft² of frame or less.
- C. No water infiltration when tested in accordance with ASTM E547 under static pressure of 6.0 psf. after 3 cycles of 5 minutes each, with water being applied at a rate of 5 U.S. gallons per square foot per hour.
- D. Window assembly shall withstand positive and negative pressures of 60 psf. acting normal to the plane of the window. Structural tests shall be conducted in accordance with ASTM E330.

1.05 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Shop Drawings: Submit shop drawings for each type of window including information not fully detailed in the manufacturer's standard product data and the following:
 1. Typical unit elevations at 1/2" scale
 2. Half size section details of every typical composite member
 3. Horizontal & Vertical Mullion Details-Field Mullion Details must be detailed and include specific instructions for field personnel. Any requirements for structural mullions must be noted at time of bid and fully detailed on shop drawings. All efforts shall be made to provide factory mulling of separate window units. This may necessitate temporary bracing for shipping and handling.
 4. Anchors

5. Hardware
 6. Operators
 7. Accessories
 8. Glazing Details
 9. Muntin Details
 10. Screening Details
- D. Product Data: Submit manufacturer's product specifications, technical product data, recommendations and standard details for type of aluminum clad window unit required. Include the following information:
1. Fabrication Methods
 2. Finishing
 3. Hardware
 4. Accessories
- E. Certification: Provide certification by the manufacturer showing that window unit(s) complies with requirements where the manufacturer's standard window units have been tested in accordance with specified tests and meet performance requirements specified. Where such testing has not been accomplished, perform required tests through a recognized testing laboratory or agency and provide certified test results.

1.06 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards.
- B. Standards: Requirements for aluminum clad wood windows, terminology and standards of performance and fabrication workmanship are those specified and recommended in AAMA/WDMA/CSA 101/I.S.2/A440-17 and applicable general recommendation published by AAMA, WDMA and CSA.
- C. Single Source Responsibility: Provide aluminum clad wood windows and aluminum framed screen panels produced by a single manufacturer. An equivalent type of window by another manufacturer may be accepted provided that deviations in component dimensions and profiles are minor and do not materially detract from the design concept or required performances as judged solely by the Architect. No deviations in masonry and/or framed opening dimensions will be permitted. No deviations in paint finish or available colors will be permitted.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Protect materials from damage before installation per instructions and in accordance with Section 016000 - Product Requirements.
1. Materials shall be packed, loaded, shipped, unloaded, stored and protected in manner that will avoid abuse, damage, and defacement in accordance with AAMA CW-10.
 2. Remove wrappings and interleaving's that are wet, or which could become wet when unloading materials.
 3. Store inside if possible in a clean, well-drained area free of dust and corrosive fumes.
 4. Stack vertically or on edge so that water cannot accumulate on or within materials. Use nonstaining wood or plastic shims between components to provide water drainage and air circulation.
 5. Cover materials with tarpaulins or plastic hung on frames to provide air circulation and prevent contaminants from contacting aluminum components.

6. Store off ground.
7. Keep water away from stored assemblies.

1.08 WARRANTIES

- A. Window System:
1. Contractor shall warrant for one year the satisfactory performance of the window installation that includes windows, hardware, glass, glazing, screening and anchorage as called for by the specifications and approved shop drawings.
 2. Provide manufacturer's standard warranty for:
 - a. Wood Members: 10 years.
 - b. Aluminum Cladding Structural Performance: Lifetime.
 - c. Exterior Aluminum Finish: Kynar finish 20 years.
 - d. Insulating Glass: 20 years.
 - e. Other Components: 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include the following:
1. Andersen E-Series windows manufactured by Eagle Window & Door; 2045 Kerper Blvd, Dubuque, IA 52001. (Basis of Design and Specification)
 2. Marvin Windows and Door, Ultimate Series, PO Box 100, Warroad, MN 56763, Phone: (888) 537-7828, provided all requirements of Paragraph 1.06 C are complied with, along with all other requirements of this Specification.
 3. Architect Approved Equivalent, provided all requirements of Paragraph 1.06 C are complied with, along with all other requirements of this Specification.

2.02 MATERIALS

- A. Andersen E-Series Aluminum clad double-hung units with transoms. Factory-assembled aluminum-clad wood window with sash installed in the frame. Sash shall pivot between jambs without removal for cleaning.
- B. Aluminum clad double-hung units, transom units and aluminum clad double hung picture units for fixed window units as manufactured by Eagle Window & Door. Factory-assembled aluminum-clad wood window with sash installed in the frame. Sash shall pivot between jambs without removal for cleaning.
1. FRAME: Exterior frame parts shall be clad with premium grade tempered aluminum extrusions, which shall be mitered at the corners and mechanically fastened together with corner locks and stainless-steel screws. Fitted to the aluminum extrusions on the inside are wood members produced from select kiln dried wood, water repellent and preservative treated wood in accordance with WDMA standard IS4. The Pine wood frame members are block mitered, power stapled and sealed at the corners with silicone. The wood frame members shall be clad with an aluminum extrusion. The interior surface shall be suitable for a stained finish. The frame shall be completely assembled with both side jambs equipped with a rigid vinyl jamb liner extrusion. Basic jamb width is 4 9/16". Window stiles shall not exceed 1-1/2" in width. Overall edge of frame to visible glass shall not exceed 3-3/4". Pre-applied extension jambs to be available to accommodate the wall thickness required. In new construction and replacement applications. Masonry clips shall be applied on all four sides of the frame to permit positive anchorage to the building.
 - a. Provide 1 1/16" drywall return on frames.
 2. REPLACEMENT WINDOWS:
 - a. Provide E-Series sub-frame shell system in matching color and finish.

- b. Provide E-Series frame expander and receiver.
 - c. Provide interior jamb extensions (pre-finished to match window finish) as required for proper finishing of existing opening.
 - d. Grout any voids in existing masonry surrounding window openings solid with non-shrink grout.
 - e. Replace any existing wood blocking that is not structurally sound with new pressure treated wood blocking.
3. WINDOWS IN NEW WALL CONSTRUCTION:
- a. Provide alternate "T" sub-sill at each window in matching color and finish.
4. SASH: All exterior sash parts are composed of a one-piece tempered aluminum extrusion, which shall be mitered and fastened at the corners. The aluminum shall be joined to water repellent, preservative treated wood in accordance with WDMA standard IS4. Sliding the aluminum onto the wood shall join it. The wood shall be mortised and tenoned, mechanically fastened at the corners and sealed with silicone.
5. EXTERIOR FINISH:
- a. Exterior finish shall be PVDF finish complying with AAMA 2605-05. Color: To be selected by Architect from manufacturer's standard colors (minimum 50 standard colors).
6. INTERIOR FINISH:
- a. The standard interior finish shall be a factory applied factory stain with polyurethane topcoat (Color: To be selected by Architect from manufacturer's standard stains).
7. INSULATED GLAZING: Sealed insulating glass; glass of thickness recommended by manufacturer for size and application; rated CBA in accordance with ASTM E 774.
- a. Overall Thickness: 5/8 inch.
 - b. All windows shall be covered with a protective film applied to the interior and exterior lites to protect against damage and aid in final cleaning.
 - c. Glass Lite Windows: Inboard and outboard lite annealed, complying with ASTM C 1036 quality Q3.
 - d. Coating Type: Low E-366 Low SHGC, High Performance Low-E4, Titanium Dioxide and Silicone Dioxide hydrophilic low-emissivity coated, with Argon gas glass blend fill and a removable translucent protective film.
 - 1) Low-Emissivity Coating. Three layers of silver Magnetron sputtering vapor deposition (MSVD) type applied to No. 2 surface.
 - 2) Performance at Center of Glass. NFRC validated.
 - (a) Thermal Transmission: U-value of 0.24.
 - (b) Solar Heat Gain Coefficient (SHGC): 0.27.
 - (c) Visible Light Transmittance (Vtc): 66 percent.
 - (d) Ultraviolet Transmittance (Tuv): 5 percent.
 - (e) Krochmann Damage Weighted Fading Function (Tdw): 43 percent.
 - e. Tint: None.
 - f. Additional Features: Provide obscure glass and/or tempered glass where shown on Drawings.
8. WEATHER-STRIPPING: All units shall have a compression bulb weather-strip on the sill and foam weather-strip at the head for maximum resistance to water and air infiltration. The upper and lower sash are sealed with a compression bulb weather-strip at the interlock. The frame shall consist of rigid vinyl jamb liners to create a positive seal between the sash and frame.
9. HARDWARE: The sash shall have locks and lifts (two locks on 3'-0" wide up to but excluding 4'-0", three locks on 4'-0" and wider, two lifts on 3'-0" and wider) factory installed. Provide manufacturer standard locks and lifts. Color to be selected by Architect from manufacturer's standard finishes. Each sash shall have two specially designed; pivot-lock mechanisms which permit each sash to be tilted 90° inward from a bottom pivot and positively held in place for washing. Each sash shall have two spring balances or a block and tackle assembly depending on sash weight. Balances shall be factory installed and

semi-concealed in vertical channels of the jamb liners. Color of balance assemblies to match exterior aluminum color chosen by Architect.

10. SCREENS: Screens shall be 18/16 aluminum screen mesh set in an aluminum frame. The frame shall match the window in color and shall be mitered and secured with corner locks for additional strength. Screens shall be fastened to the window using butterfly clips or plunger pins through the side of the screen frame.
 11. BETWEEN GLASS MUNTINS
 - a. Size 1" (One inch profiled)
 - b. Interior and Exterior color to match exterior aluminum finish color
- C. Aluminum clad double hung picture units with between the glass muntins shall be used for fixed window units that are not transom units.
- D. Provide double hung transom windows with between the glass muntins. Patterns as shown on Contract Drawings. Transom glazing shall match corresponding window glazing.

2.03 TOLERANCES

- A. Windows to accommodate the following opening tolerances:
1. Vertical dimensions between high and low points: plus $\frac{1}{4}$ " or minus 0"
 2. Width dimensions: plus $\frac{1}{4}$ " or minus 0"
 3. Building columns or masonry openings: plus, or minus $\frac{1}{4}$ " from plumb

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface and are in accordance with approved shop drawings.
1. Masonry surfaces shall be dry and free of construction debris.
 2. Wood frame walls shall be dry, clean, sound, well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3-inches (75 mm) of corner.
 3. Coordinate window installation with wall flashings and other built-in components.
- B. Do not install windows until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's recommendations and approved shop drawings to achieve weathertight and freely operating installation.
- B. Maintain alignment with adjacent work. Secure assembly to framed openings, plumb and square, without distortion.
- C. Place foam insulation in shim spaces around unit perimeter to maintain continuity of building thermal barrier.
- D. Use finish nails to apply wood trim and moldings.
- E. Putty all nail and staple holes in wood framing of window. Putty to match color of surrounding wood.
- F. Install sealant and related backing materials at perimeter of assembly to provide weathertight construction.

- G. Leave window units closed and locked.

3.03 ADJUSTING AND CLEANING

- A. After installation, windows and glazing shall be inspected and adjusted. Protect finished installation against damage.
 - 1. Adjust operating sash and hardware to provide a tight fit at contact points and weather-stripping for smooth operation and a weathertight closure. Lubricate hardware and moving parts.
 - 2. Re-adjust at the completion of the project if directed by the Architect.
- B. Clean interior and exterior surfaces immediately after installation. Remove excess glazing and sealants, dirt, and other substances.
 - 1. Final Cleaning of painted finish shall be in accordance with AAMA 610.1.
 - 2. Wash and polish glass on both faces before Substantial Completion. Remove non-permanent labels from glass surfaces.
 - 3. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

3.04 PROTECTION

- A. Protect window units from damage or deterioration until time of Substantial Completion.
- B. Protect windows from field applied CMU sealer overspray.

END OF SECTION 085213

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 01 Specification sections, apply to work of this section.

1.02 SUMMARY

- A. Definition: "Door Hardware" includes items known commercially as finish hardware which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

- B. Extent of finish hardware required is indicated on drawings and in schedules.

- C. Types of finish hardware include, but are not limited to, the following:

1. Butt hinges.
2. Lock cylinders and keys.
3. Lock and latch sets.
4. Exit devices.
5. Closers.
6. Astragal seals.
7. Door trim units.
8. Door stops.
9. Protection plates.
10. Push/Pulls
11. Fire and smoke gasketing.
12. Thresholds.
13. Door sweeps.
14. Weather stripping.
15. Drip strips.

- D. Related Sections: The following Sections contain requirements that relate to this Section.

1. Section 081113 – Hollow Metal Doors and Frames.
2. Section 081429 – Pre-Finished Wood Doors.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Obtain each type of hardware (latch and lock sets, etc.) from a single manufacturer.
- B. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, and who is, or who employs an experienced architectural hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.
- C. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings". The hardware manufacturers are to supply the pre-installation conference as well as post-installation walk thru. This is to ensure proper installation and provide for any adjustments or replacements of hardware as required. Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review required testing, inspecting, and certifying procedures.
- D. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or an approved testing agency for types and sizes of doors required and complies with requirements of door and door frame labels.
- E. Where emergency exit devices are required on fire-rated doors with supplementary marking on doors with labels indicating "Fire Door to be Equipped with Fire Exit Hardware" provide labels on exit devices indicating "Fire Exit Hardware".
- F. This Supplier shall be responsible to review the specified hardware and report any discrepancy or omission of components parts needed to complete the intent and or function of all openings. Any necessary corrections or changes shall be brought to the attention of the Architect before ordering of any material. Should any discrepancy arise after submission of shop drawings the supplier shall be responsible for supplying the correct products to complete the project at no additional cost to the Owner.

1.04 REGULATORY REQUIREMENTS

- A. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibilities Guidelines for Buildings and Facilities (ADAAG)". ANSI A1171.1, FED-STD-795, "Uniform Federal Accessibility Standards".

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for each item of hardware in accordance with Division 01 section "Submittals". Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finish.
- B. Hardware Schedule: Submit final hardware schedule in a vertical format as recognized by the Door and Hardware Institute (DHI). Horizontal schedule format will not be accepted. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Index to include location of hardware set cross-referenced to indications on drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, codes, etc., contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
 - i. Wiring diagrams with theory of operation, if applicable.

- C. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- D. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- E. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm the adequate provisions are made for proper location, coordination and installation of hardware.

1.06 PRODUCT HANDLING

- A. Tag each item or package separately, with identification related to find hardware schedule, and include basic installation instructions with each item or package.
- B. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
- D. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

PART 2 PRODUCTS

2.01 SCHEDULED HARDWARE

- A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated in the Finish Hardware Data Sheet and Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following:

1.	Hinges:	Ives
2.	Locksets:	Schlage
3.	Cylinders:	Schlage–Everest Primus (Ext.), Everest (Int.)
4.	Stops:	Ives
5.	Closers:	LCN
6.	Thresholds:	National Guard
7.	Weather Strip:	National Guard
8.	Kickplates:	Ives
9.	Panic Devices:	Von Duprin
10.	Push/Pulls	Ives
11.	Flush Bolts:	Ives
12.	Silencers:	Ives
13.	Miscellaneous Hardware:	Ives, Glyn-Johnson, National Guard

2.02 MATERIALS AND FABRICATION

H2M architects + engineers
Village of Mount Kisco-Additions/Alterations at
Mutual Fire Station

DOOR HARDWARE
087100-3

- A. General:
1. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
 2. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in connection with required UL labels and as otherwise acceptable to Architect.
 3. Manufacturer's identification will be permitted on rim of lock cylinders only.
 4. Finish: All hardware finish shall match US26D unless otherwise indicated. Closer bodies, covers, and arms shall be powder coated finish.
 5. Lockset Design: Lever handle design shall Sparta as manufactured by Schlage Lock Co. or Architect approved equivalent.
 6. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
 7. Furnish screws for installation, with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
 8. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru bolt or use sex screw fasteners.
 9. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

2.03 HINGES AND BUTTS

- A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template produced units.
- B. Screws: Furnish Phillips flat head or machine screws for installation of units, except furnish Phillips flat head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
1. Steel Hinges: Steel pins.
 2. Non-ferrous Hinges: Stainless steel pins.
 3. Exterior Doors: Non removable pins.
 4. Interior Doors: Non-rising pins.
 5. Tips: Flat button and matching plug, finished to match leaves.
 6. Number of hinges: Provide number of hinges indicated.
- D. Acceptable Manufacturers:
1. Ives
 2. Stanley
 3. Hagar

2.04 LOCK CYLINDERS AND KEYING

- A. Review the keying system with the Owner and provide the type required (master, grandmaster or great grandmaster), in a new system.
- B. Furnish Schlage Patented Security Everest Primus or Architect approved equivalent interchangeable core cylinders at all exterior doors and Schlage Everest Patented Keyway, or Architect approved equivalent interchangeable core cylinders for all interior doors unless specified otherwise, keyed as directed by the Owner.
- C. Furnish temporary keyed cores for the construction period and remove these when directed. The construction cores remain property of the supplier and shall be returned to the supplier when they are removed. Contractor shall install the permanent cores in the presence of the Owner's representative.
- D. Metals: Construct lock cylinder parts from brass/bronze, stainless steel or nickel silver.
- E. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
- F. Permanently inscribe each key and cylinder with Visual Key Control that identifies cylinder manufacturer key symbol and inscribe key with the notation "DO NOT DUPLICATE".
- G. Key Material: Provide keys of nickel silver only.
- H. Key Quantity:
 - 1. Furnish two (2) change keys for each lock.
 - 2. Five (5) keys for each master system.
 - 3. Three (3) Control Keys.
 - 4. Six (6) Construction master keys.
- I. Deliver keys as directed by the Owner.

2.05 LOCKS, LATCHES AND BOLTS

- A. Locks shall meet these certifications:
 - 1. Cylindrical Locks – ANSI A156.2 Series 4000, Grade 1 Strength and Operational requirements. Meets A117.1 Accessibility Codes. Latch bolts shall be steel with minimum 1/2" throw, deadlocking on keyed and exterior functions. 3/4" throw anti-friction latch bolt on pairs of fire doors. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame. Locksets to be tested to a minimum 2,000,000 cycles. Lock case shall be steel. Provide 5/8" minimum throw of latch and deadbolt used on pairs of doors. Provide Seven-Year Warranty.
- B. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
- C. Lock Manufacturers: Subject to compliance with requirements, provide lockset products of the following approved manufacturers:
 - 1. Sargent Lock Co. "10 Line".
 - 2. Corbin Russwin "CL3300 Series".

3. Yale Lock Co. "5400 Series".
 4. Schlage Lock Co. "ND Series".
- D. Flush Bolt Heads: Minimum of ½" diameter rods of brass, bronze or stainless steel, with minimum 12" long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" height.
- E. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.

2.06 CLOSERS AND DOOR CONTROL DEVICES

- A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.
- B. Closers: All door closers shall be of one manufacturer to provide for proper installation and servicing after installation. Closer shall carry a manufacturer's TEN YEAR WARRANTY for hydraulic units.
- C. Cylinder: Shall be of high strength cast iron construction. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified independent testing laboratory.
- D. All exterior door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 5/8" and piston diameter of 1-7/16".
- E. Parallel Arm Closer: Shall incorporate one-piece solid forged steel arms with bronze bushings, 1-9/16" x ½" steel stud shoulder bolts, shall be incorporated in parallel arms, arms with stop built in and arms with hold open and stop built in. All other closers to have forged steel main arms for strength and durability.
- F. Built In Stops: Where closers with built in positive stops are used, the stops shall be of one piece cast malleable iron material. Where field reversible arms are provided, one-piece screw applied stops are permitted. Where required, the hold open assembly handle for these stops shall rotate on ball bearings.
- G. All door closers shall pass UL10C positive pressure fire test.
- H. Non sized: All exterior closers shall be non-sized to provide a full range of Size 1 to 5 closing power.
- I. Hydraulic Fluid: All closers, except for interior electronic closers, shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees F to -30 degrees F without requiring seasonal adjustment of closer speed to properly close the door.
- J. All closers shall have a powder coat finish on closer body, arm, cover and adapter plate. If powder coat finish is not available, pre-treat closer body, arm, cover and adapter plate with special rust inhibiting coating before painted finish is applied.
- K. All closers shall have metal covers.
- L. Provide all drop plates, shoe supports, templates, etc. to properly mount closers according to manufacturers' recommendations.

- M. Closers that incorporate Pressure Relief Valve technology (PRV) will not be accepted.
- N. Closer Manufacturers: Subject to compliance with requirements, provide closer products of the following approved manufactures:
 - 1. Norton "7500 Series".
 - 2. Sargent "350 Series".
 - 3. Yale "400 Series".
 - 4. LCN Closers "1460 Series".

2.07 EXIT DEVICES

- A. General: All devices and mullions shall be of one manufacturer to provide for proper installation and servicing. Devices shall be furnished non-handed and capable of direct field conversion for all available trim functions. All devices shall carry a three-year warranty against manufacturing defects and workmanship.
- B. Devices shall be push through type touch pad design with a straight or horizontal motion to eliminate pinch points. The angular motion type pad with end cavity exposed when depressed is unacceptable. Latch bolt shall have a self-lubricating coating which reduces friction and wear. Plated latch bolts are unacceptable. Device housing shall be heavy duty extruded aluminum.
- C. Mechanism Case or Housing: Shall have an average minimum thickness of .140" aluminum and shall have the adaptability to convert from standard hex key dogging to a high security cylinder dog operation in the field. No exposed screws shall be seen from the back side (pull side) of the device. End cap shall be cast metal or forged aluminum which are flush with mechanism case and have no protruding edges. They shall be tapered in design and have a minimum thickness of .125". Plastic or metal stamping will not be acceptable. Housing shall be made of extruded aluminum.
- D. Springs: Only minimum (1/16") diameter compression springs are acceptable. All internal parts shall be zinc dichromate coated to prevent rusting.
- E. Quiet Feature: All devices shall incorporate a hydraulic sound damper to which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation.
- F. Touch Pad: Shall be architectural metal with a minimum height of 2 3/16". Plastic is not acceptable.
- G. Outside Trim: Shall be heavy duty type and fastened by means of concealed welded lugs and thru bolts from the inside. Lever trim shall be forged brass with a minimum average thickness on the escutcheon of .130. Plate with pull shall be minimum average thickness of .090 and have forged pulls.
- H. All devices with US26D finish to have stainless steel touch bars with US26D trim.
- I. All floor strikes on interior vertical rod panic devices to be similar to Von Duprin 385A.
- J. Provide all shim kits and filler plates to allow flush mounting of exit devices on all types of doors used in this project.

- K. Provide maintenance kit Von Duprin #050046 or equivalent from approved exit device manufacturer to Owner at closeout of project.
- L. Exit Device shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified independent testing laboratory. A written certification showing successful completion of a minimum of 1,000,000 cycles must be provided by the independent testing laboratory.
- M. Exit Device Manufacturers: Subject to compliance with requirements, provide products of the following approved manufacturers:
 - 2. Von Duprin – “99 Series”.
 - 3. Sargent Exit Devices – “8000 Series”.
 - 4. Corbin Russwin – “ED4000 and ED5000 Series”.

2.08 DOOR TRIM UNITS

- A. Fasteners: Provide manufacturer’s standard exposed fasteners for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units), either machine screws or self-tapping screws.
- B. Fabricate edge trim of stainless steel, not more than 1/2” nor less than 1/16” smaller in length than door dimension.
- C. Fabricate protection plates (armor, kick or mop) not more than 1 1/2” less than door width on stop side and not more than 1/2” less than door width on pull side, x the height indicated.
- D. Metal Plates: Stainless steel, .050” (U.S. 18 ga.).

2.09 WEATHERSTRIP

- A. General: Provide weatherstripping as scheduled. Provide type, sizes and profiles of door sweeps as shown or scheduled. Provide noncorrosive fasteners as recommended by manufacturer for application indicated.
 - 1. Kerf type continuous weatherstripping shall be supplied as an integral part of door frame, where scheduled.
- B. Replaceable Seal Strips: Provide only those units where nylon brush strip is easily replaceable and readily available from stocks maintained by manufacturer.
- C. Acceptable Manufacturers:
 - 1. National Guard
 - 2. Reese

2.10 THRESHOLDS

General: Except as otherwise indicated, provide standard aluminum threshold unit of type, size and profile as shown or scheduled.

- A. Provide thermally broken thresholds with vinyl foot seals at all exterior doors.
- B. Provide thermal break bumper seal threshold at roof access door.

- C. Where multi-piece thresholds are specified provide aluminum spline connectors between sections for field assembly. Provide with optional slip resistant SIA finish. Each individual section shall be securely fastened to concrete substrate with countersunk stainless steel expansion anchors.
- D. Acceptable manufactures:
1. National Guard Products, Inc.
 2. Reese

2.11 DOOR SILENCERS

- A. All interior hollow metal frames shall have gray resilient type silencers unless frame is scheduled to receive fire and smoke seals or Kerf weatherstripping. Quantity (3) on single doors and quantity (2) on pair of doors.

2.12 MISCELLANEOUS HARDWARE

- A. In existing frames provide blank filler plates at unused hardware preps such as hinged recesses, strike recesses, etc.
- B. Bondo any unused drill holes, hardware recesses, etc. not being used with new hardware. Grind bonbo smooth, prime and finish paint.

PART 3 EXECUTION

3.01 HARDWARE SCHEDULE

HW SET: 01

3	EA	HINGE	5BB1HW 4.5X4.5 NRP	630	IVE
1	EA	PANIC DEVICE	CD 996L-992L-17	626	VON
1	EA	STRIKE	299	626	VON
2	EA	CYLINDER	RIM OR MORTISE AS REQUIRED	626	SCH
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	DOOR SWEEP	C627A	AL	NGP
1	SET	SEALS	137 SA	AL	NGP
1	EA	THRESHOLD	8427 Door 114A & 118	AL	NGP
1	EA	THRESHOLD	513 Door 114		
1	EA	KICKPLATE	8400 10"	630	IVE
1	EA	DRIP STRIP	16A	AL	NGP

HW SET: 02

3	EA	HINGE	5BB1 HW 4.5X4.5	652	IVE
1	EA	PANIC HARDWARE	99L-992L-BE-17	626	VON
1	EA	STRIKE	299	626	VON
1	EA	CYLINDER	RIM OR MORTISE AS REQUIRED	626	SCH
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	KERF WEATHERSTRIP	284 Q		NGP
1	EA	WALL STOP	WS 407 CVX	630	IVE
1	EA	THRESHOLD	513	AL	NGP

SECTION 087100 – DOOR HARDWARE

H2M

1	EA	KICKPLATE	8400 10"	630	IVE
---	----	-----------	----------	-----	-----

HW SET: 03

1	EA	HINGE	5BB1HW 4.5X4.5	652	IVE
1	EA	PANIC HARDWARE	99L-F-992L-BE-17	626	VON
1	EA	STRIKE	299F	626	VON
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	WALL STOP	WS 407 CVX	630	IVE
1	SET	FIRE AND SMOKE SEAL	9850B	BRN	NGP
1	EA	KICK PLATE	8400 10"	630	IVE

HW SET: 04

3	EA	HINGE	5BB1 4.5X4.5	652	IVE
1	EA	STOREROOM LOCK	ND 80 RD SPA	626	SCH
1	EA	WALL STOP	WS 407 CVX	630	IVE
3	EA	SILENCERS	SR 64	GRY	IVE

HW SET: 05

3	EA	HINGE	5BB1 4.5X4.5	652	IVE
1	EA	PASSAGE SET	ND 10S SPA	626	SCH
1	EA	KICK PLATE	8400 10"	630	IVE
1	EA	WALL STOP	WS 407 CCV	630	IVE
3	EA	SILENCERS	SR 64	GRY	IVE

HW SET: 06

3	EA	HINGE	5BB1HW 4.5X4.5	652	IVE
1	EA	CLASSROOM LOCK	D 70 PD SPA	626	SCH
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	KICKPLATE	8400 10"	630	IVE
1	EA	WALL STOP	WS 407 CVX	630	IVE
3	EA	SILENCERS	SR 64	GRY	IVE

HW SET: 07

3	EA	HINGE	5BB1 4.5X4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	4031 REG	689	LCN
1	EA	KICK PLATE	8400 10"	630	IVE
1	EA	WALL STOP	WS 407 CVX	630	IVE
3	EA	SILENCERS	SR 64	GRY	IVE

HW SET: 08

3	EA	HINGE	5BB1HW 4.5X4.5 NRP	630	IVE
1	EA	STORE LOCK	ND 66 PD SPA	626	SCH
1	SET	SEALS	137SA	AL	NGP
1	EA	KICK PLATE	8400 10"	630	IVE
1	EA	MANUAL WALL HOLDER	WS445	628	IVE
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	BUMPER SEAL	8435 (Verify in Field depth)	AL	NGP

		THRESHOLD	required)		
1	EA	DRIP STRIP	16A	AL	NGP

HW SET: 09

6	EA	HINGE	5BB1 4.5X4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8305-6 4" X 16"	630	IVE
2	EA	SURFACE CLOSER	4111 CUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
2	EA	SILENCERS	SR64	GRY	IVE

HW SET: 10

3	EA	SPRING HINGE	3029-6X4.5 DOUBLE ACTING	652	BOMMER
2	EA	PUSH PLATE	8200 4" X 16"	630	IVE
2	EA	KICK PLATE	8400 10"	630	IVE

HW SET: 11

3	EA	HINGE	5BB1 4.5X4.5	630	IVE
1	EA	DEAD BOLT	B764T (Key operation inside/blank plate outside)	626	SCH
1	SET	SEALS (PERIMETER)	137SA	AL	NGP
1	EA	MANUAL WALL HOLDER	WS445	628	IVE
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	BUMPER SEAL THRESHOLD	8435 (Verify in Field depth required—Bumper on exterior side)	AL	NGP

HW SET: 12 OPENINGS BETWEEN ADDITION AND EXISTING STATION

1	EA	THRESHOLD	327 X 355 X 355 X 327	AL	NGP
---	----	-----------	-----------------------	----	-----

3.02 INSTALLATION

- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division 09 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

- D. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set all aluminum thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant.

3.03 ADJUST AND CLEAN

- A. Check and adjust each operating item of hardware and each door to insure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and readjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items that have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Window Units. (Refer to Window Specification)
 - 2. Exterior Doors, Transoms and Side Lites.
 - 3. Interior Doors.
 - 4. Overhead Door Lites
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 081113 - Hollow Metal Doors and Frames
 - 2. Section 081429 - Prefinished Wood Doors
 - 3. Section 083613 - Sectional Overhead Doors
 - 4. Section 085213 - Aluminum Clad Wood Windows
 - 5. Section 088300 - Mirrors

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations. Refer to the below referenced publications (latest edition) for glazing terms not otherwise defined in this section.
- B. AAMA A804.1 "Voluntary Specification for Ductile Back-Bedding Compound" (mandatory).
- C. AAMA A807.1 "Voluntary Specification for Oil-Extended Cured Rubber Back-Bedding Glazing Tapes" (mandatory).
- D. ANSI Z97.1 "American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test".
- E. ASTM C162 "Standard Terminology of Glass and Glass Products".
- F. ASTM C509 "Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material".
- G. ASTM C864 "Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers".
- H. ASTM C920 "Standard Specification for Elastomeric Joint Sealants".
- I. ASTM C1036 "Standard Specification for Flat Glass".
- J. ASTM C1048 "Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass".
- K. ASTM C1172 "Standard Specification for Laminated Architectural Flat Glass".
- L. ASTM E1300 "Standard Practice for Determining Load Resistance of Glass in Buildings".

- M. CPSC "16CFR1201, Safety Standard for Architectural Glazing Materials".
- N. FGMA (Flat Glass Manufacturers Association) "Glazing Manual".
- O. AAMA Recommendations and Guidelines.
- P. NFRC (National Fenestration Rating Council) 100 "Procedure for Determining Fenestration Product U-Factors"
- Q. NFRC 200 "Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence".
- R. NFRC 300 "Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems".

1.04 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C1036.
- C. Interspace: Space between lites of an insulating-glass unit.
- D. Sealed Insulating Glass Unit Surface Designations:
 - 1. Surface #1 - Exterior surface of the outer glass lite.
 - 2. Surface #2 - Interspace surface of the outer glass lite.
 - 3. Surface #3 - Interspace surface of the inner glass lite.
 - 4. Surface #4 - Interior surface of the inner glass lite or the interlayer surface of the first layer of laminated glass.
 - 5. Surface #5 - Interlayer surface of the second layer of laminated glass.
 - 6. Surface #6 - Interior surface of the second layer of laminated glass.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E1300 by a qualified professional engineer licensed in the State of the project, using the following design criteria:
 - 1. Design Wind Pressure: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Contract Drawings.
 - a. Wind Design Data: As indicated on Contract Drawings.
 - b. Basic Wind Speed : 120 mph.
 - c. Importance Factor: III.
 - d. Seismic Zone: As indicated on Contract Drawings.
 - 2. Design Snow Loads: As indicated on Contract Drawings.
 - 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or one (1) inch, whichever is less.
 - 4. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure, based on glass type factors for short duration load.

5. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of glass.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 1. Temperature Change: 120 degree F, ambient; 180 degree F, material surfaces.
 2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

1.06 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Product data: Description of each type of glass, glazing product, and accessory product.
- D. Samples: Provide 12" x 12" samples of all tinted glass and other glass only if requested by Architect.
- E. Product Certificates:
 1. Statement that wired glass provided for fire rated doors meets labeling or certification requirements of public authorities.
 2. Statement that the extent of tempered glass meets requirements of public authorities.
- F. Maintenance data for glass and other glazing materials to be included in Operating and Maintenance Manual specified in Division 01 including GANA Mirror Information Bulletin entitled *Proper Procedures for Cleaning Flat Glass Mirrors*.

1.07 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.
- B. Qualifications of installer: Provide glazing work by an installer who has installed the specified products for at least 2 years.
- C. Single-Source Responsibility for Glass and Glazing Accessories: Obtain glass and accessories from one source for each product indicated.
- D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
 1. Insulating Glass Certification Council (IGCC).
 2. Associated Laboratories, Inc. (ALI).
 3. National Certified Testing Laboratories (NCTL).
- E. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
 1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- F. Fire-Protection Rated Glazing Labeling: Permanently mark fire-protection rated glazing with certification label of testing agency acceptable to authorities having jurisdiction. Label shall indicate the following:

1. Manufacturer
2. Test Standard
3. Whether glazing is for use in fire doors
4. Hose-stream test
5. Temperature rise rating
6. Fire -resistance rating in minutes

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Package, handle, and store glass and mirrors so that water does not touch or condense on glass surfaces or mirror edges.
- D. Protect glass edges against chipping and other damage. Protect coated glass surfaces from abrasion and scratching.
- E. Store glass and glazing products in controlled environment, out of sunlight, so that temperature does not go above 80° F. Bring glazing materials to at least 40° F, or higher temperature if recommended by producer, before installing.
- F. Furnish labels identifying each type of glass. Keep labels in place until glass is installed.

1.09 WARRANTY

- A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.
 1. Warranty Period: Manufacturer's standard, but not less than ten (10) years after date of Substantial Completion.
- C. Manufacturer's Warranty on Coated Glass Products: Submit written warranty signed by manufacturer of coated glass agreeing to furnish replacements for those coated glass units that deteriorate as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.
 1. Warranty Period: Manufacturer's standard, but not less than ten (10) years after date of Substantial Completion.
- D. Manufacturer's Warranty on Laminated Glass: Submit written warranty signed by manufacturer of laminated glass agreeing to furnish replacements for those laminated glass units that deteriorate within specified warranty period. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard. Warranty covers only deterioration due to normal

conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard, but not less than ten (10) years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 GLAZING PERFORMANCE REQUIREMENTS

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with Performance Requirements. Where fully tempered glass is indicated or required, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed in Btu/sq.ft. x h x deg F (W/sq. m x K).
 5. Solar Heat Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.02 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C1048; Type 1; Quality-Q3; Class 1 (clear) unless otherwise indicated; of kind and condition indicated.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. For uncoated glass, comply with requirements for Condition A.
 3. For coated vision glass, comply with requirements for Condition C (other coated glass).
- B. Pyrolytic-Coated, Self-Cleaning, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
 1. Products: Subject to compliance requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cardinal Glass Industries: Neat™
 - b. Pilkington North America Activ™
 - c. PPG Industries, Inc.: SunClean®
- C. Tinted Float Glass: Class 2, complying with other requirements specified.
 1. Basis of Design Product: Subject to compliance with requirements, provide Solargray by PPG Industries or comparable product by one of the following:
 - a. Guardian Industries
 - b. Oldcastle BuildingEnvelope®
 2. Tint Color: Optigray

3. Visible Light Transmittance: 76 for Clear glazing and 54 for Gray Tinted glazing percent minimum.
- D. Spandrel Glass: ICD OPACI-COAT-300 Silicone Opacifier coating: ASTM C1048, Kind FT, Condition B, Type 1, Quality-Q3, and complying with other requirements specified.
 1. Basis of Design Product: Subject to compliance with requirements, provide Vitro Architectural Glass or comparable product by one of the following:
 2. Guardian Glass Products
 3. Pilkington North America
 4. Spandrel Coating Color: As selected by Architect.
- E. Ceramic-Coated Spandrel Glass (Frit Glass): ASTM C1048, Kind FT, Condition B, Type 1, Quality-Q3, and complying with other requirements specified.
 1. Basis of Design Product: Subject to compliance with requirements, provide Oldcastle BuildingEnvelope® Ceramic Frit Glass or Architect approved equivalent.
 2. Tint Color:
 3. Ceramic Coating Color:

2.03 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172, and complying with testing requirements in 16 CFR 1201 for Category 11 materials, and with other requirements specified. Use materials that have proven record of no tendency to bubble, discolor, or loose physical and mechanical properties after fabrication and installation.
 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements
 3. Interlayer Color: Clear unless otherwise indicated.
- B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.04 INSULATING GLASS

- A. Insulating-Glass Units: Factory assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.
 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 2. Spacer: Manufacturer's standard aluminum spacer material and construction.
 3. Desiccant: Molecular sieve or silica gel, or blend of both.
 4. Interspace Content: Argon

2.05 FIRE-PROTECTION-RATED GLAZING

- A. A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fire rated glass products that may be incorporated in the Work include, but are not limited to, the following:
 1. SAFTI FIRST, 100 N. Hill Dr., Suite 12, Brisbane, CA 94005. Phone: 888-653-3333 (Basis of Specification).
 2. Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 Phone: 800-426-0279.
 3. Architect Approved Equivalent.
- B. Material:
 1. SuperClear 45-HS-LI 45 minute fire and safety rated glazing.

2. GP Firelite Plus®
- C. Design Requirements:
1. Thickness: $\frac{3}{4}$ " standard.
 2. Weight: 9 lbs./sq.ft.
 3. Sound Transmission Rating: Must meet 37 STC/35 OITC in standard hollow metal frames. Glass and frame must be tested as an assembly. Glass only STC/OITC values are not acceptable.
 4. Appearance: clear, wireless and tint-free.
 5. Visual Light Transmission: Must meet 90% VLT for low-iron.
 6. Fire Rating: 45 minutes with hose stream.
 7. Impact Safety Resistance: Must meet CPSC 16 CFR 1201 Category I and II, ANSI Z91.1 Class A and B and CAN/CGSB 12.1 Class A and B.
- D. Manufacturer's Fire Rated Glazing Material:
1. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory, fire rating period and safety glazing standards.
 2. Glazing material installed in Hazardous Locations, subject to human impact, shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80:
 - a. CPSC 16 CFR 1201, Cat. I or II.

2.06 DECALS

- A. Description: Self-adhering acrylic or polyester sheet material with silk screened logo or lettering in one-color design as directed by Architect.
1. Size: Per Code.

2.07 GLAZING MATERIALS

- A. Description: Provide glazing materials that are compatible with one another and with materials of glazing channel as well as with any sealants or interlayers in the glass units.
1. Product quality assurance: Confirm compatibility of all products used or encountered in executing the work of this Section. Test as necessary to assure short and long term performance of frames, glazing materials, and glass without loss of seal, gassing, staining, discoloration, softening, deterioration, racking, breaking, or leaking.
 2. Color: Provide glazing materials, which match color of glazing channel. If color match is not available, submit color samples to Architect for color selection.

2.08 GLAZING TAPES

- A. Description: 100% solids, extruded, non-staining butyl-isobutylene tape. Provide hard spacer rod for use in lights over 80 united in.
- B. Standards:
1. AAMA A804.1, for normal use.
 2. AAMA A807.1, for use where much thermal movement is anticipated.

2.09 GLAZING GASKETS

- A. Description: Chloroprene (neoprene), EPDM, or Silicone compression gaskets in a soft and a dense formulation for the two sides of the glass. Select soft gasket to compress 25 to 40% when glass and dense gasket are in place.

1. Where small lites (as in doors) can be glazed with a continuous preformed elastomeric glazing extrusion, use a gasket of the dense formulation, compressed to watertightness outside and inside, with either a bent joint or a tightly compressed cut joint at corners.
- B. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 1. Neoprene complying with ASTM C864.
 2. EPDM complying with ASTM C864.
 3. Silicone complying with with ASTM C1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C1115.
- C. Soft Compression Gaskets: Extruded or molded, closed cell, integral-skinned neoprene EPDM gaskets complying with ASTM C509, Type II, black; of profile and hardness required to maintain watertight seal.
 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side o glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.10 GLAZING ACCESSORIES

- A. Setting blocks, edge blocks, spacers, and gaskets: Chloroprene (neoprene), EPDM, or silicone: ASTM C864.
 1. Hardness of setting blocks: Sufficient to compress no more than 20% under weight of glass.
- B. Cleaners, solvents: As recommended by glazing material producer for each type of glass, glazing material, and substrate.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine frames and other construction, which supports or underlies glazing work. Where frames are out of square, out of plane, subject to excessive deflection, or where substrates contain bond breaking substances, moisture, unsound material, or where there are other conditions unsuitable for proper installation or performance of the glazing work, do not start glazing work until defective earlier construction has been completed or corrected.
- B. For exterior glazing, do not start glazing until each lite is provided with 2 or more weepholes, not more than 3 ft o.c.
- C. Remove dust and other bond breaking substances from surfaces to be glazed. Do not glaze wet, damp, or uncured surfaces.

3.02 INSTALLATION

- A. Installation includes such work as surface preparation, priming, cleaning, protecting, and repairing or replacing defective and damaged work.
- B. Provide safety glass in lites where required by 16CFR1201 and public authorities, and at other locations as specified herein.
- C. Install glazing according to FGMA Glazing Manual.
- D. Orient glass so that wave and other distortions run horizontally.

- E. Install glass and glazing materials only when the temperatures of air, materials, and substrate are above 40 F. If air temperature is below 40 F, protect the and bring glazing materials to temperature recommended by producer.
- F. Install wired glass in fire rated door vision lites and fire rated windows using sealant approved by the fire rating agency for use with the tested assembly.
- G. Mount mirrors using clip fasteners in such a way that the mirror is a plane, without distortion of image, and so that at least 3/16 in. is left for air circulation behind mirror. Apply adhesives in a straight line with beads running vertically to allow proper air flow. Keep backs and edges of mirrors free of water. Clean and polish mirrors by methods that will not harm surface or backing.
- H. At fixed lites which extend within 18 in. of floor, place permanent decals 54 in. off floor, 24 in. o.c. maximum, but not closer than 12 in. edge-to-edge. At doors with lites which extend within 18 in. of floor, place one decal 54 in. off floor, in center of lite width.

3.03 PROTECTION

- A. Identify glazed areas by hanging narrow streamers from walls and mullions. Do not mark glass nor affix decals to glass.
- B. Clean installed glass frequently during construction. Do not place other materials in contact with glass nor in such a way as to create a heat trap.
- C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.
- D. Wash glass on both faces in each area of project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.04 GLAZING SCHEDULE EXTERIOR

- A. Hollow Metal Entrance Doors
 - 1. 1" Lo E3 366 insulated glass.
 - 2. Temper: all lites.
 - 3. Provide between the glass muntins only on doors indicated in elevations. Color and profile to match window muntins.
 - 4. Color:
 - a. Interior glazing: Clear
 - b. Exterior Glazing: Clear
 - 5. Type: Plain
 - 6. Glazing method: Tape or gasket for lites smaller than 5 sq. ft.
- B. Overhead Door Vision Lites
 - 1. 5/8" or 3/4" Lo E3 366 insulated glass. Coordinate with door manufacturer for maximum thickness.
 - 2. Temper: all lites
 - 3. Color:
 - a. Interior glazing: Clear
 - b. Exterior glazing: Clear
 - 4. Type: Plain
 - 5. Glazing method: Gasket

3.05 GLAZING SCHEDULE INTERIOR

- A. Fire Rated Doors
 - 1. Thickness: 3/4"
 - 2. Color: Clear
 - 3. Type: Fire-Protection-Rated Glazing
 - 4. Glazing Method: Fire rated gasket
- B. Other Interior Doors
 - 1. Thickness: 1/4"
 - 2. Color: Clear
 - 3. Type: Temper all lites
 - 4. Glazing Method: Tape or gasket perimeters.

END OF SECTION 088000

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes:
 - 1. Unframed glass mirrors.
 - 2. Framed glass mirrors.
- B. Related Sections:
 - 1. Section 079200 – Joint Sealants
 - 2. Section 092116 – Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. ASTM C1503 – “Standard Specification for Silvered Flat Glass Mirror”.
- B. GANA (TIPS) – Mirrors: Handle with Extreme Care (Tips for the Professional on the Care and Handling of Mirrors); 2011.
- C. GANA (Glass Information Bulletin) – “Proper Procedure for Cleaning Architectural Glass Products”.

1.04 SUBMITTALS

- A. Submit following pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: For the following:
 - 1. Mirrors: Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
 - 2. Mirror mastic.
 - 3. Mirror hardware.
- D. Shop Drawings: Include mirror elevations, sizes, edge details, mirror hardware, and attachment details.
- E. Product Certificates: For each type of mirror and mirror mastic, signed by product manufacturer.
- F. Closeout Submittals:
 - 1. Maintenance Data: Cleaning and care recommendations to include in maintenance manuals.
 - 2. Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed mirror glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in mirror installations with a record of successful in-service performance; and who employs glass

installers for this Project who are certified under NGA's Glazier Certification Program as level 2 (Senior Glaziers) or level 3 (Master Glaziers).

- B. Source Limitations for Mirrors: Obtain mirrors from one source for each type of mirror indicated.
- C. Source Limitations for Mirror Glazing Accessories: Obtain mirror glazing accessories from one source for each type of accessory indicated.
- D. Glazing Publications: Comply with the following published recommendations:
 - 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
 - 2. GANA Mirror Division's "Mirrors Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- E. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate as defined in "Definitions" Article, F.O.B. the nearest shipping point to Project site, within specified warranty period indicated below:
 - 1. Warranty Period: Five years from date of Substantial Completion.
 - 2. Deterioration of mirrors is defined as defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

PART 2 – PRODUCTS

2.01 SILVERED FLAT GLASS MIRROR MATERIALS

- A. General Performance: Provide mirrors that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

2.02 MIRRORS

- A. Description: Float glass with 4-layer reflective coating system on back, consisting of chemically deposited silver, electrically or chemically deposited copper, a paint coat, and a protective organic coating. Cut mirrors to size after coating. Treat and seal mirror edges in shop immediately after cutting to final size.
1. Thickness: 6.4 mm, or 1/4 in. nominal.
 2. Color: Clear.
 3. Tempering: Fully temper mirrors in locations required by 16CFR1201 and public authorities. Otherwise, provide non-tempered mirror glass.
 4. Glass Quality: Mirror.
 5. Beveling: None.
 6. Protective organic coating: Heavy duty coating such as Poly-Glaze protective coating or Architect approved equivalent.
 7. Edge treatment: Rounded polished. Treat and seal to prevent moisture, chemical, and atmospheric penetration of backing.
- B. Standard:
1. Glass, ASTM C1036, Type I, Glass 1.
 2. Tempering: ASTM C1048, Kind FT, Condition A, Type I, Class 1 or 2, Quality q3.
 3. Safety glass: Pass ANSI Z97.1.
- C. Accessories:
1. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
 2. Mirror Adhesive: Neutral cure chemically compatible with mirror coating and will substrate.
 - a. Product produced specifically for setting mirrors.
 - b. Product certified by mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors are installed.
 - c. Manufacturers:
 - 1) Gunther Mirror Mastics.
 - 2) Palmer Products Corporation.
 - 3) Bohle America Inc.
 3. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - a. Bottom Trim: J-channels formed with front let and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch. Provide weep holes in bottom J-channel. Provide 3mm neoprene setting pad between the mirror and molding.
 - b. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch. Provide 3mm neoprene setting pad between the mirror and molding.
 - c. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Bottom Trim:
 - (a) Sommer & Maca Industries, Inc.' Heavy Gauge Aluminum Shallow Nose "J" Molding Lower Bar.
 - (b) C.R. Laurence Co.
 - (c) Stylmark; J-Molding Lower Bar.
 - 2) Top Trim:
 - (a) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Molding Lower Bar.
 - (b) C.R. Laurence Co.

- (c) Stylmark; J-Molding Lower Bar.
 - d. Finish: Clear anodized.
- 4. Mirror Hardware:
 - a. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed. For non-metal applications use stainless-steel fasteners.
 - b. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized or stainless steel anchors and inserts for applications on inside face of exterior walls and where indicated.

2.03 FABRICATION

- A. Fabrication, General: Cut mirrors to final sizes and shapes to suit Project conditions. Cut custom mirrors in sizes and configurations indicated on drawings.
- B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Rounded polished edge.
 - 1. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and seating in factory immediately after cutting to final sizes.
- D. Film-Backed Safety Mirrors: Apply film backing with pressure-sensitive adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections. Use adhesives and film backing compatible with mirror backing paint as certified by mirror manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.
 - 1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
 - 2. Proceed with mirror installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.02 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.03 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Provide a minimum air space of 1/8 inch between back of mirrors and mount surface for air circulation between back of mirrors and face of mounting surface.

- C. For wall-mounted mirrors, install mirrors with mastic and mirror hardware.
 - 1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - 2. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
 - 3. Where indicated, install mirror hardware in the form of J-channels that are fabricated in single lengths to fit and cover top and bottom edges of mirrors.
 - 4. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.

3.04 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture form condensation or other sources for continuous periods of time.

END OF SECTION 088300

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Pre-formed moisture suppression membrane installed over new concrete subfloor as a floor covering underlayment.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 033000 - Cast-In-Place Concrete
 - 2. Section 096519.23 - Luxury Solid Vinyl Tile
 - 3. Section 096813 - Carpet Tile

1.03 REFERENCES

- A. Referenced Standards: These standards (latest edition or edition in force by AHJ) form part of this specification only to the extent they are referenced as specification requirements.
 - 1. ASTM International (ASTM):
 - a. ASTM D2646 - "Standard Guide for Backing Fabric Characteristics of Pile Yarn Floor Coverings".
 - b. ASTM G21 - "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi".
 - c. ASTM D5197 - "Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)".
 - d. ASTM E96 - "Standard Test Methods for Water Vapor Transmission of Materials".
 - e. ASTM E648 - "Standard Test method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source".
 - f. ASTM E662 - "Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials."
 - g. ASTM F710 - "Standard Practice Preparing Concrete Floors to Receive Resilient Flooring".
 - h. ASTM F2170 - "Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Product Data: Manufacturer's data indicating product physical characteristics, performance criteria, and limitations of use, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods and instructions.
 - 4. Two sided and seam tape product data.
 - 5. Patching and leveling compound product data.
- D. Warranty Registration: Manufacturer's warranty registration with concrete subfloor moisture test results and building ambient air temperature and relative humidity test results.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5-year experience manufacturing similar products.
- B. Installer Qualifications: Acceptable to manufacturer, experienced in performing work of this section and specialized in work similar to that required for this project. Minimum 3-year experience installing similar products.
- C. The same product shall be used thru out the project.

1.06 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.
- C. Remove packaging materials from site and dispose of at appropriate recycling facilities.

1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.09 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 COORDINATION

- A. Coordinate the work of this section and directly related sections with finish flooring work.

1.11 WARRANTY

- A. Fully executed, issued in Owner's name, and registered with Manufacturer's including:
 - 1. Manufacturer's Ten (10) year warranty, from date of substantial completion, against moisture damage to finished floor covering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. GCP Applied Technologies Inc., 62 Whittemore Ave., Cambridge, MA 02140, Phone: (617) 876-1400. (Basis of Specification)
 - 2. TRAXX Corporation, 1201 East Lexington Avenue, Pomona, CA 91766, Phone: 888-872-9926.
 - 3. Architect Approved Equivalent.

2.02 MOISTURE SUPPRESSION SYSTEM FOR FLOORING PRODUCTS

- A. Product: KOVARA™ MBX (formerly Versa Shield) Flooring Underlayment as manufactured by GCP Applied Technologies Inc., 62 Whittemore Ave., Cambridge, MA 02140, Phone: (617) 876-1400.
 - 1. Material: Free-standing, dimensionally stable, 4-ply composite product, engineered as a moisture suppression membrane to be used on concrete floors where high moisture exists.
 - 2. Dimensions: Manufacturer's standard roll.
 - 3. Mold, Mildew and Fungal Resistance, ASTM G21: Passed.
 - 4. Moisture Vapor Transmission rate, ASTM E96: Less than 0.01 g/hr/sq m.
 - 5. Flame Spread: Exceed Class 1, per ASTM E648.
 - 6. Smoke Developed: 450 or less, meeting ASTM E662.
- B. Accessories:
 - 1. KOVARA™ Tape as manufactured by GCP Applied Technologies Inc.
 - a. Membrane manufacturer's MBX double sided tape and seam tape.
 - b. Properties: Moisture suppression and adhesion per manufacturer's specifications.
 - c. Double sided size: 4 inches.
 - d. Seam Tape: 2 ½" one sided pressure sensitive tape.
 - 2. Primer: As recommended by manufacturer.
 - 3. Patching and leveling compound: Warranted by manufacturer for high moisture applications and approved by membrane manufacturer.
 - 4. Crack Mending Compound: Approved by membrane manufacture as compatible.

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. Concrete Subfloor:
 - 1. Verify internal RH of the concrete according to ASTM F-2170.
 - 2. Record readings and submit with manufacturer's warranty registration.

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.
- C. Concrete Sub Floor:
 - 1. Prepare floor according to manufacturer's instructions including removal of existing materials on concrete surface, grinding protrusions flat, and filling low spots with water-resistant (moisture resistant, or exterior grade) cementitious patching or leveling compound.
 - 2. Patch cracks greater than 1/8 inch width using manufacturer's approved crack mending compound.
 - 3. Remove debris and excessive dust from the surface.

3.03 UNDERLAYMENT INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Where plank type tile or LVT is to be installed, membrane shall be installed perpendicular to the tile/LVT layout.
- C. Install KOVARA™ MBX Double Sided Tape in a 5' x 5' box grid pattern and at both sides of all doorways where membrane runs thru doorway or partition opening. If the particular piece of membrane is less than 16' in length, switch to a 2.5' x 2.5' box grid pattern for the double-sided tape.
- D. Install moisture suppression membrane with smooth film side facing concrete slab.
- E. Do not overlap seams.
- F. If any jobsite condition interferes with compliance with manufacturer's instructions, contact manufacturer and obtain written job-specific procedures. Notify Architect or Owner's representative describing the interfering jobsite condition and manufacturer's job-specific instructions.
- G. Install finish material upon moisture suppression membrane immediately after placement. Minimize all foot traffic and/or rolling loads directly on surface of membrane prior to installation of finish materials.

3.04 FLOORING INSTALLATION

- A. Adhesives: Spray adhesives, latex, acrylics, urethanes, poly-urethanes, epoxies, modified mortar, and other non-solvent based adhesives to be applied at "finish flooring" manufacturer's recommended "non-porous spread rates".
- B. Protection: Protect moisture suppression membrane from damage during flooring installation. Do not tear, rip, puncture, or delaminate membrane when applying trowel-on adhesive. Repair damaged areas according to membrane manufacturer's instructions before flooring installation. Provide continuous, intact moisture suppression membrane under entire designated flooring area.
- C. Ceramic and Porcelain Tile: Adhere directly to moisture suppression membrane per tile manufacturer's recommendations.
- D. Broadloom Carpet and or Tile Carpet: Adhere directly to moisture suppression membrane using carpet manufacturer's recommended adhesive.
- E. Vinyl Tile: Adhere directly to moisture suppression membrane using tile manufacturer's recommended adhesive.
- F. Sheet Vinyl: Adhere directly to KOVARA™ MBX only. Blotter coat required, do not direct adherence to polymeric (mineralized) topcoat. Installation requires review by KOVARA™ Technical Services prior to installation.
- G. Recycled Rubber Flooring: Installation requires review by KOVARA™ Technical Services prior to installation.

3.05 INITIAL MAINTENANCE

- A. Upon completion of the finished flooring installation, KOVARA™ MBX requires a minimum of 120 hours (5 days) before conducting initial “wet” cleaning or maintenance. Failure to follow this requirement may result in improper adhesive curing and/or failure of the adhesive bond. Always clean and maintain flooring with neutral PH cleaning products.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged membrane products before installing permanent floor covering.

END OF SECTION 090561.13

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Non-load bearing steel framing members for gypsum board walls, soffits and ceilings.
 - 2. Gypsum board assemblies attached to steel framing.
 - 3. Tile backing panels.
 - 4. Gypsum soffits.
 - 5. Gypsum board ceilings.
 - 6. Resilient channels and metal furring.
 - 7. Control Joints in gypsum board ceiling and wall assemblies.
 - 8. Joint treatments, tapes, compounds and finishing.
 - 9. Levels of finish for gypsum board surfaces
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 054000 - Cold Formed Metal Framing
 - 2. Section 061000 - Rough Carpentry for solid wood blocking built into gypsum board assemblies
 - 3. Section 061643 - Gypsum sheathing for exterior building sheathing.
 - 4. Section 072116 - Blanket Insulation for thermal and sound attenuation insulation installed in assemblies that incorporate gypsum board.
 - 5. Section 078400 - Firestopping for firestopping systems and fire-resistive-rated joint sealants.
 - 6. Section 078600 - Smoke Barrier Systems for through penetrations smoke barrier systems.
 - 7. Section 099100 - Painting for GWB primers and finish painting.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM C11 "Standard Terminology Relating to Gypsum and Related Building Materials and Systems".
- C. ASTM C475/C475M "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board".
- D. ASTM C645 "Standard Specification for Nonstructural Steel Framing Members".
- E. ASTM C754 "Standard Specification for Installation of Steel Framing Members To Receive Screw-Attached Gypsum Board, Backing Board, or Water-Resistant Backing Board".
- F. ASTM C840 "Standard Specification for Application and Finishing of Gypsum Board".
- G. 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".
- H. ASTM C1047 "Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base".

- I. ASTM C1396/C1396M "Standard Specification for Gypsum Board".
- J. GA-216 "Recommended Specifications for the Application and Finishing of Gypsum Board".
- K. GA-253 "Application of Gypsum Board to Form Curved Surfaces".
- L. Recommended Levels of Gypsum Board Finish" published jointly by AWCI, CISCA, GA and PDCA.
- M. Gypsum Board Construction Technology: Refer to ASTM C11 and GA-505 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.

1.04 TERMINOLOGY

- A. The terms "drywall", "GWB", "gypsum board", "gypsum wallboard", and "sheetrock" are synonymous.

1.05 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide interior non-load-bearing metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Framing Systems:
 - 1) Maximum Deflection: L/240 at 5 psf, stud spacing at 16 inches o.c.
 - 2. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 129° F.
 - 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of ¾ inch.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions".
 - 1. Provide interior framing systems sized to accommodate maximum deflection using limiting heights of metal studs without contribution of gypsum wallboard (non-composite).
- C. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

1.06 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Submit manufacturers' product information, specifications, and installation instructions for the specified products including, GWB, joint compounds, fasteners, trim, control joints, joint reinforcing, metal furring members, metal studs, tracks, runners, bridging, resilient channels, steel grounds, and all related accessories.

- D. Test Reports: For all stud framing products that do not comply with ASTM C645 or C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.07 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.
- C. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- D. Single-Source Responsibility for Finishing Materials: Obtain finishing materials either from the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.
- E. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
 - 1. Fire Resistance Ratings: As indicated by reference to GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure, condensation, direct sunlight, construction damage and other potential causes of damage.
- C. Neatly stack gypsum panels flat to prevent sagging.
- D. Do not install GWB that is wet, that is moisture damaged, and/or that is mold damaged.

1.09 ENVIRONMENTAL CONDITIONS

- A. General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's written recommendations, whichever is more stringent.
- B. Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours prior to application and continuously after until dry. Do not exceed 95 deg F (35 deg C) when using temporary heat sources.

- C. Provide adequate ventilation to carry off excess moisture. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.
- D. Do not install gypsum board that is wet, those that are moisture damaged, and those that are mold damaged.

1.10 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C11 and GA-505 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.
- B. Rated or Tested Assemblies: As specified under the individual assembly description and shown in the drawings.
- C. Non-rated Assemblies: As specified under the individual assembly description and shown in the drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:
 - 1. Gypsum Board and Related Products
 - a. CertainTeed
 - b. G-P Gypsum Corp.
 - c. National Gypsum Company
 - d. USG Corporation.
 - 2. Steel Framing and Furring
 - a. ClarkDietrich Building Systems
 - b. National Gypsum Company
 - c. United States Gypsum Company
 - d. Marino/Ware: a Division of Ware Industries, Inc.

2.02 MATERIALS

- A. Runners: "U" shaped steel of same type, gage, and finish as studs with web depth compatible with studs and designed to hold studs temporarily in place at top and bottom by friction.
 - 1. Top Runners (Track): Where framing extends to overhead structural supports and/or decking, install to produce joints at top of framing systems that prevent axial loading of finished assemblies. In fire rated walls use Firestop Deflection Track.
- B. Steel Stud Framing:
 - 1. Channel shaped with return leg.
 - 2. Non-load bearing: ASTM C 645.
 - 3. Hot dip galvanized:
- C. Metal/Rigid Furring Channel:
 - 1. Product: ASTM C645.
 - 2. Hot dip galvanized:
- D. Resilient Channel:
 - 1. Product: Sound Transmission Resilient Channel.
 - 2. Corrosion-resistant steel channel.

- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - 2. ClarkDietrich Building Systems; BlazeFrame.
 - 3. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Posi Clips.
 - 4. Metal-lite, Inc.; The System.
 - 5. Sliptrack Systems; SLP-TRK.
- F. Deflection Track:
 - 1. Double track condition.
 - 2. Oversized outer track (2" deep minimum).
 - 3. Long leg inside track.
 - 4. Same gage or heavier than studs.
 - 5. Hot dip galvanized.
- G. Bridging
 - 1. Cold-rolled Channel Bridging
 - a. 16 Gauge (minimum) screwed to each stud with a clip angle not less than 1-1/2" x 1-1/2", 16 gauge, galvanized steel. Clip angle to be screwed to bridging at each stud. Use 3-3/8" wide clips for 3-5/8" studs and 5-3/4" wide clips for 6" studs. Two screws into bridging and two screws into stud.
- H. Hat-Shaped Rigid Furring Channels: ASTM C645
 - 1. Minimum Base-Metal Thickness: 20 gauge.
 - 2. Depth: 7/8 inch, 1-1/2 inches as indicated on the Contract Drawings.
- I. Resilient Furring Channels: 1/2-inch deep, 20 gauge galvanized steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetrical, single leg with 1-1/2" screw flange.
- J. Z-Shaped Furring: With non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 3/4 inch, minimum uncoated-metal thickness of 16 gauge unless noted otherwise and depth required to fit insulation thickness indicated.
- K. Blocking
 - 1. Solid wood - See Section 061000 - Rough Carpentry
- L. Column and beam clip
 - 1. "The Claw" manufactured by Claw International, 139 Parkview Drive, Lakeview, AR 72642 Phone: 870-431-5654 www.BEAMCLIPS.com or Architect Approved equivalent.
- M. Fasteners:
 - 1. Steel drill screws; for fastening gypsum boards to steel members from 0.033 to 0.112 in. thick: ASTM C954.
 - 2. Steel drill screws:
 - a. Type S: for fastening gypsum board to steel framing members.
 - b. Type W: for fastening gypsum boards to wood members.
 - c. Type G: for fastening gypsum board to gypsum board.
 - 3. Concrete anchors: Sized for installation loads imposed.
 - a. Power driven.
 - b. Pre-drilled expansion type.
 - c. Self-drilling expansion type.

N. Gypsum Wall Board:

1. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
2. Size: Provide maximum lengths and widths available that will minimize joints in each area, correspond with support system indicated, and be efficient in unusable off-cuts and waste.
3. Gypsum Board (GWB):
 - a. Type 'X' unless noted otherwise.
 - b. Thickness: 5/8" GWB unless noted otherwise.
4. Cementitious Board:
 - a. Provide on all surfaces to receive tile finish in shower area only.
 - b. Thickness: 5/8"
5. Gypsum Soffit Board
 - a. Description: Specially formulated core to resist sag and moisture
 - b. Thickness - 5/8" unless noted otherwise
 - c. Use:
 - 1) Provide on all exterior soffit/ceiling locations
 - 2) Provide on interior soffit locations where noted on Drawings
6. Tile Backing Panels
 - a. Provide on all walls to receive ceramic tile except showers.
 - b. Glass-mat, Water-Resistant Backing Board
 - 1) Complying with ASTM C 1178.
 - 2) Core: 5/8", Type X
 - 3) Products:
 - (a) DensShield® Tile Backer by Georgia Pacific Gypsum.
 - (b) FIBEROCK® Tile Backerboard by USG

O. Gypsum Board Accessories:

1. All accessories must be taped.
2. Galvanized steel; ASTM C1047
3. Corner bead: Solid flange.
4. Expansion (control) joint, with removable strip.
5. U-bead.
6. L-bead:
 - a. Solid flange.
 - b. Tear away L-bead at window applications.
7. LK-bead: Solid flange.
8. LC-bead: Solid flange.
9. Edge trim: Tapeable J-bead.

P. Joint Finishing Materials: ASTM C475

1. Joint reinforcing tape: ASTM C475
 - a. Size: not less than 1-7/8 in. or more than 2-1/4 in.
 - b. Thickness: Not more than 0.012 in.
 - c. Tensile strength: Not less than 30 lb./in. when tested pursuant to ASTM C474.
 - d. Dimensional stability: Expansion no more than 0.40% lengthwise and not more than 2.5% crosswise when tested pursuant to ASTM C474.
2. Glass fiber joint reinforcement tape: Open weave tape; ASTM C475.
3. Joint compound: Provide one or more of following pursuant to ASTM C475:
 - a. Ready-mix or dry taping or bedding compound.
 - b. Ready-mix or dry finishing or topping compound.
 - c. Ready-mix or dry all-purpose compound.
 - d. Compounds selected to be compatible.

2.03 STEEL FRAMED PARTITION: (NON-LOAD BEARING)

- A. Fire Rating: Per Drawings.
- B. Steel Framing:
 - 1. Runners, floor and ceiling:
 - a. Size: As shown on the drawings.
 - b. Material: 20 gage MSG (minimum) galvanized standard steel track or 33 mil (50 ksi) if using ViiperStud®, ProSTUD®, or other proprietary stud system unless noted otherwise on the Drawings.
 - c. Attachment to Floor and Ceiling (solid structure above): 16 in. o.c., maximum.
 - 2. Steel Studs:
 - a. Size: As shown on the drawings.
 - b. Material: 20 gage MSG (minimum) standard, galvanized steel stud, 33 mil (33 ksi) ViperStud®, 33 mil (33ksi) ProSTUD®, 33 mil (33 ksi) other proprietary stud unless noted otherwise on the Drawings.
 - c. Spacing: As shown on the Drawings.
- C. Bridging:
 - 1. U-Channel
 - a. 16 gauge (minimum).
 - b. 4'-0" o.c. vertically (maximum). Screwed to each stud. Provide bridging within 12" of the stud end at deflection top track.
 - 2. Blocking
 - a. FR Solid Wood - See Section 061000 - Rough Carpentry.
- D. Boards, Both Sides:
 - 1. Layers: As required for fire rating of wall assembly:
 - a. Edge: Tapered.
 - b. Type: As listed in 2.02 N.
 - c. Orientation: Parallel with studs or perpendicular to studs.
- E. Fasteners: Steel drill screws.

2.04 FURRED ASSEMBLY

- A. Rating: None.
- B. Metal/Rigid Furring Channel:
 - 1. Orientation: Installed vertically.
 - 2. Type: DWC.
 - 3. Depth: 7/8" or 1 1/2" in.
 - 4. Gage: 20.
 - 5. Finish: Galvanized, G60.
 - 6. Substrate Attachment:
 - a. Direct Method: Fasten alternately through both flanges directly to wall substrate at 24 in. o.c., maximum.
 - b. Fasteners to substrate: Steel power driven fasteners.
- C. Metal Furring Stud:
 - 1. Orientation: Installed vertically.
 - 2. Type: DWS.
 - 3. Depth: 1 5/8".
 - 4. Gage: 20

5. Finish: Galvanized, G60.
6. Substrate Attachment:
 - a. No attachment to substrate. Furring studs and GWB are an independent system when built tight to substrate.
- D. Boards and Sheathing:
 1. Layers: Single, face layer only.
 2. Face layer:
 - a. Type: As listed in 2.02 N.
 - b. Edge: Tapered.
 - c. Orientation: Parallel with, or perpendicular to, framing.
- E. Fasteners: Steel drill screws.

2.05 STEEL FRAMED NON-LOAD BEARING SOFFIT, FASCIA, AND EXTERIOR SHEATHING

- A. Rating: None.
- B. Installation Type: Braced.
- C. Steel Framing:
 1. Runners, floor and ceiling:
 - a. Size: As shown on the Drawings.
 - b. Material: 20 gage MSG (minimum) galvanized steel track or 33 mil (50 ksi) if using ViiperStud®, ProSTUD®, or other proprietary stud system unless noted otherwise on the Drawings.
 - c. Attachment to substrate: steel drill screws at 24-in. o.c., maximum.
 2. Steel Studs:
 - a. Size: As shown on the Drawings.
 - b. Material: 20 gage MSG (minimum) standard, galvanized steel stud, 33 mil (33 ksi) ViperStud®, 33 mil (33ksi) ProSTUD®, 33 mil (33 ksi) other proprietary stud unless noted otherwise on the Drawings.
 - c. Spacing: As shown on the Drawings.
- D. Diagonal Bracing: Use studs or runners.
- E. Boards:
 1. Layers: Single, face layer only.
 2. Material:
 - a. Interior assembly:
 - 1) Gypsum soffit board
 - 2) Edge: Tapered.
 - 3) Orientation: Parallel with studs or perpendicular to studs.
 - b. Exterior assembly:
 - 1) See Section 061643 - Gypsum Sheathing.
- F. Fasteners: Steel drill screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of

assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Ceiling Anchorage: Coordinate ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.03 INSTALLATION

- A. Install Pursuant to: Manufacturer's published instructions. Comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.
- B. Install supplementary framing, and FR solid wood blocking to support fixtures, equipment services, heavy trim, casework, TV mounts, projection screens, white boards, bulletin boards, lockers, hand rails, grab bars, toilet accessories, furnishings, or similar construction including Owner furnished items requiring attachment.
- C. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- D. Install bridging at 4'-0" o.c. vertically for full length of wall. If wall has a top deflection track, install an additional row of bridging within 12" of the top end of the studs. Install bridging prior to electrical conduit, piping and other utility installation within the wall or passing thru the wall to avoid conflicts. If bridging can not run full length of wall due to obstruction, continue bridging above or below obstruction overlapping one full stud cavity of main bridging run. Do not exceed 2 feet vertical between offset bridging runs and primary bridging run.
- E. Install bracing at terminations in assemblies.
- F. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- G. Runner Installation:
 - 1. Attach steel runners at floor and ceiling to structural elements with suitable fasteners located 2 in. from each end and spaced 16 in. o.c., maximum.
- H. Steel Stud Installation:
 - 1. Position studs vertically, with open side facing in the same direction, engaging floor and ceiling runners, and spaced pursuant to specific partition description. Trade holes (knockouts) shall not be located within 10 inches of the end of the stud. When necessary, splice studs with 8 in. nested lap and two positive attachments per stud flange. Place studs in direct contact with all door frame jambs, abutting partitions, partition corners, and existing construction elements. Where studs are installed directly against exterior walls and a possibility of water penetration through walls exists, install asphalt felt strips between studs and wall surfaces. All studs shall run full height from floor to floor deck or roof deck above unless otherwise noted.
 - 2. Anchor both flanges of all studs to ceiling (unless it is deflection track) and floor runner or track flanges as specified under specific partition description, or, if silent, with metal lock fastener tool, or 3/8 in. Type S or Type S-12 steel drill screw. Securely anchor studs to jamb and head anchors of door or borrowed-light frames by bolt or screw attachment. Over metal door and borrowed-light frames, place horizontally a cut-to-length section of runner or track, with a web-flange bend at each end, and secure to strut-studs with 2

screws in each bent web. Position a cut-to-length stud (extending to ceiling runner or track) at vertical board joints over door frame header.

- a. Install two studs at each jamb unless otherwise indicated.
- b. Install cripple studs at head adjacent to each jamb stud, with a maximum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
- c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

I. Metal/Rigid Furring Channels Erection:

1. Direct attachment: Attach furring channels in a vertical position directly to interior concrete or masonry surface with appropriate anchors and fasteners staggered 16 in. o.c. on opposite flanges. When there is a possibility of moisture penetration through walls, install asphalt felt protection strip between furring channel and wall.

J. Soffit and Fascia Erection:

1. Fasten runners to concrete or masonry substrate with appropriate fasteners spaced 16 in. o.c., maximum. Fasten runners to steel studs used as a substrate used as a substrate with steel drill screws.
2. Fasten steel studs to runners and other steel studs with steel drill screws.
3. Install steel stud diagonal bracing, if necessary; fasten with steel drill screws.

K. Gypsum Board Erection:

1. Clean stud and furring cavities of all construction debris and vacuum clean all track sections prior to installing GWB.
2. Apply gypsum boards pursuant to specific partition description. Position all edges centered over studs for parallel application; all ends centered over studs for perpendicular application. Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together.
3. Stagger vertical board joints from joints in adjacent layer and from joints on opposite side of studs. Stagger horizontal joints 1 stud spacing from boards directly above and below, from joints in adjacent layer, and from joints on opposite side of studs. Locate screws 1/2 in. from board edges or ends.
4. Fit gypsum panels around ducts, pipes, and conduits.
5. Where partitions intersect structural members and/or decking projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members and decking flutes; allow 1/4"-3/8" wide joints to install sealant or firestopping.
6. For single-layer parallel application of gypsum boards, space screws pursuant to specific partition description in field of boards and along vertical abutting edges. For single-layer perpendicular board application, space screws pursuant to specific partition description in field and along abutting end joints.

L. For single layer application erect and fasten gypsum boards pursuant to GA-216.

M. For exterior gypsum boards, erect pursuant to GA-216, and fasten at 6" o.c. along panel edge locations and 12" o.c. field locations with 1 1/4" S #6 screws.

N. Furring Installation for Suspended Gypsum Board Ceiling.

1. Install per manufactures instructions, 16" o.c. maximum spacing.

O. All joints and screw heads in GWB construction not exposed to view shall be fire taped and finished to a minimum AWCI Level 2 finish.

3.04 ACCESSORY APPLICATION

A. Corner Bead:

1. Reinforce all vertical and horizontal exterior corners with corner bead fastened by crimping at 6" o.c. on both flanges along entire length of bead. If framing is wood, apply screws at 9" o.c. both flanges along entire length of bed in addition to crimping.
- B. Edge Trim:
1. Where assembly terminates against masonry or other dissimilar material, apply tapeable metal trim over board edge and fasten with 9/16 in. galvanized staples 9" o.c.
- C. Opening Trim:
1. Provide and attach with screws 9" o.c. special J-type (semi-finishing) zinc-alloy edge trim at all exposed edges of exterior gypsum board that are not concealed by applied moldings.
 2. Provide and attach with screws 9" o.c. special J-type plastic edge trim at all exposed edges of exterior gypsum board that are not concealed by applied moldings.
- D. Control Joints:
1. Provide control joint units, of either metal or PVC at one side of door frame extending from door frame head upward to top track and/or window unit extending from window jamb upward and downward at a maximum spacing of 24' o.c. of straight wall and for straight wall sections longer than 24' without a door or window provide full height control joint extending from door frame head upward to top track and elsewhere, where control joints are indicated.
 2. Control joints shall be provided in gypsum board ceilings not more than 30'-0" o.c. in each direction and at junction of gypsum board partitions with walls or partitions of other finish materials, and at "T", "U" and "I" shaped areas.
 3. Each side of a control joint must be independently supported.
 4. Provide acoustical sealant at control joints as recommended by Drywall System manufacturer.
 5. In fire rated assemblies, control joints shall be backed as required to maintain rating of wall or ceiling.
 6. Where gypsum board is vertically continuous, as at stairwells, provide control joints at each floor level.

3.05 CONTROL JOINT INSTALLATION

- A. Attach control joint with screws or Architect approved substitution, spaced not over 6 in. apart in each flange. Cut end joints square and align for neat fit. Remove protective tape when joint treatment is completed.

3.06 FASTENER APPLICATION

- A. Drywall Screws:
1. Power-drive with an electric screwdriver so screw heads provide a slight depression below surface of gypsum boards without breaking face paper. Do not drive screws closer than 3/8 in. from edges and ends of gypsum boards.

3.07 PRE-FILL APPLICATION

- A. Use ready-mix or field mix dry taping or bedding compound pursuant to directions on container. Do not over mix, nor use extremely cold water or cold joint compound.
- B. Pre-fill all "V" grooves formed by abutting tapered eased edges of gypsum board with taping or bedding compound, or Architect approved substitution, using a flexible 5 in. or 6 in. joint finishing knife or specialty pre-fill tool. Fill "V" joint flush and wipe off excess compound beyond "V" groove, leaving a clear depression to receive tape. Allow pre-fill to harden prior to next application, taping, or embedding coat.

3.08 JOINT TREATMENT APPLICATION

- A. Mix joint compound pursuant to manufacturer's published instructions.
- B. Apply taping, embedding, or ready-mixed all-purpose compound in a thin uniform layer to all joints, angles, finishing beads, trim and control joints. Immediately apply reinforcing tape centered over joint and seated into compound. Sufficient compound, approximately 1/64 in. to 1/32 in., must remain on tape to provide proper bond. Follow immediately with a thin skim coat to embed tape, but not to function as a second coat. Fold and embed tape properly in all interior angles to provide a true angle. Tape or embedding coat must be thoroughly dry prior to application of second coat. Exception: Some joint compounds need only to have hardened prior to application of next coat. Refer to instructions on container.
- C. Spread finish coat evenly over and extend at least 2 in. beyond second coat on all joints and feather to a smooth, uniform finish. Over tapered edges, do not allow finished joint to protrude beyond plane of surface. Apply a finish coat to cover tape and taping compound at all tapered angles and provide a true angle. Where necessary, sand lightly between coats and following final application of compound to provide a smooth surface ready for decoration. When sanding, do not roughen face paper.

3.09 FINISHING FASTENERS

- A. Apply a taping, all-purpose type, or ready-mixed compound to fastener depressions as first coat. Follow with a minimum of 2 additional coats of topping or all-purpose compound, leaving all depressions level with surface.

3.10 FINISHING BEADS, TRIMS, AND CONTROL JOINTS

- A. Apply first coat and tape to all flanges, and properly feather out from ground to plane of surface. Compound must thoroughly dry prior to application of second coat. Some joint compounds need only to have hardened prior to application of next coat. Refer to instructions on container.
- B. Apply a second coat in same manner as first coat, extending compound slightly beyond onto face of board. Compound must be thoroughly dry prior to application of finish coat.
- C. Apply finish coat, extending compound slightly beyond second coat and properly feathering from ground to plane or surface. Sand finish as necessary to provide a flat, smooth surface ready for decoration. When sanding, do not roughen face paper.

3.11 LEVEL OF FINISH

- A. Surfaces to receive tile, surfaces to receive fire taping, and/or surfaces not exposed to view, shall be finished to a minimum of AWCI Level 2.
- B. Surfaces to receive heavy textured finish or heavy grade wall covering shall be finished to a minimum of AWCI level 3.
- C. Surfaces to receive gloss, semi-gloss, or egg shell paint shall be finished to a minimum of AWCI level 4.
- D. Level 5 finish only required in locations specifically noted on the contract drawings. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.12 TOLERANCES

- A. Maximum variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.

3.13 WASTE MANAGEMENT

- A. Plan and coordinate work to minimize generation of off-cuts and waste. Sequences work to maximize use of GWB off-cuts and waste.

3.14 CLEANING AND REPAIR

- A. Clean all excess materials each day. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.
- C. Repair damaged work prior to Punch List

END OF SECTION 092116

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Ceramic and Porcelain tile.
 - 2. Waterproof membrane for thin-set tile installations
 - 3. Setting products and grouts.
 - 4. Thresholds
 - 5. Metal transition strips between tile and other floor finishes.
- B. Related sections include the following:
 - 1. Section 079200 - "Sealants" for sealing of expansion, contraction, control, corner, and isolation joints in tile surfaces.
 - 2. Section 092116 - "Gypsum Board Assemblies" for gypsum backer units and cementitious backer units installed as underlayment for tile installations.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. Tile Council of North America, Inc. (TCNA) "Handbook for Ceramic, Glass and Stone Tile Installation".
- C. Ceramic Tile Standards
 - 1. Bond Strength: ASTM C482
 - 2. Breaking Strength: ASTM C648
 - 3. Color Uniformity: ASTM C609
 - 4. Crazing: ASTM C424
 - 5. Facial Dimensions: ASTM C499
 - 6. Warpage: ASTM C482
 - 7. Water Absorption: ASTM C373
 - 8. Wedging: ASTM C502
- D. Installation Standards: ANSI A108 series
- E. Material Standards: ANSI A118 Series
- F. ANSI A137.1 "American National Standards Specifications for Ceramic Tile"

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Product Data:
 - 1. For each tile type.
 - 2. Setting Products.
 - 3. Grouts.

4. Thresholds/ Transition Strips.
 5. Waterproofing Systems.
 6. Accessories.
- D. Samples: submit actual products, no plastic mock-ups or photos representing colors and textures.
1. Tile - quantity to show full range of colors, markings and textures that will occur. Samples may be on color boards or as individual tiles of minimum size 4" square or actual tile size if less than 4" square.
 2. Thresholds/Transition Strips - 8" long samples of each type.
 3. Sealant - 6" sample of each type and color.
 4. Grouts - Full range of colors available (actual grout in-lays, not plastic color representations).
- E. Submit Installer qualification certifications for Installer(s) and Installing Contractor required by the Quality Assurance paragraph below.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturers recommendations and/or industry standards shall perform all work of this section.
- B. All tiles supplied must exceed standard grade requirement set forth in the latest ANSI tile specification A137.1.
- C. Manufacturer Qualifications:
1. In business of manufacturing ceramic/porcelain tile for at least 15 years.
- D. Provide waterproofing membrane, crack control membrane, grout and setting materials from one manufacturer.
- E. Installer Qualifications:
1. Installing Contractor is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
 2. Installing Contractor employs Ceramic Tile Education Foundation Certified Installers.
 3. Not less than five (5) years experience with tile work and not less than three (3) installations of similar size and scope.
- F. The work hereunder shall be performed by a single entity with unit responsibility for field measurements, submittals, field installation and warranty.
- G. Allowable tolerances:
1. Except for allowable tolerances in tile as specified, make corners of all tiles flush and level with corners of adjacent tile.
 2. For flat surfaces, the maximum deviation from true plan shall be 1/8" in 8' as measured under straight edge placed at any location on surface.
 3. Where noted or required slope floors to drains, complying with the tolerance stated for flat surfaces.
- H. Large format floor and wall tile shall be installed utilizing a tile leveling system.
- I. Slip Resistant Floor Surface Requirements: The floor surface of the finished installation shall comply with the slip resistant requirements of the authorities having jurisdiction.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Deliver material only in and undamaged condition; store above ground and in a dry place within building. Keep packaged material in original containers with seals unbroken and labels intact until time of use. Wrapped or bundled material must bear name of manufacturer and product. Immediately remove damaged or otherwise unsuitable material from job site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Following are approved manufacturers for materials shown in the specification:
 - 1. Ceramic wall and floor tile
 - a. American Olean (Basis of Design)
 - b. Daltile
 - c. Summitville
 - 2. Setting Products
 - a. LATICRETE International, Inc. (Basis of Specification)
 - b. MAPEI
 - 3. Grout
 - a. LATICRETE International, Inc. (Basis of Specification)
 - b. MAPEI or approved equivalent.
 - 4. Waterproofing & Crack Control Membranes
 - a. LATICRETE International, Inc. (Basis of Specification)
 - b. MAPEI or approved equivalent.
 - 5. Control joints and transition strips
 - a. Schluter (Basis of Specification)
 - b. Architect approved equivalent
- B. Tile shall be of size, type and pattern shown on the Drawings and described in this Project Manual. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- C. Proprietary names used to designate materials are not intended to imply that products of those manufacturers are required to the exclusion of Architect approved equivalent products of other manufacturers.

2.02 WALL, FLOOR, AND BASE TILE

- A. Type A: Lavatory and Shower Walls
 - 1. Field Tile:
 - a. American Olean - Infusion™ Colorbody Porcelain-Wenge.
 - b. Size: 12" x 24" horizontal mount.
 - c. Colors: to be selected by Architect from seven (7) Wenge available colors.
 - d. Stagger tiles in a 30% offset pattern with a 3/16" grout joint.
 - 2. Floor/Wall Transition
 - a. Schluter DILEX-AHK Cove Base including cove inside and outside corners.
 - b. Size: to match floor and wall tile thickness.
 - c. Color and Finish: Textured color-coated aluminum TS as selected by Architect from manufacturer's ten (10) available colors.

- B. Type B: Lavatory Floors
 - 1. American Olean.
 - 2. Size 12" x 12" porcelain tiles with a 1/4" grout joint.
 - 3. Series: Stonepeak - Simply Modern
 - 4. Field Pattern: 50% Stagger
 - 5. Color: to be selected by Architect.
- C. Type C: Shower Ceiling & Floor (Handicap accessible showers)
 - 1. American Olean: Unglazed Ceramic Mosaics.
 - 2. Size: 2" x 2" with 1/16" grout joint.
 - 3. Patterns: Shower Floor - Twelve accent color tile randomly spread.
 - 4. Color: to be selected by Architect.
 - a. 100% of Price Groups 1, 2 and/or 3.

2.03 SETTING PRODUCTS

- A. Wall Tile.
 - 1. Large Format Tile: LATICRETE MULTIMAX™ LITE Polymer Fortified Mortar.
 - 2. Small Format Tile: LATICRETE 254 Platinum Polymer Fortified Thin Set Mortar.
- B. Floor Tile
 - 1. LATICRETE 125 TRI MAX™ Adhesive Mortar.

2.04 GROUTS

- A. Walls and Floors: LATICRETE SPECTRALOCK® PRO Premium Grout (Epoxy grout).
- B. Color: to be selected by Architect.

2.05 THRESHOLDS

- A. Marble:
 - 1. Profile: As shown on Contract Drawings.
 - 2. Size: Match jamb length. Align width with inside edge of door frame. See detail on Contract Drawings.
 - 3. Location: At locations shown on Door Schedule and Floor Finish Drawing.
 - 4. Color: Provide color range to coordinate with range of submitted tile colors. Architect shall select final color.
- B. Metal:
 - 1. Manufacturer: Schluter or Architect approved equal.
 - 2. Material: (Mill-finished aluminum).
 - 3. Style: as indicated by transition details shown on Contract Drawings.
 - 4. Size: Height to match tile thickness.

2.06 ACCESSORIES

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Crack Isolation Membrane
 - 1. LATICRETE HYDRO BAN®
- C. Control Joints: Provide Schluter Systems Dilex-BWS

1. Provide at all wall and floor control joints.
 2. Colors: As selected by Architect from manufacturer's full range of colors.
 3. Height as required.
- D. Tile Cleaner
1. A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.07 MEMBRANE SYSTEM AT SHOWERS & LAVATORY WALLS

- A. Showers with ceramic tile floors.
1. LATICRETE HYDRO BAN® Waterproofing Membranes under shower floor and threshold and 6 foot vertically on all shower walls.
- B. Showers with precast shower bases.
1. LATICRETE HYDRO BAN® Waterproofing Membranes 6' vertically on all shower walls from top of terrazzo base.
- C. Lavatories.
1. LATICRETE HYDRO BAN® Waterproofing Membranes 18" vertically on all walls and horizontally over entire floor surface.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine all surfaces to receive the parts of the Work specified herein.
1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are:
 - a. incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
 4. Verify all dimensions of existing and subsequent construction.
 5. Verify that GWB backing is the required type and is installed and prepared in accordance with Gypsum Association GA 216.
 6. Application of materials constitutes acceptance of substrate.
 7. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.
 8. On CMU walls to receive membrane and tile, smooth out any depressions with LATICRETE 254 Platinum Thin Set Mortar or LATICRETE 226 Thick Bed Mortar mixed with LATICRETE 3701 Mortar Admix or 3701 Fortified Mortar as recommended by manufacturer.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Keep containers in which tile and other materials are packed, dry until tiles and other materials are removed; take every precaution to see that tiles are not stained before they are set in place. Maintain temperatures in rooms where tile is being set at a minimum of 50 F and for 7 days

after tile has been set. Vent temporary heaters to outside to prevent carbon dioxide damage to the Work.

- D. Layout tile in each area in such a manner as to minimize cutting of tile, especially cuts less than one half-tile size, and maximize alignment of joints.
- E. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.02 INSTALLATION OF WATERPROOFING MEMBRANE

- A. Install waterproofing membrane as recommended by manufacturer.
- B. Protect membrane until tile installation.

3.03 INSTALLATION OF TILE

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic, Glass, and Stone Tile Installation"; comply with TCNA installation methods.
 - 1. Mortar Coverage for Ceramic/Porcelain Tile: Minimum contact area must be 95% with no voids exceeding 2 square inches and no voids within 2" of the tile corners. All corners and edges of the tiles must be fully supported. Back-parging or back-buttering is recommended on all large format tile. Use notched trowel sized to facilitate the proper coverage.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.
- F. Crack Isolation Membrane Installation
 - 1. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
 - 2. Allow crack isolation membrane to cure before installing tile or setting materials over it.
 - 3. Control Joints: Locate manufactured control joints in tile surfaces directly above joints in concrete substrates. Do not saw.
 - 4. Prepare joints and apply sealants to comply with requirements of Division 07 Section "Sealants".

- G. Grout tile to comply with the requirements of the following installation standards:
 - 1. For ceramic tile grouts (epoxy grout), comply with ANSI A108.10.
- H. At showers, tubs, and similar wet areas, install cementitious backer units and treat joints to comply with manufacturer's instructions for type of application indicated.
- I. All inside corners of wall tile shall be caulked, not grouted.
 - 1. Install bond breaker behind all caulking.
- J. Unless otherwise noted, all tile patterns are to be centered. Obtain Architect approval of all layouts before proceeding.
- K. All outside corners and tile terminations exposed to view shall receive a bullnose tile or Schluter bull nose trim.

3.04 INSTALLATION OF GROUT

- A. Install grout pursuant to ANSI A 108.10 and A 118.8.
- B. Observe the general grouting procedures outlined in ANSI A108.10, Installation of Grout in Tilework.
- C. Do not disturb, walk on or grout tiles until adhesive or dry-set has cured completely.
- D. Remove all spacers, strings, ropes or pegs before grouting.
- E. Wipe tile surfaces to remove dust or substances that may cause color contamination or discoloration during grouting.
- F. Cure epoxy grout in accordance with manufacturer's recommendations.
- G. Keep grout joints clean and free from standing water, dust and foreign substances.

3.05 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than fourteen (14) days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Prohibit foot and wheel traffic from tiles floors for at least seven (7) days after grouting is completed.
- D. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- E. Protect all walls from impact or vibration from impact to adjacent or opposite walls for 14 days minimum.

- F. Protect all tile installation from freezing or total water immersion for 21 days minimum.
- G. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
- H. Contractor to supply to Owner information regarding regular maintenance of wall and floor tile.
See Section 017700 -Closeout Procedures.

END OF SECTION 093013

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Quarry floor and base tile.
 - 2. Waterproof membrane for thin-set tile installations
 - 3. Setting products and grouts.
 - 4. Thresholds
 - 5. Metal transition strips between tile and other floor finishes.
- B. Related sections include the following:
 - 1. Section 079200 – “Sealants” for sealing of expansion, contraction, control, corner, and isolation joints in tile surfaces.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer’s recommendations.
- B. Tile Council of North America (TCNA) "Handbook for Ceramic, Glass, and Stone Tile Installation".
- C. American National Standards Institute (ANSI)
 - 1. ANSI A108/A118/A136.1: “Installation of Ceramic Tile”.
 - 2. ANSI A118.10: “Installation of Grout In Tilework”.
 - 3. ANSI A137.1: “American National Standards Specifications for Ceramic Tile”.
- D. Quarry Tile Standards
 - 1. Absorption: ASTM C373
 - 2. Compressive Strength: ASTM C67
 - 3. Freeze/Thaw: ASTM C1026
 - 4. Abrasion Resistance: ASTM C1026
 - 5. Breaking Strength: ASTM C648
 - 6. Facial Dimensions: ASTM C499
 - 7. Warpage: ASTM C482
 - 8. Wedging: ASTM C502
 - 9. Static Coefficient of Friction: ASTM C1028
- E. Setting Materials and Grout: ANSI A108 series

1.04 SUBMITTALS

- A. Pursuant to Section 013300 – Submittal Procedures.
- B. Pursuant to Section 016000 – Product Requirements
- C. Samples: submit actual products, no plastic mock-ups or photos representing colors and textures.
 - 1. Tile - quantity to show full range of colors, markings and textures that will occur. Samples may be on color boards or as individual tiles of minimum size 6” square.

2. Thresholds - 12" long samples of each type.
3. Sealant - 6" sample of each type and color.
4. Grouts - Full range of colors available.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. All tiles supplied must exceed standard grade requirement set forth in the latest ANSI tile standard - ANSI A137.1.
- C. Manufacturer Qualifications:
 1. In business of manufacturing quarry tile for at least 15 years.
 2. Capable of supplying all tiles listed in these guidelines; no partial suppliers are acceptable.
- D. Provide tile, grout and setting materials from one distributor.
- E. Installer Qualifications:
 1. Not less than five (5) years' experience with tile work and not less than three (3) installations of similar size and scope.
- F. The work hereunder shall be performed by a single entity with unit responsibility for field measurements, submittals, field installation and warranty.
- G. Allowable tolerances:
 1. Except for allowable tolerances in tile as specified, make corners of all tiles flush and level with corners of adjacent tile.
 2. For flat surfaces, the maximum deviation from true plan shall be 1/8" in 8' as measured under straight edge placed at any location on surface.
 3. Where noted or required slope floors to drains, complying with the tolerance stated for flat surfaces.
- H. Slip Resistant Floor Surface Requirements: The floor surface of the finished installation shall comply with the slip resistant requirements of the authorities having jurisdiction.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Deliver material only in and undamaged condition; store above ground and in a dry place within building. Keep packaged material in original containers with seals unbroken and labels intact until time of use. Wrapped or bundled material must bear name of manufacturer and product. Immediately remove damaged or otherwise unsuitable material from job site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Following are approved manufacturers for materials shown in the specification:
 1. Quarry floor tile and base tile.
 - a. American Olean (Basis of Design)
 - b. Daltile
 - c. Florida Tile

2. Setting Products
 - a. LATICRETE International, Inc. (Basis of Design)
 - b. MAPEI
 3. Grout
 - a. LATICRETE International, Inc. (Basis of Design)
 - b. MAPEI or approved equivalent.
 4. Waterproofing Membranes
 - a. LATICRETE International, Inc. (Basis of Design)
 - b. MAPEI or approved equivalent.
- B. Tile shall be of size, type and pattern shown on the Drawings and described in this Project Manual.
1. Proprietary names used to designate materials are not intended to imply that products of those manufacturers are required to the exclusion of Architect approved equivalent products of other manufacturers

2.02 WALL, FLOOR, AND BASE TILE

- A. Kitchen Floor
1. American Olean, unglazed quarry tile, base and trim.
 2. Size: 6 inch x 6 inch with a 1/4" grout joint.
 3. Nominal Thickness: 1/2"
 4. Series: Quarry Naturals
 5. Base and Trim tile to match wall tile in size, color and texture. Bullnose tiles required at all outside corners.
 6. Quarry tile for floors to contain abrasive grit.
 7. Color: to be selected by Architect.

2.03 SETTING PRODUCTS

- A. Quarry Tile
1. LATICRETE 254 Platinum Multipurpose Thin Set Mortar.

2.04 GROUTS

- A. Base and Floors: LATICRETE SPECTRALOCK® 2000 IG (Epoxy grout).
- B. Color: to be selected by Architect.

2.05 LEVELING UNDERLAYMENT

- A. Floors: Cement-based underlayment for leveling and patching interior substrates.
1. Laticrete NXT Level or NXT Skim.
 2. Architect Approved Equivalent.

2.06 THRESHOLDS

- A. Marble:
1. Profile: As shown on Contract Drawings.
 2. Size: Match jamb length. Align width with inside edge of door frame. See detail on Drawings.
 3. Location: At locations indicated on Door Schedule and Floor Finish Drawing.
 4. Color: Provide color range to coordinate with range of submitted tile colors. Architect shall select final color.

- B. Metal:
 - 1. Manufacturer: Schluter or Architect approved equal.
 - 2. Material: Mill - finish Aluminum.
 - 3. Style: as indicated by transition details shown in Drawings.
 - 4. Size: Match finished flooring heights on each side of transition.

2.07 ACCESSORIES

- A. Control Joints: Provide Schluter Systems Dilex-BWS
 - 1. Provide at locations shown on drawings.
 - 2. Colors: As selected by Architect from manufacturer's full range of colors.

2.08 MEMBRANE SYSTEM AT QUARRY TILE FLOORS AND BASE

- A. Kitchen
 - 1. LATICRETE 9235 Waterproofing Membrane with reinforcing fabric 4" vertically at all quarry tile wall/floor intersections and horizontally under entire quarry tile floor.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine all surfaces to receive the parts of the Work specified herein.
 - 1. Verify all dimensions of existing and subsequent construction.
 - 2. Verify that GWB backing is the required type and is installed and prepared in accordance with Gypsum Association GA 216.
 - 3. Application of materials constitutes acceptance of substrate.
 - 4. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Keep containers in which tile and other materials are packed, dry until tiles and other materials are removed; take every precaution to see that tiles are not stained before they are set in place. Maintain temperatures in rooms where tile is being set at a minimum of 50 F and for 7 days after tile has been set. Vent temporary heaters to outside to prevent carbon dioxide damage to the Work.
- D. Layout tile in each area in such a manner as to minimize cutting of tile, especially cuts less than one half-tile size, and maximize alignment of joints.
- E. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not, factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.02 INSTALLATION OF WATERPROOFING MEMBRANE

- A. Install waterproofing membrane and reinforcing fabric as recommended by manufacturer.
- B. Protect membrane until tile installation.

3.03 INSTALLATION OF TILE

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic, Glass and Stone Tile Installation" (latest edition); comply with TCNA installation methods indicated.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
- F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants to comply with requirements of Division 07 Section "Sealants".
- G. Grout tile to comply with the requirements of the following installation standards:
 - 1. For quarry tile grouts (epoxy grout), comply with ANSI A118.10.
- H. All inside corners of wall tile shall be caulked, not grouted.
 - 1. Install bond breaker behind all caulking.
- I. Unless otherwise noted, all tile patterns are to be centered. Obtain Architect approval of all layouts before proceeding.
- J. All outside corners and tile terminations exposed to view shall receive a bullnose tile.

3.04 INSTALLATION OF GROUT

- A. Install grout pursuant to ANSI A108.10 and ANSI A118.8.
- B. Observe the general grouting procedures outlined in ANSI A108.10, Installation of Grout in Tilework
- C. Do not disturb, walk on or grout tiles until adhesive or dry-set has cured completely.
- D. Remove all spacers, strings, ropes or pegs before grouting.
- E. Wipe tile surfaces to remove dust or substances that may cause color contamination or discoloration during grouting.

- F. Cure epoxy grout in accordance with manufacturer's recommendations.
- G. Keep grout joints clean and free from standing water, dust and foreign substances.

3.05 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than fourteen (14) days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Prohibit foot and wheel traffic from tiles floors for at least seven (7) days after grouting is completed.
- D. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- E. Protect all walls from impact or vibration from impact to adjacent or opposite walls for 14 days minimum.
- F. Protect all tile installation from freezing or total water immersion for 21 days minimum.
- G. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
- H. Contractor to supply to Owner information regarding regular maintenance of quarry tile. See Section 017700 –Closeout Procedures.

END OF SECTION 093016

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Acoustical Ceiling Panels.
 - 2. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.
 - 3. Accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 092116 - Gypsum Board Assemblies
 - 2. Division 22 - Plumbing
 - 3. Division 23 - Heating, Ventilating and Air Conditioning
 - 4. Division 26 - Electrical

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and manufacturer's recommendations. Where differences occur, the stricter requirement shall apply.
- B. ASTM A1008 "Standard Specifications for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability".
- C. ASTM A641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".
- D. ASTM C635 "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings".
- E. ASTM C636 "Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels".
- F. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
- G. ASTM E1264 "Standard Classification for Acoustical Ceiling Products".
- H. ASTM E1414 "Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum".
- I. ASTM E1477 "Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers".
- J. ASTM D3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber".
- K. FS SS-S-118B "Sound Controlling (Acoustical) Tiles and Panels".
- L. Ceilings & Interior Systems Contractors Association (CISCA) "Code of Practices for Acoustical Ceiling System Installations".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: Material cut sheets for each type of acoustical ceiling panel and suspension system required.
- D. Installation Instructions: Provide manufacturer's installation instructions for each type of acoustical ceiling panel/suspension system required.
- E. Maintenance and Care Instructions: Provide manufacturer's maintenance and care instructions for each type of acoustical ceiling panel/suspension system required.
- F. Samples: Minimum 6"x6" samples of each style of panel, 8" long pieces of exposed wall moldings, and suspension system.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturers recommendations and/or industry standards shall perform all work of this section.
- B. Provide acoustical panel units and grid components by single manufacturer.
- C. Coordinate work of this Section with other Work supported by or penetrating through suspended ceiling systems, including partition systems, both fixed and tracked (if any), light fixtures, HVAC equipment, fire protection systems, speakers (if any), and movie screens (if any).
- D. Each carton of panel material to have Underwriter's Laboratory classification of acoustic performance. If label is absent, Contractor shall be required to send material from every production run appearing on the site to an independent approved laboratory for testing. Panels not meeting requirements shall be replaced at Contractor's expense.
- E. Maintain installation tolerances specified in ASTM C635 and C636.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.07 JOB SITE CONDITIONS

- A. Do not store or begin installation of acoustical ceiling materials until:
 - 1. All wet work such as concrete, plastering, and terrazzo is completed and thoroughly dried.
 - 2. Building has been enclosed to the weather and suitable mechanical ventilation is supplied to maintain conditional ranges of 60° F to 85° F at not more than 70% relative humidity. Maintain these conditions for a minimum of 48 hours prior to installation as well as during and after installation.

3. Dust generating activities have terminated.
4. Overhead work such as mechanical, electrical, fire protection, etc. is completed, tested, and approved.

B. Meet CISCA requirements for seismic design category as indicated on structural documents.

1.08 EXTRA MATERIALS

- A. Furnish full size units equal to:
1. Acoustical Ceiling Panels: 3% of the amount for each type, size, and color installed.

PART 2 PRODUCTS

2.01 ACOUSTICAL CEILING PANELS

- A. Acceptable Manufacturers:
1. Armstrong (Basis of Design)
 2. Celotex
 3. USG
 4. Architect approved equivalent.
- B. 2' X 2' TILES
1. Type 22A: Description based on Dune™ Angled Tegular by Armstrong.
 - a. Material: Mineral fiber lay-in panels/cast or molded.
 - b. Surface Texture: fine textured, non-directional.
 - c. Exposed surface color: Manufacturer's standard white finish.
 - d. Panel Size: 24" x 24" x 5/8" thick
 - e. Edge Profile: Angled Tegular
 - f. Noise Reduction Coefficient (NRC): 0.50
 - g. Ceiling Attenuation Class (CAC): 35
 - h. Flame Spread: Class A
 - i. Light Reflectance: 0.83
 - j. Durability: Scratch Resistant
 - k. Humidity Resistant HumiGuard Plus with 10-year warranty.
 - l. Anti-mold/mildew, Anti-odor/stain/bacteria
 2. Type 22B: Description based on Ceramaguard® Fine Fissured™ by Armstrong
 - a. Mineral fiber lay-in panels/cast or molded.
 - b. Surface Texture: fine fissures, non-directional, perforated.
 - c. Exposed surface color: Manufacturer's standard white finish.
 - d. Panel Size: 24" x 24" x 5/8" thick.
 - e. Edge Profile: square.
 - f. Noise Reduction Coefficient (NRC): 0.55.
 - g. Ceiling Attenuation Class (CAC): 40.
 - h. Flame Spread: Class A.
 - i. Light Reflectance: 0.79.
 - j. Durability: Washable, Scrubbable.
 - k. Humidity resistant HumiGuard Plus with 10-year warranty.
 - l. Anti-mold and anti-mildew.
- C. 2' X 4' TILES
1. Type 24C: Description based on Ceramaguard® Unperforated by Armstrong
 - a. Mineral fiber lay-in panels/cast or molded.
 - b. Surface Texture: Unperforated.
 - c. Exposed surface color: Manufacturer's standard white finish.
 - d. Panel Size: 24" x 48" x 5/8" thick

- e. Edge Profile: square
- f. Noise Reduction Coefficient (NRC): 0.55
- g. Ceiling Attenuation Class (CAC): 40
- h. Flame Spread: Class A
- i. Light Reflectance: 0.88
- j. Durability: Washable, Scrubbable
- k. Humidity resistant HumiGuard Plus with 10-year warranty.
- l. Anti-mold and anti-mildew

2.02 SUSPENSION SYSTEM

- A. Suspension system/steel, direct hung exposed tee:
 - 1. Acceptable manufacturers:
 - a. Armstrong. (Basis of Design)
 - b. Chicago Metallic.
 - c. Donn/U.S. Gypsum
 - d. Architect approved equivalent
- B. Description based on Prelude XL by Armstrong:
 - 1. Double web steel/non-fire rated
 - 2. Structural Classification per ASTM C635: Intermediate duty with interlocking of main runners and cross tees.
 - 3. Components and sizes:
 - a. 1-1/2" high main tee runners, standard.
 - b. 15/16" wide exposed finished face.
 - c. Manufacturer's standard angle wall molding. Exposed flange to match size of exposed runners.
 - d. All exposed surfaces to match in color and texture.
 - 4. Exposed tee surface color, finish:
 - a. Color to match ceiling panels unless noted otherwise.
- C. Anchoring Devices: Provide hot-dip galvanized steel, ASTM A153, Coating Class C and D, screws, bolts, rods, hooks and eyes, and other devices designed for attachment to various types of structural framing systems, including system indicated, for support of ceiling suspension system.
 - 1. Provide tested and certified carrying and pull-out capacities, for each device, for not less than five (5) times the design load in ASTM C635, Table 1, Direct Hung installations.
 - 2. Hanger wire and ties:
 - a. Galvanized steel wire pursuant to ASTM A641, soft temper, Class 1 coating.
 - b. Size hanger wire to carry three (3) times hanger design load pursuant to ASTM C635, Table 1, Direct Hung, but not less than 12 gauge.
 - c. Tie Wire: not less than 16 gauge.

2.03 SUPPLEMENTAL MATERIALS

- A. Hold Down Clips for Non-Fire-Resistance-Rated-Ceilings: For interior ceilings composed of acoustical panels weighing less than 1 lb. Per sq. ft., provide hold-down clips spaced 24-inches o.c. on all cross tees.
- B. Impact Clips: Provide manufacturer's standard impact clips.
- C. Angle Hangers: Angles with legs less than 7/8-inch (22 mm) wide, formed with 0.0396-inch (1 mm) thick galvanized-steel sheet complying with ASTM A446, G 90 ASTM
 - 1. A446M, Z 275 Coating Designation, with bolted connections and 5/16-inch (8 mm) diameter bolts.

- D. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's product designations, complying with the following requirements:
1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of finish indicated and with aluminum extrusions complying with ASTM B 221 (ASTM B 221M) not less than the strength and durability properties for alloy and temper 6063-TS.
 2. Baked-Enamel Finish: AA-C12C42R1x - Apply baked enamel according to paint manufacturer's specifications for cleaning, conversion coating, and applying organic coating.
 - a. Organic Coating: Manufacturer's standard thermosetting coating system with a minimum dry film thickness of 0.8 to 1.2 mil.
 - b. Color: White.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine areas to receive materials for conditions which will adversely affect installation. Provide written report of discrepancies with copies to Contractor and Architect.
- B. Do not start work until unsatisfactory conditions are corrected or architect issues notice to proceed. Application or installation of materials constitutes acceptance of supporting construction.
- C. Work to be concealed: Verify work above ceiling suspension system is complete and installed in manner that will not affect layout and installation of suspension system components.

3.02 PREPARATION

- A. Field Dimensions: Verify ceiling layouts by actual field dimensions prior to installation.
- B. Acoustical panels must reach room temperature and stabilized moisture content prior to installation.

3.03 INSTALLATION - DIRECT HUNG CEILING SUSPENSION SYSTEM

- A. Install pursuant to ASTM C636, CISCA current published recommendations, CISCA 0-2 and applicable code requirements in force at time of installation.
- B. Install pursuant to manufacturer's published instructions where more stringent than standards specified, or where procedure is not covered by standards.
- C. Suspend main beams from overhead construction with hanger wires spaced a maximum of 4'-0" o.c. along the length of the main runner. Install hanger wires plumb and straight.
- D. Do not load system so as to produce rotation of runners.
- E. Allowable deflection of main runners and cross runners is limited to 1/360 of the span between supports pursuant to ASTM C635.
- F. When weight of components supported on main runners and cross runners causes total dead load to exceed deflection capability, provide additional hangers located within 6 in. of each corner of the component, unless otherwise recommended by manufacturer, or support components independently of the suspension system.

- G. No. 12 gage hangers shall be attached to the grid members within 3 inches of each corner of each lighting fixture. Tandem fixtures may use common wires. Lighting fixtures must be positively attached to the suspended ceiling system - see Division 26 - Electrical for further information.
- H. Support system independent of walls, columns, ducts, pipes, and conduit. When splicing carrying T's, maintain face plane with adjacent members.
- I. Use properly placed and suspended load carrying bracing channels to maintain hanger vertical when interrupted by mechanical ducts and other horizontally run equipment.
- J. Attachment to metal roof deck is prohibited.
- K. Provide and coordinate installation of hanger clips during erection of structural framing.
 - 1. Space hangers not more than 48-inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8-inches (22 mm) from ends of each member.
- L. Center suspended ceiling grid on room axis so as to provide equal border units, so arranged that units less than one-half width do not occur unless otherwise shown on Drawings.
- M. Install wall molding at intersection of ceiling and vertical surfaces after primer and first coat of finish paint has been applied, using longest practical lengths. Continuously back bed vertical leg of molding with acoustical sealant. Firmly secure moldings to walls with corners neatly mitered or provide corner caps.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not over 16-inches o.c. and not more than 3-inches from ends, leveling with ceiling suspension system to a tolerance of 1/8-inch in 12-feet. Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- N. Where circular or radius penetrations occur, provide preformed closers to match edge moldings.

3.04 INSTALLATION, LAY-IN CEILING PANELS

- A. Install acoustical ceiling materials in compliance with manufacturer's specifications and recommendations, including the following:
 - 1. Fit acoustic units in place, free from damaged edges, soiled surfaces, or other defects detrimental to appearance and function.
 - 2. Any cut tegular tile must be cut to a matching tegular profile at cut line.
 - 3. Install acoustic units level, in uniform plane, free from twist, warp, and dents.
 - 4. Lay directional patterned units one way with pattern parallel to longest room axis, unless otherwise shown on the drawings.
 - 5. Fit border panels neatly against abutting surfaces.
 - 6. Reveal edge panels:
 - a. Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
 - b. Paint cut edges if exposed to view.
 - 7. Install hold-down clips:
 - a. For minimum 4 ft. radius from all doors on both sides of door opening.
 - b. For all panels weighing less than 1 lb./sq. ft.
 - 8. Install impact clips for ceiling areas shown and as specified by manufacturer.

3.05 CLEANING AND PROTECTION

- A. Upon completion of the Work, remove all unused materials, debris, containers, and equipment from the project site. Clean and repair floors, walls, and other surfaces that have been stained, marred, or otherwise damaged by work under this Section.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension member. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- C. Protect acoustical ceilings during the construction period so that they will be without any deterioration or damage at the time of acceptance by Owner.

END OF SECTION 095100

PAGE INTENTIONALLY BLANK

PART I GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Rubber Wall Base.
 - 2. Related Accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 096513.23 - Resilient Stair Treads
 - 2. Section 096519.23 - Luxury Solid Vinyl Tile
 - 3. Section 096813 - Carpet Tile

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM F1861 "Standard Specification for Resilient Wall Base".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Product Data: Manufacturer's technical data for resilient base and accessory.
- D. Samples for Initial Selection Purpose: Manufacturer's standard and custom color samples in form of actual sections of rubber base including accessories, showing full range of colors and patterns available for each type of resilient and rubber flooring or base required. The Architect shall select the colors, patterns, and textures from the manufacturer's complete range of standard and custom colors.
- E. Maintenance Instructions: Submit two (2) Copies of manufacturer's recommended maintenance practices for each type of resilient base and accessory required.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards shall perform all work of this section.
- B. Provide each type of resilient base and accessories as produced by a single manufacturer, including recommended primers, adhesive, and sealants.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

- C. Store and install only where space temperatures are within resilient materials manufacturer's specified range. Thereafter, maintain resilient materials manufacturer's specified environmental conditions.

1.07 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65-degrees F (18 deg C) in spaces to receive resilient base for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient base materials in spaces where they will be installed for at least 48 hours before beginning installation. Maintain minimum temperature of 55 degrees F (13 deg C) in areas where work is completed.
- B. Install resilient base and accessories after other finishing operations, including painting, have been completed.

1.08 WARRANTY

- A. Provide manufacturer's standard limited commercial warranty covering manufacturing defects.

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Acceptable Manufacturers
 - 1. Armstrong World Industries, Inc.
 - 2. Roppe Corporation, USA
 - 3. Johnsonite.
 - 4. Architect Approved Equivalent
- B. Material: Rubber.
- C. Height: 4 inch
- D. Toe shape: Cove, with toe.____.
- E. Thickness: 1/8 in.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed or preformed.
- H. Color: Selection by Architect from manufacturer's standard array.

2.02 ACCESSORY MATERIALS

- A. Adhesive: Resilient base manufacturers recommended product that meets VOC requirements of the project.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer shall inspect subfloor & wall surfaces to determine that they are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, and

ridges. Coatings preventing adhesive bond, and other defects that impair performance or appearance shall be corrected.

- B. Fill cracks, holes, depressions and irregularities in the substrate/background to prevent transferring through to the surface of the resilient wall base.
- C. Vacuum surfaces to be covered and inspect floor/wall intersection.

3.02 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed outside corner units. Inside corners fabricated from base materials with mitered or coped inside corners or use preformed inside corners.
- C. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
 - 1. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
- D. Pre-formed Corners: Install preformed corners before installing straight pieces.
- E. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 24 inches in length.
- F. Roll resilient base with a hand roller for complete adhesion.

3.03 CLEANING AND PROTECTION

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.
- B. Keep traffic away from resilient base for at least 72 hours after installation.
- C. Clean resilient base in accordance with manufacturer's written instructions and as follows:
 - 1. After two weeks, scrub resilient base with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue.
- D. Protect newly installed base from damage by other trades. Be sure all construction debris is picked up and vacuumed or removed prior to leaving area.
- E. When protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

END OF SECTION 096513

PAGE INTENTIONALLY BLANK

PART I GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Rubber Stair Tread without Riser.
 - 2. Rubber Stair Landing Surfacing.
 - 3. Related Accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 096513 – Resilient Base and Accessories

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM F2169 – "Standard Specification for Resilient Stair Treads".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 – Submittal Procedures.
- B. Pursuant to Section 016000 – Product Requirements
- C. Product Data: Manufacturer's technical data for each type of stair tread, stair landing flooring, adhesives and any other related accessories.
- D. Samples for Initial Selection Purpose: Manufacturer's standard and custom color samples in form of actual sections of rubber stair treads, and stair landing surfacing, including accessories, showing full range of colors and patterns available for each type of resilient and rubber flooring required. The Architect shall select the colors, patterns, and textures from the manufacturer's complete range of standard and custom colors.
- E. Warranty: Submit manufacturer's standard limited commercial warranty.
- F. Maintenance Instructions: Submit two (2) Copies of manufacturer's recommended maintenance practices for each type of stair tread and flooring required.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards shall perform all work of this section.
- B. Manufacturer Qualifications: Provide resilient stair treads, risers and stair landing flooring materials manufactured in the United States of America by a firm with a minimum of 10 years' experience producing resilient stair flooring materials of type equivalent to those specified.
- C. Sustainable Design Requirements:
 - 1. Rubber Stair Tread must be easily cleaned and do not require coatings and strippers or use of chemicals that may be hazardous to human health.

2. Rubber Stair Tread must have a published Environmental Product Declaration (EPD).
 3. Rubber Stair Tread must have a published Health Product Declaration (HPD).
 4. Rubber Stair Treads, Risers and Landing materials must be 100% recyclable.
 5. Rubber Stair Treads, Risers and Landing materials must be SCS FloorScore® Certified.
 6. Rubber Stair Treads, Risers and Landing materials must meet GREENGUARD GOLD requirements.
 7. Rubber Stair Treads, Risers and Landing materials must be free of materials known to be teratogenic, mutagenic or carcinogenic including halogens, asbestos and chlorines.
- D. Provide each type of stair tread, floor landing material and accessories as produced by a single manufacturer, including recommended primers, adhesive, and sealants.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.
- C. Store and install only where space temperatures are within stair covering manufacturer's specified range.

1.07 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65-degrees F (18 deg C) in spaces to receive stair covering materials for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store stair covering materials in spaces where they will be installed for at least 48 hours before beginning installation. Maintain minimum temperature of 55 degrees F (13 deg C) in areas where work is completed.
- B. Maintain relative humidity at service levels, or between 40% and 65% RH.
- C. Install stair covering materials after other finishing operations, including painting, have been completed.

1.08 WARRANTY

- A. Provide manufacturer's standard limited commercial warranty covering manufacturing and material defects.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roppe Corporation, 1602 N. Union St., Fostoria, OH 44830. Phone: 800-537-9527 (Basis of Specification)
- B. Other acceptable manufacturers provided they meet or exceed all requirements of this specification:
 1. FLEXCO, Corporation, 1401 East 6th Street, Tuscumbia, AL 35674. Phone: 800-633-3151
 2. Johnsonite Inc., 16910 Munn Road, Chagrin Falls, Ohio 44023. Phone: 800-899-8916

2.02 STAIR COVERING MATERIALS:

- A. Stair Treads: Molded rubber, 1/4-inch-thick at nose tapering to 1/8-inch-thick at back edge and riser; FS RR-T-650, Composition A, Type 2 - Designed; full width and depth of stair; provide tread and riser (if specified) in separate pieces; raised pattern design (tread); square nose

returning down edge of tread 1-1/2 inches. Provide tread with self-illuminating abrasive glow strips at front edge of tread.

1. Tread Raised Pattern Design: Roppe #94 Raised Square Design
- B. Adhesive: As recommended by the stair covering material manufacturer for the type of substrate indicated.
- C. Epoxy Void Filler: As recommended by the stair tread manufacturer to strengthen nosing, fill voids and open spaces at the nosing between the stair tread and stair substrate. Recommended void filler to be used also at junction of riser and tread, as chamfer support for rubber.

2.03 STAIR LANDING TILES

- A. 1/8" thick, manufacturer's standard tile size with raised square design to match stair treads.

2.04 ACCESSORY MATERIALS

- A. Adhesive: Rubber Stair Treads, Risers and Landing manufacturer's recommended product that meets VOC requirements of the project.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer shall inspect stair tread and landing surfaces to determine that they are satisfactory. A satisfactory surface is defined as one that is clean, smooth, permanently dry, flat and free from cracks, holes, and ridges. Coatings preventing adhesive bond, and other defects that impair performance or appearance shall be corrected.
- B. Perform bond and moisture tests on concrete substrates to determine if surfaces are sufficiently cured and dry as well to ascertain presence of curing compounds.
- C. Do not allow stair tread flooring work to proceed until substrate surfaces are satisfactory.
- D. Vacuum surfaces just prior to installation of treads, risers, and landing surfaces.

3.02 INSTALLATION

- A. Install material in accordance with manufacturer's instructions and recommendations.
 1. Select the appropriate, approved adhesive for the application and job conditions.
 2. A stair tread is to be placed at the edge of each landing at the top of the stairs.
- B. Tightly bond treads, risers and flooring to substrate throughout length of each piece, with continuous contact at surfaces.
- C. Roll treads, risers and flooring for complete adhesion.
- D. Promptly remove any excess adhesive.
- E. Rubber Stair Tread Accessories:
 1. Provide stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 2. For treads installed as separate, equal-length units, install to produce a flush joint between units.

3.03 CLEANING AND PROTECTION

- A. Clean up installation area and sweep, vacuum dust or wipe material to remove any dirt, dust or debris.
- B. Keep traffic off stair tread and landings for at least 72 hours after installation.
- C. When construction traffic is anticipated, cover tread materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until Substantial Completion.
- D. When protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean stair treads, risers and landing flooring. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

END OF SECTION 096513.23

PART I GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Luxury Solid Vinyl Tile (LVT)
 - 2. Edge Strips.
 - 3. Related Accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 033000 - Cast-In-Place Concrete
 - 2. Section 090561.13 - Moisture Vapor Emission Control
 - 3. Section 096513 - Resilient Base and Accessories

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. RFCI Handbook.
- C. ASTM F710 "Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
 - 1. Product Data: Manufacturer's technical data for each type of resilient flooring and accessory.
 - 2. Samples for Initial Selection Purpose: Manufacturer's standard and custom color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available for each type of resilient and rubber flooring required. The Architect shall select the colors, patterns, and textures from the manufacturer's complete range of standard and custom colors.
- B. Maintenance Instructions: Submit two (2) Copies of manufacturer's recommended maintenance practices for Luxury Vinyl Tile flooring and accessories.
- C. Pursuant to Section 016000 - Product Requirements

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards shall perform all work of this section.
- B. Provide each type of Luxury Vinyl Tile flooring and accessories as produced by a single manufacturer, including recommended primers, adhesive, sealants, and leveling compounds.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.

- B. Protect against moisture exposure and damage.
- C. Store and install only where space temperatures are within resilient materials manufacturer's specified range. Thereafter, maintain resilient materials manufacturer's specified environmental conditions.

1.07 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65-degrees F in spaces to receive luxury vinyl tile for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store luxury vinyl tile flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Maintain minimum temperature of 55 degrees F in areas where work is completed.
- B. Install luxury vinyl tile flooring and accessories after other finishing operations, including painting, have been completed. Do not install luxury vinyl tile flooring over concrete slabs until the installation of the moisture vapor emission control membrane is complete.

1.08 MANDATORY TESTING

- A. Hardened concrete to receive resilient flooring shall be tested using anhydrous calcium chloride test for measurement of vapor emissions.
 - 1. Three (3) tests shall be required for initial 2,000 sq. ft. and one (1) additional test for each 1,000 sq. ft. of floor over 2,000 sq. ft.
 - 2. All tests must be done simultaneously.
 - 3. Resilient flooring shall not be installed unless tests meet or exceed manufacturer's recommendations for their adhesive and flooring.
 - 4. Test must be performed by an independent testing agency.
 - 5. Testing agency shall supply three (3) copies of test results to the Architect.

1.09 EXTRA MATERIALS

- A. Furnish an extra 3% of each tile type, shape, size, gloss, and color in clean marked containers for Owner's use.

PART 2 PRODUCTS

2.01 LUXURY SOLID VINYL TILE

- A. Manufacturer
 - 1. Armstrong World Industries, Inc., Natural Creations with Diamond 10 Technology.
- B. Products.
 - 1. Description: A layered construction consisting of a tough, clear, vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
 - 2. Luxury Vinyl Tile shall conform to the requirements of ASTM F 1700, "Standard Specification for Solid Vinyl Tile", Class III, Type B - Embossed Surface.
- C. Color: As selected by the Architect from all available colors in the Natural Creations collection. Multiple colors may be used.
- D. Size: 4 inch x 36 inch, 4 inch x 48 inch, 6 inch x 36 inch , 8 inch x 36 inch , or 8 inch x 48 inch as selected by the Architect. Multiple widths/lengths may be used.

2.02 VAPOR REDUCTION MEMBRANE

- A. See Specification Section 090561.13.

2.03 ACCESSORY MATERIALS

- A. Adhesive: Luxury Vinyl Tile manufacturer's recommendation for each product, substrate, and location; must meet manufacturer's warranty requirements.
- B. Leveling and Underlayment Compound:
 - 1. Where required- verify with architect prior to placement.
 - 2. Latex cementitious type as required by moisture vapor emission control manufacturer. Minimum 28-day compressive strength: 4000-lb./sq. ft.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer shall inspect subfloor surfaces to determine that they are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, and ridges. Coatings preventing adhesive bond, and other defects impair performance or appearance.
- B. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well to ascertain presence of curing compounds. Slab tolerance to be 1/16-inch per 1'-0" max. Coordinate with concrete slab contractor. (Manufacturer recommendation will supersede this requirement).
- C. Do not allow luxury vinyl tile flooring work to proceed until subfloor surfaces are satisfactory.

3.02 PREPARATION

- A. Test substrate to ensure proper dryness.
- B. Prepare subfloor surfaces as follows:
 - 1. Use leveling, and patching compounds as recommended by moisture vapor emission control manufacturer for filling small cracks, holes, and depressions in subfloors. Maximum surface variation: 1/8-inch in 10-feet in any direction.
 - 2. Remove coatings from subfloor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paint, oils, waxes and sealers.
- C. Vacuum surfaces to be covered and inspect floor.
- D. Apply moisture vapor reduction membrane, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.03 INSTALLATION

- A. Standards: Manufacturer's published instructions.
- B. Lay tile and related materials so that fields or patterns center on areas, so that tile at opposite edges of room are of equal width.
 - 1. Adjust pattern that edge pieces are not less than 1/2 tile size.
 - 2. Lay tile square to room axis, unless otherwise shown.

3. Verify moisture membrane has been laid perpendicular to the luxury vinyl tile direction.
 4. Stagger adjacent tiles per manufacturer's recommendation or as directed by the Architect.
- C. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged, if so numbered.
- D. Lay materials true to line, level, and with tight joints. Scribe, cut, and tightly fit materials to and around permanent fixtures, equipment, pipes, and bases. Extend luxury vinyl tile into toe spaces, door reveals, and into closets and similar openings.
1. Lay tile with grain running in same directions.
- E. Tightly cement luxury vinyl tile to subbase (using full spread of adhesive applied in compliance with flooring manufacturer's directions) without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll luxury vinyl tile flooring at perimeter of each covered area to assure adhesion.
- F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.
- G. After installation, remove excessive adhesive pursuant to luxury vinyl tile manufacturer's published instructions.

3.04 INSTALLATION OF ACCESSORIES

- A. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed and extends beyond.
- B. Do not install LVT after wall tile installation.
- C. Rubber Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

- A. Sweep and vacuum tile surfaces thoroughly.
- B. Scrub the floor with a neutral detergent solution to remove black marks and excessive soil. Thoroughly rinse and allow to air dry. DO NOT wash floor until time period recommended by luxury vinyl tile and moisture vapor emission control manufacturers has elapsed to allow luxury vinyl tile flooring to become well sealed in adhesive.
- C. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by luxury vinyl tile manufacturer.
- D. Protect flooring against damage during construction period to comply with luxury vinyl tile flooring manufacturer's directions.
- E. Protect flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishing across floors.
- F. Cover flooring with un-dyed, untreated building paper until inspection for Substantial Completion.

END OF SECTION 096519.23

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Carpet tile, including transition strips to other floorings.
 - 2. Carpet Tile on existing Stair A treads and risers with vinyl stair nosings.
- B. Related Sections include the following:
 - 1. Section 033500 - Concrete Finishing.
 - 2. Section 090561 13 - Moisture Vapor Emission Control.
 - 3. Section 096513 - Resilient Base and Accessories.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. The American Association of Textile Chemists and Colorists (AATCC).
 - 1. AATCC TM16 - "Test Method for Colorfastness to Light".
 - 2. AATCC TM134 - "Test Methods for Electrostatic Propensity of Carpets".
 - 3. AATCC TM174 - "Antimicrobial Activity Assessment of New Carpets".
- C. ASTM D2859 "Standard Test Method for Flammability of Finished Textile Floor Covering Materials".
- D. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
- E. ASTM E648 "Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source".
- F. The Carpet and Rug Institute (CRI) - CRI 104 "Standard for Installation of Commercial Carpet".
- G. NFPA 253 "Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source".
- H. ISO (the International Organization for Standardization):
 - 1. ISO 2551 - "Textile Floor Coverings and Textile Floor Coverings in Tile Form - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions and Distortion Out of Plane".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Product Data:
 - 1. For each style and pattern of carpet tile indicated, provide manufacturer's written data on physical and performance characteristics including: radiant flux classification, durability, emissions, electrostatic properties and fade resistance.

2. Adhesives including VOC content.
 3. Transition, stair nosings and termination strips.
- D. Shop Drawings: Provide room layout drawing indicating tile layout, color /style of carpet tile, transition details to other flooring materials.
- E. Samples: Provide two samples of each different carpet tile manufacturer, product, trade name, series, texture, pattern, and color. Size of each: 12 in. by 12 in. minimum.
- F. Qualifications Data: For Installer.
- G. Maintenance Instructions: Carpet tile manufacturer's published maintenance instructions.
1. Include methods for maintaining carpet tile, including cleaning and stain removal recommended products and procedures.
 2. Manufacturer's recommended maintenance instructions.
- H. Sample Warranty: Provide sample special warranty as specified in this Section.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements or an Installer certified by the carpet tile manufacturer.
- C. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2 of this Specification, as determined by testing identical products per ASTM E648 by an independent testing and inspection agency acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Store and install only where space temperatures are within carpet manufacturer's specified range. Thereafter, maintain carpet manufacturer's specified environmental conditions.

1.07 MANDATORY TESTING

- A. Hardened concrete to receive carpet shall be tested using anhydrous calcium chloride test for measurement of vapor emissions.
1. Three (3) tests shall be required for 2,000 sq. ft. and one (1) additional test for each 1,000 sq. ft. of floor over 2,000 sq. ft.
 2. All tests must be done simultaneously.
 3. Carpet tile shall not be installed unless tests meet or exceed manufacturer's recommendations for their adhesive and flooring.
 4. Test must be performed by an independent testing agency.
 5. Testing agency shall supply three (3) copies of test results to the Architect.

1.08 EXTRA MATERIALS

- A. Furnish to Owner an additional Twelve (12) carpet tiles of each different color selected and one (1) full gallon of adhesive, unopened.

1.09 WARRANTY

- A. Manufacturer's written warranty in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling and zippering, snags, runs, loss of tuft bind strength, backing integrity-delamination, excess static discharge, abrasive wear, and delamination.
 - 3. Warranty Period: Lifetime Commercial Warranty.

PART 2 PRODUCTS

2.01 CARPET TILE

- A. Manufacturer: Shaw Contract Group
- B. Size: 24" x 24".
- C. Collections:
 - 1. No Rules" as selected by the Architect from the full complement of colors in the following styles: Byline #59113, Link #59105 and Linage #59106.
 - 2. Multiple Styles and colors may be used thru out the project as selected by the Architect.
- D. Product Specifications:
 - 1. ASTM E-648-03 Radiant Panel: Class 1
 - 2. NFPA 253 Class 1
 - 3. NFPA Life Safety Code 101—must meet or exceed Class 1 Critical Radiant Flux of .45 watts/sq. cm or higher.
 - 4. NBS Smoke Chamber Test: less than 450 (flaming)
 - 5. Static Propensity: 3.5 K.V. or less (as tested in accordance with AATCC-134) with built in permanent conductive fiber.
- E. Warranty: Lifetime Commercial Warranty Covering
 - 1. Edge Ravel & Zippering
 - 2. Backing Integrity—Delamination
 - 3. High Tuff Bind
 - 4. Abrasive Wear

2.02 ACCESSORIES

- A. Adhesives: As recommended by carpet tile manufacturer for substrate, location, and installed conditions.
- B. Base and transitions: Required by carpet tile manufacturer and by installation conditions for finishing exposed edges, access panel edges, and transitions between carpet tile and other flooring materials.
 - 1. Resilient and Metal Transitions: See drawings for specific transition requirements.
- C. Existing Stair A-- Carpet Tile on treads, risers and landings.

1. Provide Tarkett Vinyl Stair Nosing Model # VIRCN-XX-A with 2" ADA compliant visually impaired contrast strip or Architect approved equivalent.

PART 3 EXECUTION

3.01 PREPARATION

- A. Test substrate to ensure proper dryness.
- B. Prepare subfloor surfaces as follows:
 1. Use leveling, and patching compounds as recommended by moisture vapor emission control manufacturer for filling small cracks, holes, and depressions in subfloors. Maximum surface variation: 1/8-inch in 10-feet in any direction.
 2. Remove coatings from subfloor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paint, oils, waxes and sealers.
- C. Vacuum surfaces to be covered and inspect floor.
- D. Install vapor reduction membrane in accordance with Specification Section 090561.13.

3.02 INSTALLATION

- A. Commencement of installation implies that:
 1. Substrate has been tested and results are acceptable pursuant to CRI 104 and carpet manufacturer's published instructions.
 2. Installation components and accessories are compatible with site conditions pursuant to carpet tile manufacturer's published instructions.
 3. Ambient environmental conditions are satisfactory pursuant to CRI 104 and carpet tile manufacturer's published instructions.
- B. Pursuant to carpet tile manufacturer's published instructions and CRI 104, Section 14, "Carpet Modules".
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves and similar openings.
- F. Install free of spots, dirt, or soil; without tears, fraying, raveling, or other defects or damage.

3.03 DIRECT GLUE-DOWN INSTALLATION

- A. Apply adhesive and spread at coverage rate per manufacturer's instructions.
- B. Test for complete contact of adhesive to carpet, backing and floor surface.
- C. Directional and/or pattern tile shall be installed in directions approved by the Architect.
- D. Install free of buckles and ripples.

- E. Ensure proper seam execution using materials and methods pursuant to carpet tile manufacturer's published instructions.
- F. Protect from foot traffic for 48 hours after installation.

3.04 INSTALLATION SCHEDULE

- A. Installation method: Direct glue-down.
- B. Location: as indicated on finish schedule.

3.05 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations".
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.
- D. Perform Final Cleaning in accordance with Section 017423 - Cleaning.

END OF SECTION 096813

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Agreement, including General Conditions, and Divisions 01 of the Project Manual, apply to work of this section.

1.02 SUMMARY

- A. This Section includes prefinished polyester glass reinforced plastic sheets (FRP) and associated trim pieces adhered to unfinished gypsum wall board, at locations as indicated on Contract Drawings.
- B. Related Sections include the following:
 - 1. Section 079200 - Sealants.
 - 2. Section 092116 - Gypsum Board Assemblies.
 - 3. Section 096513 - Resilient Base and Accessories

1.03 STANDARDS

- A. All work of this Section shall conform to industry standards and/or manufacturer's recommendations.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Product Data: Submit manufacturer's data to indicate compliance with these specifications including:
 - 1. Catalogue cuts including adhesive product data accessory trim and molding sizes and shapes.
 - 2. Storage, handling and preparation instructions and recommendations.
 - 3. Installation instructions.
- D. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- E. Selection Samples: Submit manufacturer's color and pattern selection samples representing manufacturer's full range of available colors and patterns.
- F. Samples of each selected color and pattern:
 - 1. Plastic Panels: Two (2) 12-inch square samples or larger if necessary showing complete pattern repeat in selected color. Provide samples for each different color and/or pattern selected.
 - 2. Accessories and Moldings: 12 inches long, full section, each type.
- G. Maintenance Data: Deliver 2 copies, covering the installed products.

1.05 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - 1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
 - a. Wall Required Rating – Class C.

- B. Sanitary Standards: System components and finishes to comply with:
1. United States Department of Agriculture (USDA) / Food Safety & Inspection Services (FSIS) requirements for food preparation facilities, incidental contact.
 2. Food and Drug Administration (FDA) 2013 Food Code 6-101.11.
 3. Canadian Food Inspection Agency (CFIA) requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Deliver panels with protection sheets intact on exposed finished surfaces. Deliver accessories in original, unopened containers.
- B. Storage and Protection: Store materials lying flat in a manner to prevent soiling. Protect materials from physical damage and wetting.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with manufacturer's written recommendations regarding environmental conditions under which materials can be installed.

1.08 WARRANTY

- A. A. Furnish one-year guarantee against defects in material and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Marlite, 1 Marlite Drive, Dover, Ohio 44622; Phone: 800-377-1221
- B. Architect approved equivalent offering a precision grid, Class C FRP in colors and patterns equal to or greater than specified product.

2.02 MATERIALS

- A. Plastic Panels: Glass-fiber reinforced polyester plastic panels; ASTM D 3481, USDA accepted.
1. Minimum Physical Properties for Class C (III) Panels:

PROPERTY	TYPICAL VALUE	TEST METHOD
Flexural strength (PSI)	0.9 x 10 ⁴	ASTM D 790
Flexural modulus (PSI)	6.0 x 10 ⁶	ASTM D 790
Tensile strength (PSI)	11.5 x 10 ³	ASTM D 638
Tensile modulus (PSI)	0.45 x 10 ⁶	ASTM D 638
Impact strength (IZOD) (ft. lbs./in. notched)	6.0	ASTM D 256
Barcol hardness	28	ASTM D 2583
Mold & Mildew	Pass	ASTM D 3273
Water absorption (percent)	0.15	ASTM D 570

2. Fire Rating: Class C.
3. Nominal Thickness: 0.090 inch nominal.

4. Finish: Scored pattern from manufacturer's Blue Sky™ Tile & Mosaics Library with Sani-Coat finish.
 5. Color: As selected by Architect from manufacturer's standard classic, checkerboard, accent and Blue Sky™ Tile & Mosaics colors.
- B. Accessories and Moldings: One-piece, color integral PVC, color to match plastic panels, thickness to match plastic panels and plastic boards.
- C. Adhesive & Sealant: Plastic panel manufacturer's standard or recommended high strength waterproof adhesive for substrate involved.

2.03 PRODUCT

- A. Symmetrix™ with BlueSky™ Advanced Finishing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed instructions, except as shown or specified otherwise.
- B. Install moldings and trim plumb and level, within 1/8 inch in any 8 feet of length, in longest lengths practicable. Install division bars between panels in the same plane, inside corners at interior junctures, outside corners at external corners, and cap at top of panels and where panels abut dissimilar materials.
1. Attach moldings and trim to substrate with concealed fasteners spaced not more than 2 inches from ends and 12 inches on center.
 2. Apply a continuous bead of Type 1D sealant to one side of channel trim piece. Install trim piece on leading edge of panel. Apply a continuous bead of Type 1D sealant to exposed channel and install the next panel. Continue in this manner until installation is complete.

3.02 CLEANING

- A. Remove dirt and other foreign substances from exposed surfaces in accordance with manufacturer's printed cleaning instructions.

END OF SECTION 097720

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Stainless Steel Wall Covering Panels and associated trim.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Section 092116 - Gypsum Board Assemblies
 - 2. Section 233813 - Kitchen Hood Systems

1.03 REFERENCES

- A. ASTM A240 "Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate Sheet and Strip for Pressure Vessels and for General Applications".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Product Data: Manufacturer's data indicating product data for stainless steel wall panels:
 - 1. Gauge of material.
 - 2. Finish – see sample requirements
 - 3. Accessories
 - 4. Adhesive
 - 5. Cleaning product
- D. Shop Drawings: Submit elevations of each wall showing location of panels and trim pieces with respect to all discontinuities in the wall elevation.
- E. Samples: Submit two 4" x 4" samples showing stainless steel finish for approval.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver panels with protection sheets intact on exposed finished surfaces. Deliver accessories in original, unopened containers.
- B. Storage and Protection: Store materials lying flat in a manner to prevent soiling. Protect materials from physical damage and wetting.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with manufacturer's written recommendations regarding environmental conditions under which materials can be installed.

1.07 WARRANTY

- A. Furnish one-year guarantee against defects in material and workmanship.

PART 2 PRODUCTS

2.01 MATERIAL SUPPLIERS

- A. Commerce Metals, 920 Chatfield St S, Dover MN 55929, Phone: 877-887-9523, www.commerceMetals.com. (Basis of Specification)
- B. Stainless Supply, 307 North Secrest Ave., Monroe, NC 28110, Phone: 877-484-0088.
- C. Architect Approved Equivalent.

2.02 MATERIALS

- A. Stainless Steel Wall Panels
 - 1. 4' wide x length required where full sheets will fit.
 - 2. 22 GA, Brushed Appliance Finish (#4) or #4 Brushed/Satin Finish-Fine Line.
 - 3. Removable PVC film on the finished side.
- B. Trim Pieces
 - 1. Stainless Steel Divider (T-Molding)
 - a. Pro Trim - Divider: 304 Stainless Steel with a #4 finish, 20 GA, exposed profile = 1".
 - 2. Stainless Steel Inside Corner
 - a. Pro Trim - Inside Corner: 304 Stainless Steel with a #4 finish, 20 GA, exposed profile = 1" on each leg.
 - 3. Stainless Steel Edge (J-Molding)
 - a. Pro Trim - Edge: 304 Stainless Steel with a #4 finish, 20 GA, exposed profile = 1".
 - 4. Stainless Steel Outside Corner
 - a. Pro Trim - Outside Corner: 304 Stainless Steel with a #4 finish, 20 GA, exposed profile = 1" on each leg.
- C. Adhesive
 - 1. Titebond Advanced Polymer Panel Adhesive
 - a. NFPA Class A Fire Rating.
 - b. Service Temperature: -40° F to 220° F.
 - c. Zero VOC's when cured.
 - 2. Sealant
 - a. High temperature silicone sealant with NSF certification, meeting MIL-46106 Type 1 FDA and USDA requirements.
- D. Cleaner
 - 1. Weiman Stainless Steel Cleaner and Polish or Architect Approved Equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. The installer shall inspect wall surface to receive paneling to determine that they are satisfactory. A satisfactory wall surface is defined as one that is smooth and free of cracks, holes and ridges. Coatings preventing adhesive bond and other defects impairing performance or appearance.
- B. Do not begin Stainless Steel wall paneling installation until substrate surfaces are satisfactory.

3.02 INSTALLATION

- A. Install panels square and true.
- B. Provide necessary cut-outs in panels for electrical boxes and pipe penetrations.
- C. In Kitchen:
 - 1. Bottom of panels shall terminate with a J-Molding on top of quarry tile base.
 - 2. Top of panels shall terminate three (3) inches above bottom of kitchen hood. Where there is no hood, terminate panels two (2) inches above bottom of ceiling edge molding.
 - 3. Provide inside and outside corners full height as required.
 - 4. Any exposed edge of panel shall be trimmed with a J-Molding.
- D. Panels and their pieces shall be installed in a full bed of adhesive, spread at a notched thickness as recommended by the adhesive manufacturer.

3.03 CLEANING

- A. Remove protective plastic film just prior to substantial completion or installation of kitchen equipment.
- B. Clean all Stainless-Steel panels and trim with an approved stainless-steel cleaner.

END OF SECTION 097813

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Surface Preparation.
 - 2. Extent of painting work is shown on drawings and schedules, and as herein specified.
 - 3. The Work includes: painting and finishing of all interior and exterior work, except as otherwise indicated.
 - a. Painting and finishing of all interior and exterior work, except as otherwise indicated.
 - b. Painting and finishing existing Fire Station construction that has been modified and/or damaged.
 - c. Where new infills have been installed the entire section of wall (corner to corner) shall be painted.
 - d. Existing door frames and/or doors that remain are to be sanded and repainted.
 - e. Existing exposed ceilings are to be scraped and painted in locations as noted on the Contract Drawings.
 - 4. Special painting items include but are not limited to: exterior steel lintels; exposed ductwork, pipes, and conduits; and exposed structural and miscellaneous steel.
 - 5. Stencil painting fire rated and/or smoke tight wall assembly identification.
- B. Work Not Included
 - 1. Prefinished Materials: Including floor finishes, prefinished ceiling components, cement board siding, brick, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, and bronze and other products furnished with factory finishes unless otherwise indicated.
 - 2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 033500 - Concrete Finishing
 - 2. Section 042200 - Concrete Unit Masonry.
 - 3. Division 05 - Metals
 - 4. Section 062000 - Finish Carpentry
 - 5. Section 079200 - Sealants.
 - 6. Section 081113 - Hollow Metal Doors & Frames
 - 7. Section 083113 - Access Doors and Frames
 - 8. Section 092116 - Gypsum Board Assemblies.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ASTM D16 "Standard Terminology for Paint, Related Coatings, Materials, and Applications".
- C. ASTM D4214 "Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films".
- D. ASTM D660 "Standard Test Method for Evaluating Degree of Checking of Exterior Paints".

- E. ASTM D661 "Standard Test Method for Evaluating Degree of Cracking of Exterior Paints".
- F. ASTM D714 "Standard Test Method for Evaluating Degree of Blistering of Paints".
- G. ASTM D5324 "Standard Guide for Testing Water-Borne Architectural Coatings".
- H. ASTM D3170 "Standard Test Method for Chipping Resistance of Coatings".
- I. SSPC - SP 1 "Solvent Cleaning".
- J. SSPC - SP 2 "Hand Tool Cleaning".
- K. SSPC - SP 3 "Power Tool Cleaning".
- L. SSPC - SP 13/NACE No. 6 "Surface Preparation for Concrete".
- M. EPA-Method 24.
- N. OTC (Northeast Ozone Transport Commission) Latest adopted model rules.

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures:
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Manufacturer's Literature: Material description and application instructions for each type of material specified or required.
- D. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples ("drops") of each color and finish used.
- E. Manufacturer's latest array of full line of colors (color fans).
- F. For materials to receive stain & polyurethane provide three (3) samples of each selected stain color on each wood species being used.
- G. Submit OTC (Ozone Transport Commission) lower VOC compliant products only. Colorant/Tint used in coatings shall add no additional VOC to final product.
- H. Provide Manufacturer Safety Data Specs (MSDS).

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work shall perform all work of this section according to manufacturers' recommendations and/or industry standards.
- B. Provide materials only in factory sealed and labeled containers. Reuse of any containers for any reason is prohibited and will result in work not being acceptable.
- C. Unless specified, or Architect approved to the contrary, provide all coating materials from same manufacturer.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Receive paint materials only in unopened, original containers with labels intact. Store materials on site in an approved location. When so ascertained, remove immediately from job site all damaged or otherwise defective material.
- D. Provide labels on each container with the following information:
 - 1. Name or title of product.
 - 2. Manufacturer's color identification code
 - 3. Manufacturer's stock number.
 - 4. Manufacturer's name.
 - 5. VOC Content.
 - 6. Batch Date.
 - 7. Contents by volume, for major pigment and vehicle constituents.
 - 8. Thinning instructions.
 - 9. Application instructions.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental conditions can be modified only if such requirements are a part of manufacturer's published application instructions.
- B. Apply paint materials only when surface and air temperatures are above 50 degrees F for 48 hours before, during, and after the paint application.
- C. Do not apply exterior paint or stain during rain, snow, or damp weather.
- D. Do not apply paint in direct sunlight.
- E. Apply paint materials only when relative humidity is lower than 85% and surface temperature is at least 5 degrees F above dew point.
 - 1. Conditions must remain acceptable to manufacturer's recommendations during drying time.
- F. Apply paint only to surfaces that are free of surface moisture.
- G. Do not apply paint in areas with airborne dust or where dust can be generated.

1.08 SAMPLING OF MATERIALS

- A. Samples of materials being used on the job may be taken at any time at discretion of Architect and checked for compliance to these specifications.

1.09 EXTRA STOCK

- A. Provide 1 gallon of each separate color and finish product used on Project.
- B. Label each container with color, texture, sheen, and room designation, in addition to manufacturer's unobstructed label.

1.10 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.
- B. The term "Paint", as used herein, includes enamels, paints, sealers, fillers, emulsions, stains, varnishes and other coatings whether used as prime, intermediate, or finish coats.
- C. "MDF" equals minimum dry film thickness. The numbers specified denote the thickness of each coat.
- D. "Properly Painted Surface" - A surface that is uniform in appearance, color, sheen, and without telegraphing of any portion of the substrate. It is one that is free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, or insufficient coverage. It is a surface that is free of drips, spatters, spills, or overspray which a Contractor's workforce may cause. Compliance to meeting the criteria of a "Properly Painted Surface" shall be determined by the Architect when viewed without magnification at a distance of five (5) feet or more under normal lighting (both daylight and artificial) conditions and from a normal viewing position.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. General Architectural Coatings
 - a. Benjamin Moore & Co.
 - b. Sherwin Williams Company.
 - c. Architect Approved Equivalent.
- B. Provide products specifically formulated for geographical area in which Project is located.
- C. MPI Standards: Provide products that comply with MPI standards and that are listed in its "MPI Approved Products List".

2.02 COLORS

- A. Selection: by Architect from manufacturer's full range.
- B. Proprietary names used to designate colors or materials are not intended to imply that products of those manufacturers are required to the exclusion of Architect approved equivalent products of other manufacturers - unless noted otherwise.

2.03 COATING SYSTEMS

- A. Gypsum board - General Office Area (dry environment)
 - 1. Sherwin Williams
 - a. Drywall Primer: USG Sheetrock Brand First Coat Primer DFT 0.9-1.2
 - b. Paint Primer: ProMar 200 Zero VOC Primer; MDF 1.5
 - c. Two coats: ProMar 200 Zero VOC Low Sheen Eg-Shel; MDF 1.6
 - d. Total System: MDF 4.7
 - 2. Benjamin Moore
 - a. Drywall Primer: USG Sheetrock Brand First Coat Primer DFT 0.9-1.2
 - b. Paint Primer: Eco Spec WB Latex Primer Sealer (372); MDF 1.2
 - c. Two coats: Eco Spec WB Latex Sheen Eggshell (374); MDF 1.4 per coat
 - d. Total System: DFT 3.5 - 4.0.

- B. Ferrous metals, shop primed (flat and gloss, solvent base)
 - 1. Sherwin Williams
 - a. Primer: Pro Industrial Pro-Cryl Universal Primer (B66-310);
 - b. MDF 2.0-4.0
 - c. Two coats: Pro Industrial Acrylic Semi-Gloss; MDF 2.5 per coat
 - d. Total System: MDF 7.0 - 9.0
 - 2. Benjamin Moore
 - a. Primer: Alkyd Metal Primer (P04); MDF 2.0
 - b. Two coats: Super Spec HP DTM Acrylic High Gloss (P28); MDF 2.0 per coat
 - c. Total System: DFT 6.0
- C. Wood, painted (semi-gloss, water base)
 - 1. Sherwin Williams
 - a. Primer: PrepRite Premium Wall and Wood Primer MDF 1.4
 - b. Two coats: ProMar 200 Zero VOC Semi-Gloss MDF 1.6
 - c. Total System: MDF 4.6
 - 2. Benjamin Moore
 - a. Primer: Eco Spec WB Latex Primer Sealer (372); MDF 1.2
 - b. Two coats: Eco Spec WB Latex Semi-Gloss (376); MDF 1.5 per coat
 - c. Total System: DFT 3.5 - 4.5
- D. Wood, finished (semi-gloss, solvent base and stain)
 - 1. Sherwin Williams
 - a. Primer: follow manufacturer's instructions for wood grain filler and/or wood conditioner
 - b. First Coat: Minwax 250 VOC Stains
 - c. Second & Third Coat: Wood Classics Waterborne Satin Varnish (A68) MDF 1.3 per coat
 - d. Total System: MDF 2.6
 - 2. Benjamin Moore
 - a. Primer: follow manufacturer's instructions for wood grain filler and/or wood conditioner
 - b. First Coat: Benwood Interior Wood Finishes, Polyurethane Low Lustre (435); MDF 1.0 - 1.2
 - c. Second & Third Coat: Benwood Interior Wood Finishes, Polyurethane Low Lustre (435); MDF 1.0 - 1.2 per coat
 - d. Total System: MDF 3.0 - 3.6
- E. Interior CMU (Paint)
 - 1. Sherwin Williams
 - a. First Coat: Pro Industrial® HD Block Filler (B42W00150) MDF 8.0-10.5
 - b. Two Coats: ProMar® 200 Zero VOC Eg-shel (B20W12651); MDF 1.6
 - c. Total System: MDF 11.2-13.5
 - 2. Benjamin Moore
 - a. First Coat: Moorecraft Super Craft Latex Block Filler (285), MDF 8.1-11.0
 - b. Two Coats: Eco Spec WB Latex Eggshell (374); MDF 1.4 per coat
 - c. Total System DFT: 12.0 - 13.5
- F. Ferrous Metal hidden from view (e.g. - back side of door frames, lintels, etc.);
 - 1. Sherwin Williams
 - a. One Coat: Pro Industrial™ Pro-Cryl Universal Primer (B66-310);
 - b. MDF 2.0-4.0
 - 2. Benjamin Moore
 - a. One Coat: Acrylic Metal Primer (P04), MDF 1.5-2.5

- G. Apparatus Bay and Exterior Apron Painted Guide Stripe on Concrete Floor, Hardened Concrete Floor, or Polished Concrete Floor (Must mechanically prep areas to receive traffic marking)
 - 1. Watco
 - a. One Coat: Anti Slip Traffic Paint,
- H. Exposed PVC Piping
 - 1. Sherwin Williams
 - a. One Coat: Extreme Bond™ Primer (B5100150)
 - b. Two Coats: Pro Industrial™ Acrylic Eg-Shel (B66-660)
 - 2. Benjamin Moore
 - a. One Coat: STIX Waterborne Bonding Primer SXA-110
 - b. Two Coats: Ultra Spec 500 Interior Eggshell Finish (N538)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 GENERAL PREPARATION (ALL SUBSTRATES)

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.

3.03 CONCRETE AND CMU PREPARATION

- A. Remove all surface dust, dirt and other contaminants by brooming, air blast, or vacuum cleaner.
- B. Remove form release agents, laitance, dirt and other contamination, as required by coatings manufacturer, by using a light blast with fine silica sand.
- C. Obtain allowable moisture content level from coatings manufacturer. Determine moisture content by means of a moisture meter designed specifically for concrete and operated by a qualified inspector. Apply coatings only after all conditions conform to published requirements of coating manufacturer.

3.04 GYPSUM BOARD SURFACE PREPARATION

- A. Do not use linseed oil putty, glazing materials, patching pencils, caulking, or masking tape on surfaces to be painted.
- B. Sand and dust as necessary.
- C. Remove all dust, dirt, powdery residue, grease, oil, wax, or any other contaminants.
- D. Spot prime defects after repair.

3.05 FERROUS METAL SURFACE PREPARATION

- A. Shop Primed
 - 1. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 2. Remove oils and lubricants by using mineral spirits or xylol solvents. Change applicators frequently to avoid recontamination. Execute pursuant to SSPC SP-1.

3.06 GALVANIZED METAL SURFACE PREPARATION

- A. Remove oils, greases, and waxes by using appropriate solvents. Change applicators frequently to avoid recontamination. Execute pursuant to SSPC SP-1.
- B. Remove water-soluble contaminants by washing with water.

3.07 WOOD SURFACE PREPARATION

- A. Remove oil and grease by using mineral spirits or xylol. Change applicators frequently to avoid recontamination.
- B. Seal defects such as knots, resins, gum pockets, or extractives by using a mixture of equal parts of shellac and alcohol.
- C. Remove mildew by scrubbing with a solution of 1 tablespoon of dry powdered laundry detergent with 1 quart of hypochlorite type household bleach to 3 quarts of warm water. After scrubbing, rinse thoroughly with clean water.
- D. Fill nail holes, cracks, or other surface defects by using putty. Where stained or clear finishes will be applied, use putty that is colored to match natural color of the unfinished wood.
- E. Back prime all trim, bases, casing, and finish lumber prior to installation.
- F. Apply two (2) coats of primer on all redwood or cedar where paint will be applied.
- G. Sand and dust as necessary.

3.08 INTERIOR POLYURETHANE MOLDINGS, TRIM AND EXTERIOR SYNTHETIC TRIM

- A. Follow manufacturers recommended surface preparation requirements.
- B. Fill nail holes, cracks, joints between pieces, or other surface defects by using putty or material as recommended by molding and/or trim manufacturer. Sand all patched areas smooth.

3.09 APPLICATION

- A. Beginning of installation means acceptance of existing surfaces.
- B. Apply paint pursuant manufacturer's directions. Use applicators and techniques best suited for type of material being applied.
- C. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- D. On GWB walls with suspended acoustical ceilings, apply primer and first coat of finish paint prior to ceiling grid installation. Extend these two coats 4" above ceiling line.
- E. Sand lightly between each succeeding enamel or varnish coat.
- F. Spray Painting: allowable interiors to be approved by the Architect. Limit spray-painting on interior surface to acoustical plaster (if any) and service spaces such as mechanical equipment rooms.
- G. Minimum coating thickness: apply each material at not less than manufacturer's recommended spreading rate.
- H. Prime coats: apply a prime coat if specified to material which is required to be painted or finished, and which has not been prime coated.
- I. Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Roller Applications: roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfections.
- K. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections are not acceptable. Cut in sharp lines and color breaks.
- L. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
- M. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint Work not in compliance with specified requirements.

3.10 INCLUSIONS

- A. Paint all surfaces specified, scheduled, illustrated, and otherwise exposed to view except those items or surfaces specifically noted.
- B. Paint all exposed exterior and interior piping, bollards, frames, conduit, ductwork, steel grilles, and related fittings identical with room or ceiling color or adjacent surfaces unless specifically noted otherwise. This includes all conduit, ductwork and piping in the Apparatus Bays and adjacent rooms.

1. All gas piping (interior and exterior) shall be painted with a rust-inhibitive primer and final coated with yellow paint in accordance with ANSI/ASME A13.1.
 2. All compressed air piping shall be painted with a rust-inhibitive primer (special galvanized primer if pipe is galvanized) and final coated with blue paint in accordance with ANSI/ASME A13.1.
- C. Finish recesses same as adjoining rooms. Finish all other surfaces same as nearest or adjoining surfaces unless specifically noted otherwise.
- D. Paint surfaces behind equipment and furniture same as equal or adjacent exposed surfaces.
- E. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
- F. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
- G. Paint all hollow metal doors and frames that do not have a factory provided finish.
1. As directed by Architect, hollow metal frames and doors may be different colors on each side of frame and/or door.
 2. Finish door tops, bottoms and side edges same as faces, unless otherwise indicated.
 3. Hollow metal doors and/or frames may be painted different colors from one side to the other.
- H. Paint all steel bollards, overhead door steel jambs and lintels, all exposed steel structure, galvanized decking, conduit, piping, exposed ductwork and framing in the apparatus bay and adjoining rooms.
- I. Paint all metal stairs, stringers, guardrails and handrails.
- J. Paint all exterior and interior lintels.
- K. Paint numbers on interior of each overhead door as detailed on Contract Drawings.
- L. Paint metal louvers in wood doors to match door frame.
- M. Paint any exterior trim that does not have a factory provided finish.
- N. Stencil paint in contrasting color "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS" at tops of all fire rated and/or smoke tight walls and or partitions. Lettering must be a minimum 3.0 inches in height, must appear within 15 feet of the end of each wall or partition and at intervals not exceeding 30 feet measured horizontally along the wall or partition.

3.11 EXCLUSIONS

- A. Exclude finishing of pre-finished items including but not limited to plastic laminate finished components, metal or plastic toilet partitions, factory finished equipment, acoustical materials, light fixtures, wiring devices, electrical device plates, and fire detection, alarm and suppression devices unless specifically noted otherwise.
- B. Exclude finishing of chases, concealed wall or ceiling spaces, or similar inaccessible spaces unless specifically noted otherwise.
- C. Exclude finishing of anodized or electrostatically painted aluminum, stainless steel, chrome plating, copper, brass, bronze, ceramic tile, quarry tile, stone products, or similar materials with an integral finish unless specifically noted otherwise.

- D. Do not paint over labels or plates containing written or numerical information such as laboratory fire resistivity labels on rated doors and frames and the manufacturer's name and descriptive information on circuit breaker panel covers.
- E. Do not paint over the moving portion of any mechanical or electrical assemblies, sensing devices, and/or fusible links.

3.12 PROTECTION OF OTHER WORK

- A. Protect adjacent surfaces, whether to be painted or not, against damage by painting and finishing work. Correct any damages by cleaning, repairing or replacing, and repainting, as directed by Architect.
- B. Coordinate the maintenance and subsequent removal of temporary protective wrappings.

3.13 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. 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.
- B. Should telegraphing (photographing) of the substrate and or discoloration of the surface caused by the substrate appear within one (1) year from the date of Substantial Completion, the Contractor shall repaint the area with matching paint to resolve the telegraphing/discoloration. The Architect shall be the sole judge of the extent of telegraphing and or discoloration.

3.14 CLEANING

- A. Daily clean up: During the progress of the Work, remove from the project daily, all discarded paint materials, rubbish, cans and rags.
- B. Properly handle, store, and dispose of all hazardous materials.
- C. Upon completion, clean all glass and other paint--spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage-finished surfaces. Restore all damaged surfaces to their original condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099100

PART 1-GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following types of signs;
 - 1. ADA Compliant Interior Room/Door Signage & Specialty Signage.
 - 2. Cast Metal Dedication Plaque.
 - 3. Truss Identification Signage.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary project identification signs.
 - 2. Section 061000 - Rough Carpentry.
 - 3. Division 22 for "Plumbing Identification" for labels, tags, and nameplates for mechanical equipment.
 - 4. Division 23 for "Mechanical Identification" for labels, tags, and nameplates for mechanical equipment.
 - 5. Division 26 for "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
 - 6. Division 26 for "Interior lighting" for illuminated exit signs.
 - 7. Civil Drawings for exterior traffic control and parking space signage.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. 36 CFR 1191 - American with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
- C. ADA Standards - American with Disabilities Act (ADA) Standards for Accessible Design.
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. Submit samples of each color and finish of exposed materials and accessories required for specialty signs. Submit full range of available fonts for all signage. Architect's review of samples will be for color, texture and fonts only.
- D. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 - 1. Provide message list for each sign, including large-scale details of wording, lettering, and Braille layout.
 - 2. Any sign, plaque and or medallion containing artwork, it is the responsibility of the manufacturer to re-create artwork (vector graphics will not be provided).

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.08 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs and/or letters.
 - 1. For signs and letters supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

PART 2 PRODUCTS

2.01 MANUFACTURERS & MATERIALS

- A. Interior Room Signs: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Interior Room Signs
 - a. Mohawk Sign Systems, Series 200A, P.O. Box 966, Schenectady, NY 12301-0966. (T) (518) 842-5303; (F) (518) 842-5306.
 - b. Architect Approved Equivalent meeting LEED Credit MR 5.1 requirements.
 - 2. All signs shall be manufactured using Graphic Process Series 200A-Sand Carved using Format D.
 - a. Plastic or metal signs with tactile reflective routed lettering. Raised and Brailled Characters and Pictorial Symbol Signs (Pictograms) shall be raised the required 1/32-inch from sign face. Glue-on letters or etched backgrounds are not acceptable.
 - b. Grade 2 Braille shall accompany all text. Braille shall be separated ½-inch from the corresponding raised characters. Grade 2 Braille translations to be provided by signage manufacturer.
 - c. Architect shall select colors from manufacturer's full range.
 - d. Every door in the project shall have an identifying sign at every door or opening into the room/corridor.
 - e. All signage shall meet ADA and ANSI requirements.
 - f. Symbols of Accessibility: Facilities and elements required to be identified as accessible by Part 1341.0401 shall use the International symbol of accessibility.
 - 3. Sign material shall be melamine plastic laminate, approximately 1/8-inch thick

- a. with contrasting core color. The melamine shall be non-static, fire-retardant and
- b. self-extinguishing. The plastic laminate shall be impervious to most acids,
- c. alkalis, alcohol, solvents, abrasives and boiling water.
- 4. Size of letters and numbers shall be as follows:
 - a. Room Number shall be 1-inch high.
 - b. Lettering for Room ID signs shall be ¾-inch high.
 - c. Symbol size shall be 4-inches high.
 - d. Standard Grade 2 Braille shall be ½-inch below copy.
- 5. Letterform shall be Gill Sans upper case.
- 6. Copy Position: CC (centered/centered)
- 7. Sign Size:
 - a. Room Function Signs: 6 inch x 6 inch unless text requires a longer sign.
 - b. Restroom Signs; shall be design ADA-4 size 8-inches x 8-inches with a 4-inch accessibility symbol, gender symbol, and the verbal description placed directly below followed by Grade 2 Braille.
 - c. Restroom Sign with Changing Station: shall be same as restroom sign only increase size to 12-inches x 12-inches to also include baby changing symbol and verbal description.
 - d. Corners: Square Edge.

2.02 DEDICATION PLAQUE

- A. Available Manufacturers:
 - 1. United States Bronze, 811 Second Avenue, New Hyde Park, NY 11040 Phone: (800) 872-5155
 - 2. Architect Approved Equivalent.
- B. Plaque: Castings shall be free from pits, scale, sand holes, or other defects. Comply with requirements specified for metal, border style, background texture, and finish and with other requirements shown for thickness, size, shape, and copy. Hand-tool and buff corners and raised copy to produce the manufacturer's standard satin polished finish. Refer to the "Materials" Article for other finish requirements.
- C. Material: Cast Bronze
 - 1. Lettering, border, texture and background color selected by Architect from manufacturer's full range.
- D. Size: Minimum 432 Sq. In.
- E. Lettering: Raised, Gill Sans upper case.
- F. Mounting:
 - 1. Verify location with Owner and Architect.
 - 2. Method: Drilled thru to receive screws with rosettes
- G. Names:
 - 1. Village & Fire Company Names
 - 2. H2M architects + engineers
 - 3. Other individuals and wording to be selected by Owner.
 - 4. Construction Contractor
- H. Bronze Castings: Provide bronze castings, copper alloy UNS C83600, complying with the requirements of ASTM B 584.

2.03 TRUSS IDENTIFICATION SIGNAGE

- A. Signs identifying the existence of truss construction shall consist of a circle 6" in diameter, with a stroke width of ½ inch. The sign background shall be reflective white in color. The circle and contents shall be reflective red in color, conforming to Pantone matching system (PMS) #187. Signs directly applied to a door or sidelight may be a permanent non-fading sticker or decal. Signs not directly applied to doors or sidelights shall be of sturdy, non-fading, weather resistant material.
- B. Quantity: Two decal type, One aluminum.
- C. Copy: To be furnished

2.04 SPECIALTY SIGNS

- A. Special Signs
 - 1. Provide the following special signs constructed in the same manner as room identification signage unless noted otherwise, in colors as selected by the Architect. Consult Architect for exact placement location of these signs.
 - a. Two - 12 inch x 12 inch, "In Case of Fire-Use Stairs" with graphics to be located near elevator doors on each floor.
 - b. Six rappelling point load signs (4"x12")
 - 1) Copy to be furnished.
 - c. One - 8 inch x 11 inch, typical class K fire extinguisher sign.
 - d. 8, "EXIT" (See LS Drawing for Locations)
 - e. Four 12 inch x 12 inch, "Training Only" furnish with brass screws for exterior mounting.
 - f. Two door signs (16 inch x 16 inch) at Doors 214A, 215 and 216-"Training Only-Door must remain closed and locked at all times when not in use".
 - g. Three - 12 inch x 12 inch sign "Authorized Personnel Only - Not An Exit"

2.05 FASTENERS AND ANCHORS

- A. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- B. Anchors and Inserts: Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions and conformance with ADA.
 - 1. Install signs level, plumb, and at height indicated, with sign surfaces free from distortion or other defects in appearance.
 - 2. Corrosion Protection: Coat Concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:

1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 2. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
 3. Exterior signs: Use brass screws with plastic shields or stainless steel expansion type anchors at all four corners.
- C. Cast Metal Plaques: Mount plaques using the standard method recommended by the manufacturer for the type of wall surface indicated.
1. Face Mounting: Mount plaques using exposed fasteners with rosettes attached through the face of the plaque into the wall surface.
- D. All signage and subsequent mounting shall comply with ANSI and ADA.
1. Tactile signage shall be located alongside the door on the latch side
 2. Tactile signage shall be mounted at 60" A.F.F. to the centerline of the sign.
 3. At locations of double doors, tactile signs shall be mounted to the right of the right-hand door.
 4. Where there is no available wall space at the latch side of the door, signs may be placed on the nearest adjacent wall.
- E. Verify all mounting locations with the Architect prior to any work.

3.02 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner and Substantial Completion.

END OF SECTION 101400

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Toilet Compartments: Solid polymer plastic doors and partition panels; pilasters, floor-mounted-overhead braced; high privacy design; hardware; fittings; and other appurtenances.
 - 2. Urinal Screens: Solid polymer plastic panels mounted on the wall with full height "U" brackets.
 - 3. Attachment hardware.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 061000 - Rough Carpentry
 - 2. Section 093013 - Ceramic Tiling.
 - 3. Section 102813 - Toilet and Miscellaneous Accessories.

1.03 STANDARDS AND REFERENCES

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ICC A117.1 - "Standard for Accessible and Usable Building, and Facilities.
- C. Americans with Disabilities Act (ADA).
- D. ASTM B85 - "Standard Specification for Aluminum-Alloy Die Castings".
- E. ASTM B221 - "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes".
- F. ASTM E84 - "Standard Test Method for Surface Burning Characteristics of Building Materials".
- G. National Fire Protection Association (NFPA) 286 - "Standard Methods of Fire Tests for Evaluation Contribution of Wall and Ceiling Interior Finish to Room Fire Growth".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Manufacturer's product data illustrating and describing materials, components, hardware, and installation methods.
- D. Shop drawings, including but not limited to, plans, elevations, and details of connecting, mounting, anchoring, and assembling.
- E. Selection Samples: Two complete sets of color chips of manufacturer's full range of available colors and patterns in the actual finish.

- F. Verification Samples: Provide two samples minimum 4" x 4" of each color, pattern selected.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this Section, and whose products have been in satisfactory use under similar service conditions for not less than 10 years.
- B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years' experience.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.

1.07 FIELD MEASUREMENTS

- A. Verify field measurements, as shown on Contract Documents, before installation.

1.08 PROJECT CONDITIONS

- A. Do not install the Work of this Section until the floors, walls, and ceilings of the spaces to receive the Work have been completed.

1.09 WARRANTY

- A. Provide manufacturer's twenty-five (25) year guarantee to replace panels due to breakage, corrosion or delamination under normal conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Scranton Products; (T) 800-445-5148, Email: info@scrantonproducts.com
 - 2. Architect Approved Equivalent.

2.02 TOILET PARTITIONS

- A. Basis of Design: Eclipse 2 Toilet Partitions as manufactured and supplied by Scranton Products.
- B. Materials
 - 1. Panels and pilasters shall be 1" thick solid HDPE resin; water resistant; non-absorbent; self-lubricating surface; covered with protective masking. Color and material homogeneous throughout.
 - 2. Edges: Shiplap.
- C. Doors and Dividing Privacy Panels:
 - 1. High Privacy
 - a. Height: 66 inches high and mounted at 8 to 14 inches above the finished floor.
 - b. Doors: shiplap edge opposite hinge side. Straight cut edge on hinge side.

- c. Dividing Panels: Two panels stacked and secured with 3 dowels ensuring proper alignment totaling the system specified height.
- D. Colors and Textures: The Architect shall select from the FULL line of manufacturer's traditional, bold and warm series colors and textures.
- E. Fittings and Fasteners:
 - 1. Furnish fittings for wall hung urinal and sight screen brackets of aluminum wing type, extending on panels full height of panel.
 - 2. Fabricate overhead bracing of aluminum tubing with walls not lighter than 16 gage and not smaller than 1 x 1-1/2-inch size. Give aluminum an etched and anodized finish equal to Aluminum Association Designation C22A-41.
 - 3. Pilaster Leveling Devices:
 - a. At floors, a bar type jackscrew of approved design.
 - b. At ceilings, an approved bar type, including necessary clips, bolts and similar accessories required for a complete installation.
 - c. Furnish each device with a highly polished, Type 302/304 stainless steel snap-on plinth, not less than 3 inches high to conceal all parts of leveling devices, easily removable for cleaning and pilaster adjustment.
 - 4. Fasteners:
 - a. Furnish minimum 1/4-inch diameter machine bolts with tamper resistant heads, finished to match hardware.
 - b. Furnish approved concealed fastenings for securing wall hung wedge or wing type urinal screens, and in all other locations required by the Drawings.
 - c. Furnish minimum 1/4-inch diameter sex-bolts with tamper resistant heads at stirrup brackets and wing brackets, where thru bolting of panels is required.
 - d. Furnish toggle bolts for securing brackets to hollow masonry, except where solid masonry is encountered, in which case, provide Type H/S Drop-In Anchors by the Rawplug Co., Inc., New Rochelle, NY 10802.
- F. Concealed Reinforcing:
 - 1. Steel Reinforcing for Anchorages: 12 gage.
 - 2. Steel Reinforcing for Tapping: 14 gage.
 - 3. Wood Reinforcing: Continuous solid wood, minimum 4 inches wide, thickness as required to match pilaster, panel, or door thickness.
- G. Overhead Bracing: Continuous heavy duty, extruded aluminum tube, designer anti-grip design, with clear anodized finish.
- H. Wall Supports: Heavy duty aluminum double ear bracket. Where back-up, upright supports, brackets or plates are indicated and/or required to solidly secure wall hung units, provide them in adequate size, material and number, to support the Work as a part of the Work under this Section and clearly show them on shop drawings. Length to be 1" shorter than panel height.
- I. Cutouts and Reinforcement:
 - 1. Provide cut-outs, with concealed reinforcing, as required for hardware, convector covers, pipes, and other obstructions that interfere with pilasters or panels. Edge cut-outs and finish exposed edges to match remaining uncut edges.
- J. Door Hardware:
 - 1. Furnish for each door, as follows:
 - a. Hinges: Edge-mounted stainless steel continuous hinge.
 - b. Occupancy Indicator Latch and Housing: Satin stainless steel showing green and red occupancy indicators.
 - c. Combination Stop and Keeper: Clamp flange type, with securely attached rubber bumper.

- d. Combination Coat Hook and Bumper: Manufacturer's standard unit, rubber tipped.
- e. Wall Bumper: Ives No. 406 or Glynn-Johnson No. 50W rubber dome stop with concealed fastener, for doors opening out and striking adjacent wall at 90 degrees.
- f. Door Pull: Manufacturer's standard, for doors opening out.
- g. Hardware: Furnish chrome plated or stainless steel through bolts, or machine screws as required, with theft proof (one way) heads for all hardware.

2.03 URINAL SCREENS - WALL HUNG

- A. Screens shall be solid polymer resin nominal 1-inch thick by 24-inches deep by 48-inches high with uniformly machined radius edges. Screens shall be anchored to the walls with one full-length double ear heavy extruded brite anodized type 6463TS aluminum bracket and six (6) #14 x 1-3/4-inch stainless steel tamperproof screws into conical plastic anchors.

2.04 FABRICATION

- A. Fabricate partitions from solid polymer resins through process of high-pressure thermal conduction, then stress relieved to assure linear stability and uniform color throughout.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Check areas scheduled to receive compartments for correct dimensions, plumbness of the walls and the soundness of the surfaces that would affect the installation of the holding brackets.
- B. Verify field measurements as shown on Contract Documents.
- C. Verify correct location of built-in framing, blocking, anchorage, bracing, and plumbing fixtures.
- D. Beginning of installation means Installer accepts existing conditions.

3.02 INSTALLATION

- A. Comply with manufacturer's published instructions. Conceal fasteners wherever practicable. Install complete with trim, hardware, and accessories.
- B. Tolerances: Install straight, true, plumb, and in alignment for uniform appearance; permanently anchored to building construction with anchors of suitable size and type.
- C. Locate bottom edge of doors and panels 10 inches above finished floor.
- D. Provide uniform, maximum 1/4 inch vertical clearance at doors.
- E. Perform all necessary cutting and drilling of adjacent surfaces required for the installation of the Work. Perform all drilling for anchors with carbide or diamond tipped rotary drills of minimum required sizes, to minimize damage to adjacent construction and finishes.
- F. Attach panel brackets securely to walls using appropriate anchor devices. Tamper-proof screws.
- G. Attach panels and pilasters to brackets with through bolts and nuts. Locate headrail joints at pilaster centerline.
- H. Anchor urinal screen panels to walls with continuous panel brackets, and tamper-proof screws.

- I. Provide for adjustment of floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- J. Assemble all Work accurately, free from dents, tool marks, warpage, buckle, open joints, or other defects. Erect Work rigid, plumb, and true to line in the designed location, with the doors hung and all hardware, fittings and accessories securely attached. Leave all hardware in perfect operating condition.

3.03 ERECTION TOLERANCES

- A. Maximum Variation from Plumb or Level: 1/8-inch
- B. Maximum Misplacement from Intended Position: 1/8-inch

3.04 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust and align door hardware to uniform clearance at vertical edges of doors.
- B. Adjust door hinges so that free movement is attained and will locate in-swinging doors in closed position when unlatched or return out-swinging doors to closed position.
- C. Before acceptance, clean Work thoroughly of dirt, grease, and other foreign matter, and leave all surfaces in perfect condition.
- D. Remove all protective coverings.
- E. After erection, protect finished installation as necessary to avoid damage.
- F. Field touch-up of finished surfaces will NOT be permitted. Replace parts damaged in any manner, including adjacent Work that may be incidentally damaged.

END OF SECTION 102113.21

PAGE INTENTIONALLY BLANK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Lavatory Mounted Soap Dispensers
 - 2. Surface-Mounted Multi-Roll Toilet Tissue Dispensers.
 - 3. ADA Compliant Grab Bars.
 - 4. Surface Mounted Sanitary Napkin Disposals.
 - 5. Robe Hooks.
 - 6. Shower Curtain Rods, Curtains and Hooks.
 - 7. Fold Down Shower Seat.
 - 8. Mop and Broom Holders.
 - 9. Diaper Changing Station
 - 10. Associated Fasteners
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 042200 – Concrete Unit Masonry for attachment to this material.
 - 2. Section 061000 – Rough Carpentry for wood blocking and nailers.
 - 3. Section 088300 – Mirrors.
 - 4. Section 092116 – Gypsum Board Assemblies for attachment to and strapping for this material.
 - 5. Section 093013 – Ceramic Tiling for attachment to this material.
 - 6. Section 102113 – Toilet Partitions for attachment to this material.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 – Submittal Procedures.
- B. Pursuant to Section 016000 – Product Requirements
- C. Product Data: Provide manufacturer's cut sheets for each different type or style of toilet and miscellaneous accessories required for the project.
- D. Accessories schedule: Indicate manufacturer's name, product description, product model number, finish, mounting, special components, and location of each item.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.

- B. Protect against moisture exposure and damage.
- C. Deliver to project site in manufacturer's original packaging with intended location marked on package. Include manufacturer's published installation instructions, fasteners, and installation tools.
- D. Retain finish protective coverings until final cleanup.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers for Toilet Accessories: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Bradley Corporation (Basis of Specification – unless noted otherwise)
 - 2. Bobrick Washroom Equipment
 - 3. American Specialties, Inc.
 - 4. AJW Architectural Products
 - 5. Architect Approved Equivalent
- B. Available Manufacturers for Miscellaneous Accessories: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include those listed below or Architect Approved Equivalents to the specified products.

2.02 TOILET/SHOWER ROOM ACCESSORIES

- A. Items
 - 1. Lavatory mounted touchless soap dispenser with individual tank – Bradley 6-3100 (Battery Operated) Polished Chrome Finish

2.03 TOILET COMPARTMENTS

- A. Items
 - 1. Surface-mounted multi-roll toilet tissue dispenser - Bradley 5402.
 - 2. Grab Bars – Bradley 812-2 with peened gripping surface – where shown on contract drawings.
 - a. Mounting: concealed with grab bar welded to the mounting flange, mounting flange secured to substrate with stainless steel screws.
 - b. Escutcheon: Cover plate escutcheon is decorative only.
 - c. Surface finish: satin.
 - d. Diameter: 1-1/2 in.; uniform around curves.
 - e. Configurations: as shown on Contract Drawings.
 - 3. Surface mounted sanitary napkin disposal – Bradley 4781-15 where shown on Contract Drawings.

2.04 ADA SHOWER AREA

- A. Items:
 - 1. Robe Hook: Stainless Steel, Double Hook, standard duty. - Bradley 9124.
 - 2. Shower Curtain Rods:
 - a. Rod size and material: 1-1/4 in. - Bradley 9539.
 - b. Mounting: Concealed mounting with snap-on vandal resistant protective escutcheons.
 - 3. Microban anti-bacterial shower curtain: Bradley 9537 – shower width +6" wide, white

4. Curtain Hooks: Bradley 9536.
5. Grab Bars - Bradley 800 Series with peened gripping surface.
 - a. Mounting: concealed with grab bar welded to the mounting flange, mounting flange secured to substrate with stainless steel screws.
 - b. Escutcheon: Cover plate escutcheon is decorative only.
 - c. Surface finish: Satin.
 - d. Diameter: 1-1/2 in.; uniform around curves.
 - e. Configuration: shown on drawings.
6. Fold Down Shower Seat: Bradley 956 (9561) Configuration as shown on Contract Drawings.
7. Surface Mount Shower Soap Dish: Bradley 9014.

2.05 CUSTODIAL AREAS (ROOMS R106 AND 211)

- A. Mop and Broom Holders (without shelf)
 1. Configuration: holders - Bradley 9954 304 Stainless Steel.
 2. Length: 36 inches.
 3. One per Room

2.06 DIAPER CHANGING STATION

- A. Koala Kare Products, 6982 S. Quentin St., Centennial, CO 80112, Phone: 888-733-3456.
 1. Model Number: KB110-SSRE, Stainless Steel-Clad Recess mounted horizontal Baby Changing Station with polyethylene interior.

2.07 FASTENERS – ALL ACCESSORIES

- A. Provide bolts, screws, plates, anchors, toggles, and other fastening devices for permanent and secure installation to produce loading requirements where applicable and which are designed specifically for adjoining construction.
- B. All fasteners: Stainless steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pursuant to manufacturers published instructions.
- B. Install plumb, level, and square, free of bowing, warping, or racking.
- C. Install at elevations pursuant to applicable codes, manufacturers published instructions, and as may be modified on Drawings.
 1. Diaper Changing Station to be mounted with top of unit 46 1/2" A.F.F.
- D. All installations must fasten into solid structure or blocking.
- E. Fit flanges, escutcheons, and edges tight against finish surface.
- F. Provide all accessories keyed alike. Turn over all keys and/or access tools to the Owner.
- G. Remove and discard finish protective coverings.

END OF SECTION 102813

PART 1- GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of the Agreement, including General Conditions, and Division 01 of the Specifications, apply to work of this section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Emergency Self-Contained Eyewash Station.
- B. Related Sections include the following:
 - 1. Section 042200 – Concrete Unit Masonry for attachment to this material.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

1.04 SUBMITTALS

- A. Submit following pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: Indicate manufacturer's name, product model number, mounting, special components, and location of each item.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.
- C. Deliver to project site in manufacturer's original packaging with intended location marked on package. Include manufacturer's published installation instructions, fasteners, and installation tools.
- D. Retain finish protective coverings until final cleaning.

PART 2 – PRODUCTS

2.01 EYEWASH STATION

- A. Honeywell Fendall 2000™ series Sterile Eyewash Station Model #32-002000-0000 with sterile saline cartridge manufactured by Sperian Eye & Face Protection.
 - 1. Provide with four (4) (three (3) extra) eyewash station sterile saline refill cartridges #32-ST2050-0000.
 - 2. Provide with one Fendall 2000 Dust Cover #32-002015-0000 and emergency eyewash station sign.

3. Provide installation/training DVD to Owner as part of closeout documents.

2.02 FASTENERS – ALL ACCESSORIES

- A. Provide bolts, screws, plates, anchors, toggles, and other fastening devices for permanent and secure installation to produce loading requirements where applicable and which are designed specifically for adjoining construction.
- B. All fasteners: Stainless steel.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Pursuant to manufacturers published instructions.
- B. Install plumb, level, and square, free of bowing, warping, or racking.
- C. Install at elevations pursuant to applicable codes, manufacturer's published instructions, and as may be modified on Drawings.
- D. Do not install eyewash station until just before Substantial Completion and all final cleaning has been performed. Install emergency eyewash station sign directly above unit with bottom of sign at 8'-0" A.F.F.
- E. Turn over spare saline refill cartridges to Owner.
- F. Remove and discard finish protective coverings.

END OF SECTION 104319

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes:
 - 1. Fire Extinguisher Cabinets (F.E.C.)
 - 2. Fire Extinguishers
 - 3. Fire Extinguisher Signage
 - 4. Exterior Knox Box

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. NFPA 10 "Standard for Portable Fire Extinguishers".
- C. Fire extinguishers shall comply with all codes and requirements.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures
- B. Pursuant to Section 016000 - Product Requirements
- C. Product Data: Submit manufacturer's product data and installation instructions including roughing-in dimensions, and details showing mounting methods, relationships to surrounding construction, cabinet type and materials, and trim style.
- D. Shop drawings or manufacturer's literature showing size, configuration, capacity, contents and all additional pertinent information describing the equipment to be provided.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Do not test operate extinguishers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Amerex Corporation
2. J. L. Industries, Inc.
3. Larsen's Manufacturing Co.
4. Potter Roemer
5. Kidde
6. Knox Company (Knox Box)

B. FIRE EXTINGUISHER CABINETS

1. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim, style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.
2. Cabinets in fire rated walls must be fire rated.
3. Cabinet Type: Suitable for mounting conditions indicated, of the following types.
 - a. Semi-recessed the maximum amount limited by the thickness of the wall cavity.
 - b. Inside Dimensions: 9-1/2" wide, 24" high, 6" deep.
 - c. Maximum projection into room, 4" as per ADA.
4. Trim Style: Fabricate trim in one piece with corners mitered, welded and ground smooth.
 - a. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1) Rolled-Edge Trim: Rolled edges backbend as required.
5. Door Material and Construction: Manufacturer's standard door construction of material indicated, coordinated with cabinet type and trim style selected.
 - a. Stainless Steel: Satin finish, hollow steel door construction with tubular stiles and rails.
 - b. Door Glazing: Clear tempered float glass complying with FS DD-G1403, grade B, style I, type I, quality q3, class 1 (transparent).
 - c. Door Style: Manufacturer's standard design as indicated below.
 - 1) Full-Glass Panel: Solid metal door with vertical letters of contrasting color.
 - d. Door Hardware: Provide manufacturer's standard door operating hardware of proper type of cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous type of hinge permitting door to open 180 degrees.

2.02 FACTORY FINISH

- A. General: Comply with NAAMM "Metal Finishes Manual" for designations and applications recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering prior to shipment.
- B. Painted Finishes: Provide painted finish to comply with requirements indicated below for extent, preparation and type.
 1. Extent of Painted Finish: Apply painted finish to both concealed and exposed surfaces of cabinet components.
 2. Color: Provide color indicated, or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
 3. Preparation: Clean surfaces of dirt, grease and loose rust or mill scale.
 4. Powder Coated Baked Enamel Finish: Immediately after cleaning and pretreatment, apply cabinet manufacturer's standard baked enameled finish system to the following surfaces:
 - a. Interior of cabinets

2.03 PORTABLE FIRE EXTINGUISHERS

- A. Type FEC-1: Multi-purpose dry chemical type. Minimum 5-pound capacity, minimum UL rating 2A:10B:C with hose, nozzle, and color-coded pressure gauge. Amerex Model B500 or equal.

1. For Fire Extinguisher Cabinets
 - B. Type FE-1: Multi-purpose dry chemical type. Minimum 10-pound capacity, UL rating 4A: 80 B: C with hose, nozzle, and color-coded pressure gauge. Amerex Model B456 or equal.
 1. Supply mounting bracket for locations in apparatus bay and any other locations as shown on drawings and any other locations required by Codes.
 2. Provide rigid plastic 3-Way View Fire Extinguisher glow-in-the-dark sign with arrow and graphic Style No. 2095C by Seton or Architect approved equivalent.
 - C. Type FE-2: Wet chemical type. Minimum 6-liter capacity, UL rating 2A:K with spray applicator wand and color-coded pressure gauge. Amerex Model B260 or equal.
 1. Supply mounting bracket.

2.04 KNOX BOX

- A. KNOX-BOX as manufactured by KNOX Company, 1601 W. Deer Valley Road, Phoenix, AZ 85027, Phone: 800-552-5669.
 1. Model: 3200 Series with recessed mounting kit (RMK).
 2. Color as selected by the Architect from manufacturer's standard colors.
 3. Coordinate with Owner for exterior location.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install cabinets to comply with manufacturer's instructions in locations to comply with applicable regulations of governing authorities.
 1. Prepare recesses in walls for cabinets as required by size of cabinet, style of trim, fire rating to be maintained if required and to comply with manufacturer's instructions.
 2. Securely fasten cabinets to structure, square and plumb.
 3. Install Fire Extinguisher Cabinets at locations indicated on the drawings. Top of cabinets shall be four feet six inches above finished floor.
- B. Install extinguishers at locations indicated on the drawings.
 1. Top of individually mounted extinguishers shall not be more than 54" above finished floor.
 2. Bottom shall not be less than 15" above finished floor.
- C. Install KNOX Box in accordance with manufacturer's instruction and fire department requirements.

3.02 IDENTIFICATION

- A. Identify existence of fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" applied to door by process indicated below. Provide lettering as selected by Architect from manufacturer's standard arrangements.
 1. Application Process: Die Cut.
- B. Provide each wall hung Type FE-1 fire extinguisher with a 3D plastic angle stand out sign mounted above each fire extinguisher. Top of sign to be placed 7'-6" AFF.

3.03 INSPECTION

- A. Verify and ensure that all fire extinguishers are fully charged at the time of installation and that a current fire department inspection tag is prominently attached to each wall unit.
 1. Do not test discharge any fire extinguisher. If discharge occurs, recharge unit and secure and affix new inspection tag. Submit copy of new tag to Architect, identifying the affected

unit and its installed location. Architect reserves the right to require recharging and inspection of any fire extinguisher which shows evidence of having been operated prior to acceptance.

END OF SECTION 104400

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Building supported, pre-engineered metal canopies including fascia channels, decking, tension rods, downspouts and attachment hardware.
- B. Related Sections:
 - 1. Section 076200 - Sheet Metal Flashing and Trim.
 - 2. Section 079200 – Sealants.

1.03 REFERENCES

- A. Aluminum Association (AA) DAF 45 – Designation System for Aluminum Finishes.
- B. American Society of Civil Engineers (ASCE) 7 – Minimum Design Loads for Buildings and Other Structures.
- C. ASTM B221– "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes".
- D. ASTM B429 - "Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube".

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Design canopy system to withstand: wind pressure, snow load, and drifting snow load in accordance with values shown on the Contract Drawings and with current adopted requirements of the International Building Code or accepted requirements of local authorities having jurisdiction.

1.05 SUBMITTALS

- A. Pursuant to Section 013300 – Submittal Procedures.
- B. Pursuant to Section 016000 – Product Requirements.
- C. Manufacturer's Qualifications: Company specializing in the engineering and manufacture of preassembled canopies with a minimum of fifteen (15) years experience in canopy design and fabrication.
- D. Product Data:
 - 1. Manufacturer's catalogue cuts.
- E. Shop Drawings: Indicate system components, dimensions, attachments, and accessories.
 - 1. Professional Engineering calculations are required and must be signed and sealed by an Engineer licensed in the State canopy is to be installed.

- F. Color Samples for Initial Selection Purposes: Submit manufacturer's color samples of materials, consisting of complete color charts (3 copies) representing manufacturer's full range of available colors in the specified finish.
- G. Verification Samples:
 - 1. 3 x 3 inch coating samples in specified color and finish.
 - 2. 6 inch long fascia extrusion sample showing profile and standard finish.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 5 years experience in installation of pre-engineered canopy systems.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store all canopy components in protected areas.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. MASA Architectural Canopies. 250 Stelton Road, Piscataway, NJ 08854, Phone: (800) 761-7446. Web site: www.architecturalcanopies.com. (Basis of Design)
 - 1. Extrudeck Series
- B. FenWall Fabrication & Manufacturing, 13929 Lynmar Boulevard, Tampa, FL 33626, Phone: (813) 343-5979.
- C. Vestis Systems, 213 East Ermina Avenue, Spokane, WA 99207. Phone: (509) 213-1342.

2.02 MATERIALS

- A. Aluminum Extrusions:
 - 1. ASTM B221 & ASTM B429/B429M 6063-T5 alloy and temper.
- B. Hardware:
 - 1. All fasteners shall be stainless steel for corrosion resistance.

2.03 COMPONENTS

- A. Framing:
 - 1. Type: Extruded aluminum "J" channel fascia.
 - 2. Size: 8" x .125".
- B. Canopy Supports: Extruded Aluminum Canopy Support "I" Beam.
- C. Decking: 3" x 6" x .090" Interlocking Extruded aluminum flat soffit decking.
- D. Attachment: 1.050" diameter steel hanger rod with square wall plates, finished to match canopy.
- E. Custom Fascia Profiles: Standard "J" frame
- F. Other Components: Other components as indicated or as required for system attachment and performance.

2.04 ACCESSORIES

- A. Down Spouts 2" x 3", 0.125 Heavy Extruded Finished to match canopy color and finish.
 - 1. Extend downspouts to precast concrete splash blocks at grade.
 - 2. Secure downspouts to building with matching brackets located at a maximum 5' - 0" o.c. with no less than two (2) brackets per downspout..

2.05 FABRICATION

- A. Fabricate canopy system in accordance with approved Shop Drawings.
 - 1. Pre-assembled canopies are shop welded by MASA approved personnel.
 - 2. Drainage system to be concealed type. Covered surfaces direct water to field drilled drain, to be coordinated at site.

2.06 FINISHES

- A. Tiger Drylac Series 49 polyester resin based powder coat finish.
- B. Color: As selected by Architect from RAL's full color range.

PART 3 EXECUTION

3.01 FIELD DIMENSIONS

- A. Field verify dimensions of supporting structure at site of installation prior to fabrication.

3.02 INSTALLATION

- A. Install in strict accordance with manufacturer's instructions and approved Shop Drawings.
- B. Protect the finish during handling and erection.
- C. Install components plumb and level, in proper plane, free from warp and twist.
- D. Anchor canopy system to building components; provide adequate clearance for movement caused by thermal expansion and contraction and wind loads.
- E. Provide compression spacers between canopy and veneer masonry.
- F. Surround wall anchors with watertight sealant.
- G. Embed all wall anchors washers in sealant to provide watertight seal.
- H. To ensure proper drainage, install canopy with positive camber.
- I. Seal all corners, edge seams, etc. Rain water must flow to gutter and downspout(s). Water shall not drip-thru canopy in any location.

3.03 ADJUSTING

- A. Touch up minor scratches and abrasions on finished surfaces to match original finish.
- B. Clean with mild, non-abrasive solution and a cotton cloth under low pressure.

END OF SECTION 107316.13

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Projector Mount
 - 2. Note: Projection Screens are furnished and installed by the Owner.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 095100 - Acoustical Lay-In Ceilings
 - 2. Division 26 - Electrical

1.03 STANDARDS AND REFERENCES

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Manufacturer's product data illustrating and describing materials, components, hardware, and installation methods.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver projector mount after building is enclosed and construction where projector mount will be installed is substantially complete.
- B. Deliver projector mount in manufacturer's undamaged, labeled packaging.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Da-Lite Screen Company, Inc., 3100 North Detroit St., PO Box 137, Warsaw, IN 46581-0137 Phone (800) 622-3737 or (574) 267-8101
 - 2. Architect Approved Equivalent.

2.02 PROJECTOR MOUNT

- A. Universal ceiling mounted projector kit with extensions to provide a projector height as shown on the contract drawings.
 - 1. Quick release universal mount for projector.
 - 2. 360 degrees rotation for projector.
 - 3. Plus/minus 20 degrees tilt and roll for projector.
 - 4. Cable routing channel for clean look.

5. Adjustable angle ceiling attachment.
6. Provide unistrut sub-frame from exposed steel structure for securing ceiling attachment plate.

PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate screen with locations of other wall and ceiling mounted components such as visual display boards, casework, structural framing, light fixtures, air diffusers, ducts, and fire sprinklers to eliminate potential conflicts.
- B. Coordinate requirements for blocking to ensure adequate means for installation of screens.

3.02 INSTALLATION

- A. Install projector mount in accordance with approved shop drawings and manufacturer's installation instructions.

END OF SECTION 115213

SHELVING AND CASEWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This section includes, but not limited to, the following:
 - 1. Window Sills
 - 2. Window Surrounds
 - 3. Lavatory countertops including sinks if they are integral, backsplashes, side splashes, and aprons.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 061000 - Rough Carpentry for blocking within walls to adequately support casework.
 - 2. Section 079200 - Sealants for caulking of casework and/or countertops to abutting walls.
 - 3. Section 092116 - Gypsum Board Assemblies.
 - 4. Division 22 Plumbing - Furnishing, installation, and hook-up of sinks, fixtures, outlets, strainers, tailpieces, traps, vacuum breakers, stops, etc., shall be performed by the Plumbing Contractor in accordance with IPC of New York State and local building codes. In all cases, sink cutouts shall be by the Casework Contractor and coordinated with the Plumbing Contractor.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. Architectural Woodwork Institute (AWI) Quality Standard: "Architectural Woodwork Quality Standards".
- C. AWI Custom grade.
- D. ANSI/KCMA A161.1 "Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets".
- E. ANSI 161.2 "Performance Standards for Fabricated High Pressure Decorative Laminate Countertops".

1.04 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Product Data: Submit manufacturer's technical product data and installation instructions indicating materials, hardware, and finishes used in fabrication of cabinets, as required to show compliance with specifications.
- D. Shop Drawings: Submit shop drawings indicating location and size of each type of cabinet and countertops, accessories, materials, finishes, hardware types and locations, fillers, etc. Include

fully dimensioned plans and elevations and indicate details of anchorage to countertop and to walls.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards.
- B. Verify casework dimensions with field measurements.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.

1.07 JOB CONDITIONS

- A. Do not deliver or install any items of this specification until spaces are enclosed and weathertight. Comply with plastic laminate fabricator's recommendations for temperature and humidity requirements in areas. Do not install countertops until required temperature and relative humidity have been stabilized and will be maintained in installed areas.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plastic laminates to be selected from Nevamar, Formica, Wilsonart or approval equivalent.
 - 1. 0.050 countertops, edge boards and backsplash.
 - 2. Shall have white melamine laminated backer sheets at underside.
 - 3. Colors to be selected by Architect.
- B. Particle Board
 - 1. 45 lb. Density
 - 2. Other thickness as noted below
- C. Plywood
 - 1. 3/4" AC exterior Grade

2.02 COMPONENTS

- A. Countertops
 - 1. Plastic Laminate Counters: Fabricated with 3/4" 45 lb. particle board (build down to 1 1/2" thickness) and (GP-50) plastic laminate edge banding, top surface and backsplash; all tops to have white melamine laminated backer sheet at underside.
 - 2. Plastic Laminate Backsplash: Fabricated with 3/4" white melamine balanced material and to be attached with #8 x 2" screws (Equality Screw Co. #7650) and sealed with adhesive caulk at all locations.
- B. Window Sills
 - 1. Plastic Laminate Window Sills: Fabricated with 3/4" 45 lb. particle board (build down to 1 1/2" thickness unless noted otherwise on contract drawings or required to cover gap between bottom of window sill and finished vertical wall surface) and (GP-50) plastic laminate top surface, front face, ends of sill "ears" and exposed portion of bottom of sill that extends out from the wall.
 - a. Caulk joint on underside of sill between bottom of sill and finished wall.

C. Window Recessed Surrounds

1. Plastic Laminate Window Surrounds: Where shown on Contract Drawings provide window jambs and window head fabricated with 3/4" 45 lb. particle board and plastic laminate covering all visible surfaces. Surrounds shall be secured with hidden fasteners and adhesives. Surrounds shall align with pre-finished portions of the window unit. Jambs shall align with the same point on each side of the window frame.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect substrate and conditions under which cabinets are to be installed.

3.02 BLOCKING

- A. Contractor shall provide blocking in walls for casework support.

3.03 CASEWORK INSTALLATION

- A. Install casework (countertops, window sills, and other plastic laminate covered wood work) plumb, level, true and straight with no distortions. Shim as required using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips and molding as indicated or required, and in finish to match.
- B. Anchor countertops and windowsills securely in place with concealed fasteners, anchored into structural support members of wall construction or countertop brackets. Comply with manufacturer's instructions for support of units.

3.04 WINDOW SILL AND WINDOW SURROUND INSTALLATION

3.05 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed upon completion of installation.
- B. Clean exposed and semi-exposed surfaces, touch-up as required. Remove and refinish damaged or soiled areas.

END OF SECTION 123216

PAGE INTENTIONALLY BLANK

ART 1 GENERAL

- 1.01 A. Drawings and General Provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. Section includes: Machine room-less hydraulic passenger elevator as shown and specified. Elevator work includes:
1. Standard pre-engineered hydraulic passenger elevator.
 2. Elevator car enclosure, hoistway entrances and signal equipment.
 3. Operation and control systems.
 4. Jacks.
 5. Accessibility provisions for physically disabled persons.
 6. Equipment, machines, controls, systems and devices as required for safety operating the specified elevators at their rated speed and capacity.
 7. Materials and accessories as required to complete the elevator installation.
 8. Elevator pit ladder.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
1. Division 03 - Concrete: Installing inserts, sleeves and anchors in concrete.
 2. Division 04 - Masonry: Installing inserts, sleeves and anchors in masonry.
 3. Division 05 - Metals:
 - a. Providing hoist beam, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
 - b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
 - c. Providing elevator pit sump recessed frame and grate.
 4. Division 09 - Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
 5. Division 22 - Plumbing:
 - a. Sump pump and oil interceptor.
 6. Division 23 - Heating, Ventilation and Air Conditioning:
 - a. Heating and ventilating hoistways and/or control room.
 7. Division 26 - Electrical:
 - a. Providing electrical service to elevators, including fused disconnect switches where permitted. (Note: fused disconnect switch to be provided as part of elevator manufacture product, see Section 2.11 Miscellaneous elevator components for further details.)
 - b. Emergency power supply, transfer switch and auxiliary contacts.
 - c. Heat and smoke sensing devices.
 - d. Convenience outlets and illumination in hoistway and pit.
 - e. Telephone system wiring for ADAAG Required Emergency Communications Systems.

1.03 SUBMITTALS

- A. Product data: The elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop Drawings:

H2M architects + engineers

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORS
142400-1

Village of Mount Kisco-Additions/Alterations at
Mutual Station

1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 3. Show floors served, travel distances, maximum loads imposed on the guiding structure at points of support and all similar considerations of the elevator work.
 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
1. Owner's manuals and wiring diagrams.
 2. Parts list, with recommended parts inventory.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
1. The manufacturer of machines, controllers, signal fixtures, door operator cabs, entrances, and all other major parts of elevator operation equipment.
 - a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
 2. The manufacturer shall have a documented, on-going quality assurance program.
 3. ISO-9001: Latest Edition Manufacture Certified.
 4. ISO-14001: Latest Edition Environmental Management System Certified.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevator(s).
- C. Regulatory Requirements:
1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 2. Building Code: National.
 3. NFPA 70 National Electrical Code.
 4. NFP 80 Fire Doors and Windows.
 5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG).
 6. Section 407 in ICC A117.1, when required by local authorities.
- D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1-1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

H2M architects + engineers

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORS

Village of Mount Kisco-Additions/Alterations at
Mutual Station

142400-2

- E. Inspection and testing:
 - 1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
 - 2. Arrange for inspections and make required tests.
 - 3. Deliver to the Owner upon completion and acceptance of elevator work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.06 PROJECT CONDITIONS

- A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.07 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.08 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for elevator after Substantial Completion, during normal working hours excluding callbacks.
 - 1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
 - 2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
 - 3. Manufacturer shall have a service office and full time service personnel within a 75 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Thyssenkrupp Elevator's Endura model Machine Room-Less hydraulic elevator or Architect approved equivalent.

2.02 MATERIALS, GENERAL

H2M architects + engineers

Village of Mount Kisco-Additions/Alterations at
Mutual Station

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORS
142400-3

- A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and HPD, and shall meet the California Department of Public Health Standard Method V1.1-2010, CA Section 01350.
- B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- C. Steel:
 - 1. Shapes and bars: Carbon.
 - 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
 - 3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacturer's standard selections.
- D. Plastic Laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.
- E. Flooring by General Contractor.

2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fire proofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guides: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: A Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post hole less telescopic 2-stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the assembly. Each jack section will be guided from within the casing, or the plunger assembly used to house the section. Each plunger shall have a high-pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each jack assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.

- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit.
- I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform “flooded pit operation”, which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.
- J. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also, a means for manual operation at the valve in the pit is required.

2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
 - 1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather.
 - 2. An oil hydraulic pump.
 - 3. An electric motor.
 - 4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating - motors shall be capable of 80 starts per hours with a 30% motor un time during each start.
- D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
 - 1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 - 2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 - 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.

H2M architects + engineers

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORS
142400-5

Village of Mount Kisco-Additions/Alterations at
Mutual Station

4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth “down” starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
7. A secondary hydraulic power source (powered by 110VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e., pump motor, starter, etc.)
8. Oil Type: USDA certified biobased product, ultra-low toxicity, readily biodegradable, energy efficient, high performing fluid made from canola oil with antioxidant, anti-corrosive, anti-foaming, and metal-passivating additives. Especially formulated for operating in environmentally sensitive areas. USDA certified biobased product, >90% biobased content, per ASTM D6886.

2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: provide complete hollow metal type hoist way entrances at each hoist way opening bolted/knock down construction.
 1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
 2. Main landing door & frame finish: ASTM A1008 steel panels, factory applied powder coat finish.
 3. Typical door & frame finish: ASTM A 366 steel panels, factory applied powder coat finish.
- B. Integrated Control System: the elevator controller to be mounted to hoist way entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.
- C. At the controller landing, the hoist way entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details.
- D. Interlocks: Equip each hoist way entrance with an approved type of interlock tested as required by code. Provide door restriction devices as required by code.
- E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoist way horizontal sliding door.
 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- F. Hoist way Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 PASSENGER ELEVATOR CAR ENCLOSURE

- A. Car Enclosure:
1. Walls: Cab type a laminate wall design, durable wood core finished on both sides with high pressure plastic laminate.
 2. Reveals and frieze: Not applicable.
 3. Canopy: Cold-rolled steel with hinged exit.
 4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.
 5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with No. 4 brushed stainless steel.
 6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
 - a. Door Finish: Factory applied powder coat finish.
 - b. Cab Sills: Extruded aluminum, mill finish.
 7. Handrail: Provide 1.5" diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, No. 4 brushed finish.
 8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
 9. Protection pads and buttons: Required.
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

- A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.
1. No Un-Necessary Door Operation: the car door shall open only if the car is topping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
 3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an

H2M architects + engineers

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORSVillage of Mount Kisco-Additions/Alterations at
Mutual Station

142400-7

- onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse, and the door shall reopen to answer the other call.
4. Nudging Operation: the doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
 5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct fault.
 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a No. 4 brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. Emergency Communications System: Integral phone system provided.
- C. Auxiliary Operating Panel: Not Required.
- D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate, and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.
- E. Special Equipment: Not Applicable.

2.09 CONTROL SYSTEMS

- A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by “up-down” push buttons at each intermediate landing and “call” push buttons at terminal landings.
- B. Service Panel - to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
 - 1. Access to main control board and CPU.
 - 2. Main controller diagnostics.
 - 3. Main controller fuses.
 - 4. Universal Interface Tool (UIT).
 - 5. Remote valve adjustment.
 - 6. Electronic motor starter adjustment and diagnostics.
 - 7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit.
 - 8. Operation of auxiliary pump/motor (secondary hydraulic power source).
 - 9. Operation of electrical assisted manual lowering.
 - 10. Provide male plug to supply.
 - 11. Run/Stop button.
- C. Automatic Light and Fan Shut Down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- D. Emergency Power Operation: Fully automatic operation (Simples 10-D4A) upon loss of the normal power supply, building-supplied standby power is available to the elevator on the same wires as the normal power. Once the loss of normal power has been detected and standby power is available, the elevator is lowered to a pre-designated landing and will open the doors. After passengers have exited the elevator, the doors are closed. At this time the elevator is automatically allowed to continue service using the building-supplied standby power.
- E. Special Operation: Not Applicable

2.10 HALL STATIONS

- A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at the floor for the indicated direction.
 - 1. Provide one pushbutton riser with faceplates having a No. 4 brushed stainless steel finish.
 - a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: Provide at all levels.
- D. Hall Lanterns: Provide at all appropriate levels.

H2M architects + engineers

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORSVillage of Mount Kisco-Additions/Alterations at
Mutual Station

142400-9

- E. Special Equipment: Not Applicable.

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.
- B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.
- C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
 - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved Contract Drawings.
 - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- C. Supply an ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- D. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.

- E. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- F. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
- G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- H. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.
- I. Lubricate operating parts of system, where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Acceptance Testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times test are to be performed on the elevator.

3.04 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; It shall not be cleaned with bleach-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
 - 1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

H2M architects + engineers

MACHINE ROOM-LESS
HYDRAULIC PASSENGER
ELEVATORS
142400-11

Village of Mount Kisco-Additions/Alterations at
Mutual Station

3.07 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of Substantial Completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

- A. Elevator Quantity: 1 (one).
 - 1. Elevator Model: enduraMRL Above-Ground (2-Stage).
 - 2. Elevator Type: Hydraulic Machine Room-Less, Passenger.
 - 3. Rated Capacity: 2,500 lbs.
 - 4. Rated Speed: 80 ft./min.
 - 5. Operation System: TAC32H.
 - 6. Travel.
 - 7. Landings: 2 (two) total.
 - 8. Openings:
 - a. Front: 1
 - b. Rear: 0
 - 9. Clear Car Inside: 6'-8" wide x 4'-3" deep.
 - 10. Cab Height: 8'-0" standard.
 - 11. Hoistway Entrance Size: 3'-6" wide x 7'-0" high.
 - 12. Door Type: Single Speed.
 - 13. Power Characteristics: 208 volts, 3 Phase, 60 Hz.
 - 14. Seismic Requirements: Zone 2.
 - 15. Hoistway Dimensions: 8'-4" wide x 5'-9" deep.
 - 16. Pit Depth: 4'-0".
 - 17. Button & Fixture Style: Traditional Signal Fixtures.
 - 18. Special Operations: None.

END OF SECTION